

# Babel

Localization and  
internationalization

Unicode

T<sub>E</sub>X

pdfT<sub>E</sub>X

LuaT<sub>E</sub>X

XeT<sub>E</sub>X

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# Part I

## User guide

**What is this document about?** This user guide focuses on internationalization and localization with  $\LaTeX$  and pdf $\TeX$ , xetex and luatex with the babel package. There are also some notes on its use with e-Plain and pdf-Plain  $\TeX$ . Part II describes the code, and usually it can be ignored.

**What if I'm interested only in the latest changes?** Changes and new features with relation to version 3.8 are highlighted with **New X.XX**, and there are some notes for the latest versions in [the babel site](#). The most recent features can be still unstable.

**Can I help?** Sure! If you are interested in the  $\TeX$  multilingual support, please join the [kadingira mail list](#). You can follow the development of babel in [GitHub](#) and make suggestions; feel free to fork it and make pull requests. If you are the author of a package, send to me a few test files which I'll add to mine, so that possible issues can be caught in the development phase.

**It doesn't work for me!** You can ask for help in some forums like tex.stackexchange, but if you have found a bug, I strongly beg you to report it in [GitHub](#), which is much better than just complaining on an e-mail list or a web forum. Remember *warnings are not errors* by themselves, they just warn about possible problems or incompatibilities.

**How can I contribute a new language?** See section 3.1 for contributing a language.

**I only need learn the most basic features.** The first subsections (1.1-1.3) describe the traditional way of loading a language (with ldf files), which is usually all you need. The alternative way based on ini files, which complements the previous one (it does *not* replace it, although it is still necessary in some languages), is described below; go to 1.13.

**I don't like manuals. I prefer sample files.** This manual contains lots of examples and tips, but in GitHub there are many [sample files](#).

## 1 The user interface

### 1.1 Monolingual documents

In most cases, a single language is required, and then all you need in  $\LaTeX$  is to load the package using its standard mechanism for this purpose, namely, passing that language as an optional argument. In addition, you may want to set the font and input encodings. Another approach is making the language a global option in order to let other packages detect and use it. This is the standard way in  $\LaTeX$  for an option – in this case a language – to be recognized by several packages.

Many languages are compatible with xetex and luatex. With them you can use babel to localize the documents. When these engines are used, the Latin script is covered by default in current  $\LaTeX$  (provided the document encoding is UTF-8), because the font loader is preloaded and the font is switched to `lmroman`. Other scripts require loading `fontspec`. You may want to set the font attributes with `fontspec`, too.

**EXAMPLE** Here is a simple full example for “traditional”  $\TeX$  engines (see below for xetex and luatex). The packages `fontenc` and `inputenc` do not belong to babel, but they are included in the example because typically you will need them. It assumes UTF-8, the default encoding:

PDFTEX

```
\documentclass{article}

\usepackage[T1]{fontenc}
```

```

\usepackage[french]{babel}

\begin{document}

Plus ça change, plus c'est la même chose!

\end{document}

```

Now consider something like:

```

\documentclass[french]{article}
\usepackage{babel}
\usepackage{varioref}

```

With this setting, the package `varioref` will also see the option `french` and will be able to use it.

**EXAMPLE** And now a simple monolingual document in Russian (text from the Wikipedia) with `xetex` or `luatex`. Note neither `fontenc` nor `inputenc` are necessary, but the document should be encoded in UTF-8 and a so-called Unicode font must be loaded (in this example `\babelfont` is used, described below).

LUATEX/XETEX

```

\documentclass[russian]{article}

\usepackage{babel}

\babelfont{rm}{DejaVu Serif}

\begin{document}

Россия, находящаяся на пересечении множества культур, а также
с учётом многонационального характера её населения, — отличается
высокой степенью этнокультурного многообразия и способностью к
межкультурному диалогу.

\end{document}

```

**TROUBLESHOOTING** A common source of trouble is a wrong setting of the input encoding. Depending on the  $\TeX$  version you can get the following somewhat cryptic error:

```
! Paragraph ended before \UTFviii@three@octets was complete.
```

Or the more explanatory:

```
! Package inputenc Error: Invalid UTF-8 byte ...
```

Make sure you set the encoding actually used by your editor.

**NOTE** Because of the way `babel` has evolved, “language” can refer to (1) a set of hyphenation patterns as preloaded into the format, (2) a package option, (3) an `ldf` file, and (4) a name used in the document to select a language or dialect. So, a package option refers to a language in a generic way – sometimes it is the actual language name used to select it, sometimes it is a file name loading a language with a different name, sometimes it is a file name loading several languages. Please, read the documentation for specific languages for further info.

**TROUBLESHOOTING** The following warning is about hyphenation patterns, which are not under the direct control of `babel`:

```
Package babel Warning: No hyphenation patterns were preloaded for
(babel)                  the language `LANG' into the format.
(babel)                  Please, configure your TeX system to add them and
(babel)                  rebuild the format. Now I will use the patterns
(babel)                  preloaded for \language=0 instead on input line 57.
```

The document will be typeset, but very likely the text will not be correctly hyphenated. Some languages may be raising this warning wrongly (because they are not hyphenated); it is a bug to be fixed – just ignore it. See the manual of your distribution (MacTeX, MikTeX, TeXLive, etc.) for further info about how to configure it.

**NOTE** With hyperref you may want to set the document language with something like:

```
\usepackage[pdflang=es-MX]{hyperref}
```

This is not currently done by babel and you must set it by hand.

**NOTE** Although it has been customary to recommend placing `\title`, `\author` and other elements printed by `\maketitle` after `\begin{document}`, mainly because of shorthands, it is advisable to keep them in the preamble. Currently there is no real need to use shorthands in those macros.

**NOTE** Babel does not make any readjustments by default in font size, vertical positioning or line height by default. This is on purpose because the optimal solution depends on the document layout and the font, and very likely the most appropriate one is a combination of these settings.

## 1.2 Multilingual documents

In multilingual documents, just use a list of the required languages as package or class options. The last language is considered the main one, activated by default. Sometimes, the main language changes the document layout (eg, spanish and french).

**EXAMPLE** In  $\LaTeX$ , the preamble of the document:

```
\documentclass{article}
\usepackage[dutch,english]{babel}
```

would tell  $\LaTeX$  that the document would be written in two languages, Dutch and English, and that English would be the first language in use, and the main one.

You can also set the main language explicitly, but it is discouraged except if there is a real reason to do so:

```
\documentclass{article}
\usepackage[main=english,dutch]{babel}
```

Examples of cases where `main` is useful are the following.

**EXAMPLE** Some classes load babel with a hardcoded language option. Sometimes, the main language can be overridden with something like that before `\documentclass`:

```
\PassOptionsToPackage{main=english}{babel}
```

**NOTE** Languages may be set as global and as package option at the same time, but in such a case you should set explicitly the main language with the package option `main`:

```
\documentclass[italian]{book}
\usepackage[ngerman,main=italian]{babel}
```

**WARNING** In the preamble the main language has *not* been selected, except hyphenation patterns and the name assigned to `\language` (in particular, shorthands, captions and date are not activated). If you need to define boxes and the like in the preamble, you might want to use some of the language selectors described below.

To switch the language there are two basic macros, described below in detail:  
`\selectlanguage` is used for blocks of text, while `\foreignlanguage` is for chunks of text inside paragraphs.

**EXAMPLE** A full bilingual document with pdf<sub>tex</sub> follows. The main language is french, which is activated when the document begins. It assumes UTF-8:

PDF<sub>TEX</sub>

```
\documentclass{article}

\usepackage[T1]{fontenc}

\usepackage[english,french]{babel}

\begin{document}

Plus ça change, plus c'est la même chose!

\selectlanguage{english}

And an English paragraph, with a short text in
\foreignlanguage{french}{français}.

\end{document}
```

**EXAMPLE** With xet<sub>ex</sub> and lua<sub>tex</sub>, the following bilingual, single script document in UTF-8 encoding just prints a couple of ‘captions’ and `\today` in Danish and Vietnamese. No additional packages are required, because the default font supports both languages.

LUATEX/XETEX

```
\documentclass{article}

\usepackage[vietnamese,danish]{babel}

\begin{document}

\prefacename, \alsoname, \today.

\selectlanguage{vietnamese}

\prefacename, \alsoname, \today.

\end{document}
```

**NOTE** Once loaded a language, you can select it with the corresponding BCP47 tag. See section 1.22 for further details.

### 1.3 Mostly monolingual documents

**New 3.39** Very often, multilingual documents consist of a main language with small pieces of text in another languages (words, idioms, short sentences). Typically, all you need is to set the line breaking rules and, perhaps, the font. In such a case, babel now does not



require declaring these secondary languages explicitly, because the basic settings are loaded on the fly when the language is selected (and also when provided in the optional argument of `\babelfont`, if used.)

This is particularly useful, too, when there are short texts of this kind coming from an external source whose contents are not known on beforehand (for example, titles in a bibliography). At this regard, it is worth remembering that `\babelfont` does *not* load any font until required, so that it can be used just in case.

**EXAMPLE** A trivial document with the default font in English and Spanish, and FreeSerif in Russian is:

LUATEX/XETEX

```
\documentclass[english]{article}
\usepackage{babel}

\babelfont[russian]{rm}{FreeSerif}

\begin{document}

English. \foreignlanguage{russian}{Русский}.
\foreignlanguage{spanish}{Español}.

\end{document}
```

**NOTE** Instead of its name, you may prefer to select the language with the corresponding BCP47 tag. This alternative, however, must be activated explicitly, because a two- or three-letter word is a valid name for a language (eg, `lu` can be the locale name with tag `khb` or the tag for `lubakatanga`). See section 1.22 for further details.

**New 3.84** With `pdftex`, when a language is loaded on the fly (actually, with `\babelprovide`) selectors now set the font encoding based on the list provided when loading `fontenc`. Not all scripts have an associated encoding, so this feature works only with Latin, Cyrillic, Greek, Arabic, Hebrew, Cherokee, Armenian, and Georgian, provided a suitable font is found.

## 1.4 Modifiers

**New 3.9c** The basic behavior of some languages can be modified when loading `babel` by means of *modifiers*. They are set after the language name, and are prefixed with a dot (only when the language is set as package option – neither global options nor the main key accepts them). An example is (spaces are not significant and they can be added or removed):<sup>1</sup>

```
\usepackage[latin.medieval, spanish.notilde.lcroman, danish]{babel}
```

Attributes (described below) are considered modifiers, ie, you can set an attribute by including it in the list of modifiers. However, modifiers are a more general mechanism.

## 1.5 Troubleshooting

- Loading directly `sty` files in  $\text{\LaTeX}$  (ie, `\usepackage{<language>}`) is deprecated and you will get the error:<sup>2</sup>

```
! Package babel Error: You are loading directly a language style.
(babel)                This syntax is deprecated and you must use
(babel)                \usepackage[language]{babel}.
```

<sup>1</sup>No predefined “axis” for modifiers are provided because languages and their scripts have quite different needs.

<sup>2</sup>In old versions the error read “You have used an old interface to call `babel`”, not very helpful.

- Another typical error when using babel is the following:<sup>3</sup>

```
! Package babel Error: Unknown language `#1'. Either you have
(babel)                misspelled its name, it has not been installed,
(babel)                or you requested it in a previous run. Fix its name,
(babel)                install it or just rerun the file, respectively. In
(babel)                some cases, you may need to remove the aux file
```

The most frequent reason is, by far, the latest (for example, you included spanish, but you realized this language is not used after all, and therefore you removed it from the option list). In most cases, the error vanishes when the document is typeset again, but in more severe ones you will need to remove the aux file.

## 1.6 Plain

In e-Plain and pdf-Plain, load languages styles with `\input` and then use `\begindocument` (the latter is defined by babel):

```
\input estonian.sty
\begindocument
```

**WARNING** Not all languages provide a sty file and some of them are not compatible with those formats. Please, refer to [Using babel with Plain](#) for further details.

## 1.7 Basic language selectors

This section describes the commands to be used in the document to switch the language in multilingual documents. In most cases, only the two basic macros `\selectlanguage` and `\foreignlanguage` are necessary. The environments `otherlanguage`, `otherlanguage*` and `hyphenrules` are auxiliary, and described in the next section.

The main language is selected automatically when the document environment begins.

`\selectlanguage`  $\{ \langle language \rangle \}$

When a user wants to switch from one language to another he can do so using the macro `\selectlanguage`. This macro takes the language, defined previously by a language definition file, as its argument. It calls several macros that should be defined in the language definition files to activate the special definitions for the language chosen:

```
\selectlanguage{german}
```

This command can be used as environment, too.

**NOTE** For “historical reasons”, a macro name is converted to a language name without the leading `\`; in other words, `\selectlanguage{\german}` is equivalent to `\selectlanguage{german}`. Using a macro instead of a “real” name is deprecated. **New 3.43** However, if the macro name does not match any language, it will get expanded as expected.

**NOTE** Bear in mind `\selectlanguage` can be automatically executed, in some cases, in the auxiliary files, at heads and foots, and after the environment `otherlanguage*`.

**WARNING** If used inside braces there might be some non-local changes, as this would be roughly equivalent to:

```
{\selectlanguage{<inner-language>} ...}\selectlanguage{<outer-language>}
```

If you want a change which is really local, you must enclose this code with an additional grouping level.

<sup>3</sup>In old versions the error read “You haven’t loaded the language LANG yet”.

**WARNING** There are a couple of issues related to the way the language information is written to the auxiliary files:

- `\selectlanguage` should not be used inside some boxed environments (like floats or minipage) to switch the language if you need the information written to the aux be correctly synchronized. This rarely happens, but if it were the case, you must use `otherlanguage` instead.
- In addition, this macro inserts a `\write` in vertical mode, which may break the vertical spacing in some cases (for example, between lists). **New 3.64** The behavior can be adjusted with `\babeladjust{select.write=<mode>}`, where `<mode>` is `shift` (which shifts the skips down and adds a `\penalty`); `keep` (the default – with it the `\write` and the skips are kept in the order they are written), and `omit` (which may seem a too drastic solution, because nothing is written, but more often than not this command is applied to more or less short texts with no sectioning or similar commands and therefore no language synchronization is necessary).

**`\foreignlanguage`** [*<option-list>*] {<language>} {<text>}

The command `\foreignlanguage` takes two arguments; the second argument is a phrase to be typeset according to the rules of the language named in its first one.

This command (1) only switches the extra definitions and the hyphenation rules for the language, *not* the names and dates, (2) does not send information about the language to auxiliary files (i.e., the surrounding language is still in force), and (3) it works even if the language has not been set as package option (but in such a case it only sets the hyphenation patterns and a warning is shown). With the `bidir` option, it also enters in horizontal mode (this is not done always for backwards compatibility), and since it is meant for phrases only the text direction (and not the paragraph one) is set.

**New 3.44** As already said, captions and dates are not switched. However, with the optional argument you can switch them, too. So, you can write:

```
\foreignlanguage[date]{polish}{\today}
```

In addition, captions can be switched with `captions` (or both, of course, with `date`, `captions`). Until 3.43 you had to write something like `{\selectlanguage{..} ..}`, which was not always the most convenient way.

## 1.8 Auxiliary language selectors

**`\begin{otherlanguage}`** {<language>} ... **`\end{otherlanguage}`**

The environment `otherlanguage` does basically the same as `\selectlanguage`, except that language change is (mostly) local to the environment.

Actually, there might be some non-local changes, as this environment is roughly equivalent to:

```
\begingroup
\selectlanguage{<inner-language>}
...
\endgroup
\selectlanguage{<outer-language>}
```

If you want a change which is really local, you must enclose this environment with an additional grouping, like braces `{}`.

Spaces after the environment are ignored.

`\begin{otherlanguage*}` [*<option-list>*] {*<language>*} ... `\end{otherlanguage*}`

Same as `\foreignlanguage` but as environment. Spaces after the environment are *not* ignored.

This environment was originally intended for intermixing left-to-right typesetting with right-to-left typesetting in engines not supporting a change in the writing direction inside a line. However, by default it never complied with the documented behavior and it is just a version as environment of `\foreignlanguage`, except when the option `bidi` is set – in this case, `\foreignlanguage` emits a `\leavevmode`, while `otherlanguage*` does not.

## 1.9 More on selection

`\babeltags` {*<tag1>* = *<language1>*, *<tag2>* = *<language2>*, ...}

**New 3.9i** In multilingual documents with many language-switches the commands above can be cumbersome. With this tool shorter names can be defined. It adds nothing really new – it is just syntactical sugar.

It defines `\text<tag1>{<text>}` to be `\foreignlanguage{<language1>}{<text>}`, and `\begin{<tag1>}` to be `\begin{otherlanguage*}{<language1>}`, and so on. Note `\<tag1>` is also allowed, but remember to set it locally inside a group.

**WARNING** There is a clear drawback to this feature, namely, the ‘prefix’ `\text...` is heavily overloaded in  $\TeX$  and conflicts with existing macros may arise (`\textlatin`, `\textbar`, `\textit`, `\textcolor` and many others). The same applies to environments, because `arabic` conflicts with `\arabic`. Furthermore, and because of this overloading, detecting the language of a chunk of text by external tools can become unfeasible. Except if there is a reason for this ‘syntactical sugar’, the best option is to stick to the default selectors or to define your own alternatives.

**EXAMPLE** With

```
\babeltags{de = german}
```

you can write

```
text \textde{German text} text
```

and

```
text
\begin{de}
  German text
\end{de}
text
```

**NOTE** Something like `\babeltags{finnish = finnish}` is legitimate – it defines `\textfinnish` and `\finnish` (and, of course, `\begin{finnish}`).

`\babelensure` [*include=<commands>*, *exclude=<commands>*, *fontenc=<encoding>*] {*<language>*}

**New 3.9i** Except in a few languages, like `ruussian`, captions and dates are just strings, and do not switch the language. That means you should set it explicitly if you want to use them, or hyphenation (and in some cases the text itself) will be wrong. For example:

```
\foreignlanguage{ruussian}{text \foreignlanguage{polish}{\seename} text}
```

Of course,  $\TeX$  can do it for you. To avoid switching the language all the while, `\babelensure` redefines the captions for a given language to wrap them with a selector:

```
\babelensure{polish}
```

By default only the basic captions and `\today` are redefined, but you can add further macros with the key `include` in the optional argument (without commas). Macros not to be modified are listed in `exclude`. You can also enforce a font encoding with the option `fontenc`.<sup>4</sup> A couple of examples:

```
\babelensure[include=\Today]{spanish}  
\babelensure[fontenc=T5]{vietnamese}
```

They are activated when the language is selected (at the `afterextras` event), and it makes some assumptions which could not be fulfilled in some languages. Note also you should include only macros defined by the language, not global macros (eg, `\TeX` of `\dag`). With `ini` files (see below), captions are ensured by default.

## 1.10 Shorthands

A *shorthand* is a sequence of one or two characters that expands to arbitrary  $\TeX$  code. Shorthands can be used for different kinds of things; for example: (1) in some languages shorthands such as "a are defined to be able to hyphenate the word if the encoding is OT1; (2) in some languages shorthands such as ! are used to insert the right amount of white space; (3) several kinds of discretionaries and breaks can be inserted easily with "-", "=", etc. The package `inputenc` as well as `xetex` and `luatex` have alleviated entering non-ASCII characters, but minority languages and some kinds of text can still require characters not directly available on the keyboards (and sometimes not even as separated or precomposed Unicode characters). As to the point 2, now `pdfTeX` provides `\knbcode`, and `luatex` can manipulate the glyph list. Tools for point 3 can be still very useful in general. There are four levels of shorthands: *user*, *language*, *system*, and *language user* (by order of precedence). In most cases, you will use only shorthands provided by languages.

**NOTE** Keep in mind the following:

1. Activated chars used for two-char shorthands cannot be followed by a closing brace `}` and the spaces following are gobbled. With one-char shorthands (eg, `:`), they are preserved.
2. If on a certain level (system, language, user, language user) there is a one-char shorthand, two-char ones starting with that char and on the same level are ignored.
3. Since they are active, a shorthand cannot contain the same character in its definition (except if deactivated with, eg, `\string`).

**TROUBLESHOOTING** A typical error when using shorthands is the following:

```
! Argument of \language@active@arg" has an extra }.
```

It means there is a closing brace just after a shorthand, which is not allowed (eg, `"}`). Just add `{}` after (eg, `"{} }`).

```
\shorthandon  {\shorthands-list}  
\shorthandoff *{\shorthands-list}
```

It is sometimes necessary to switch a shorthand character off temporarily, because it must be used in an entirely different way. For this purpose, the user commands `\shorthandoff` and `\shorthandon` are provided. They each take a list of characters as their arguments. The command `\shorthandoff` sets the `\catcode` for each of the characters in its argument to other (12); the command `\shorthandon` sets the `\catcode` to active (13). Both commands

---

<sup>4</sup>With it, encoded strings may not work as expected.

only work on ‘known’ shorthand characters, and an error will be raised otherwise. You can check if a character is a shorthand with `\ifbabelshorthand` (see below).

**New 3.9a** However, `\shorthandoff` does not behave as you would expect with characters like `~` or `^`, because they usually are not “other”. For them `\shorthandoff*` is provided, so that with

```
\shorthandoff*{~^}
```

`~` is still active, very likely with the meaning of a non-breaking space, and `^` is the superscript character. The catcodes used are those when the shorthands are defined, usually when language files are loaded.

If you do not need shorthands, or prefer an alternative approach of your own, you may want to switch them off with the package option `shorthands=off`, as described below.

**WARNING** It is worth emphasizing these macros are meant for temporary changes. Whenever possible and if there are not conflicts with other packages, shorthands must be always enabled (or disabled).

**\usesshorthands** `*{⟨char⟩}`

The command `\usesshorthands` initiates the definition of user-defined shorthand sequences. It has one argument, the character that starts these personal shorthands.

**New 3.9a** User shorthands are not always alive, as they may be deactivated by languages (for example, if you use `"` for your user shorthands and switch from german to french, they stop working). Therefore, a starred version `\usesshorthands*{⟨char⟩}` is provided, which makes sure shorthands are always activated.

Currently, if the package option `shorthands` is used, you must include any character to be activated with `\usesshorthands`. This restriction will be lifted in a future release.

**\defineshorthand** `[⟨language⟩,⟨language⟩,...]{⟨shorthand⟩}{⟨code⟩}`

The command `\defineshorthand` takes two arguments: the first is a one- or two-character shorthand sequence, and the second is the code the shorthand should expand to.

**New 3.9a** An optional argument allows to (re)define language and system shorthands (some languages do not activate shorthands, so you may want to add `\languageshorthands{⟨lang⟩}` to the corresponding `\extras⟨lang⟩`, as explained below). By default, user shorthands are (re)defined.

User shorthands override language ones, which in turn override system shorthands. Language-dependent user shorthands (new in 3.9) take precedence over “normal” user shorthands.

**EXAMPLE** Let’s assume you want a unified set of shorthand for discretionaries (languages do not define shorthands consistently, and `"`-, `\`-, `"=` have different meanings). You can start with, say:

```
\usesshorthands*{"}
\defineshorthand{"*}{\babelhyphen{soft}}
\defineshorthand{"-}{\babelhyphen{hard}}
```

However, the behavior of hyphens is language-dependent. For example, in languages like Polish and Portuguese, a hard hyphen inside compound words are repeated at the beginning of the next line. You can then set:

```
\defineshorthand[*polish,*portuguese]{"-}{\babelhyphen{repeat}}
```

Here, options with `*` set a language-dependent user shorthand, which means the generic one above only applies for the rest of languages; without `*` they would (re)define the language shorthands instead, which are overridden by user ones.

Now, you have a single unified shorthand (`"-`), with a content-based meaning (‘compound word hyphen’) whose visual behavior is that expected in each context.

## `\languageshorthands` $\{\langle language \rangle\}$

The command `\languageshorthands` can be used to switch the shorthands on the language level. It takes one argument, the name of a language or none (the latter does what its name suggests).<sup>5</sup> Note that for this to work the language should have been specified as an option when loading the babel package. For example, you can use in english the shorthands defined by `ngerman` with

```
\addto\extrasenglish{\languageshorthands{ngerman}}
```

(You may also need to activate them as user shorthands in the preamble with, for example, `\usesshorthands` or `\usesshorthands*`.)

**EXAMPLE** Very often, this is a more convenient way to deactivate shorthands than `\shorthandoff`, for example if you want to define a macro to easy typing phonetic characters with `tipa`:

```
\newcommand{\myipa}[1]{\{\languageshorthands{none}\tipaencoding#1}}
```

## `\babelshorthand` $\{\langle shorthand \rangle\}$

With this command you can use a shorthand even if (1) not activated in shorthands (in this case only shorthands for the current language are taken into account, ie, not user shorthands), (2) turned off with `\shorthandoff` or (3) deactivated with the internal `\bbl@deactivate`; for example, `\babelshorthand{"u}` or `\babelshorthand{:}`. (You can conveniently define your own macros, or even your own user shorthands provided they do not overlap.)

**EXAMPLE** Since by default shorthands are not activated until `\begin{document}`, you may use this macro when defining the `\title` in the preamble:

```
\title{Documento científico\babelshorthand{"-}técnico}
```

For your records, here is a list of shorthands, but you must double check them, as they may change.<sup>6</sup>

**Languages with no shorthands** Croatian, English (any variety), Indonesian, Hebrew, Interlingua, Irish, Lower Sorbian, Malaysian, North Sami, Romanian, Scottish, Welsh

**Languages with only " as defined shorthand character** Albanian, Bulgarian, Danish, Dutch, Finnish, German (old and new orthography, also Austrian), Icelandic, Italian, Norwegian, Polish, Portuguese (also Brazilian), Russian, Serbian (with Latin script), Slovene, Swedish, Ukrainian, Upper Sorbian

**Basque** " ' ~

**Breton** : ; ? !

**Catalan** " ' `

**Czech** " -

**Esperanto** ^

**Estonian** " ~

**French** (all varieties) : ; ? !

**Galician** " . ' ~ < >

**Greek** ~

**Hungarian** `

**Kurmanji** ^

**Latin** " ^ =

<sup>5</sup>Actually, any name not corresponding to a language group does the same as none. However, follow this convention because it might be enforced in future releases of babel to catch possible errors.

<sup>6</sup>Thanks to Enrico Gregorio

**Slovak** " ^ ' -  
**Spanish** " . < > ' ~  
**Turkish** : ! =

In addition, the babel core declares ~ as a one-char shorthand which is let, like the standard ~, to a non breaking space.<sup>7</sup>

**\ifbabelshorthand** {<character>}{<true>}{<false>}

**New 3.23** Tests if a character has been made a shorthand.

**\aliasshorthand** {<original>}{<alias>}

The command `\aliasshorthand` can be used to let another character perform the same functions as the default shorthand character. If one prefers for example to use the character / over " in typing Polish texts, this can be achieved by entering `\aliasshorthand{"}{/}`. For the reasons in the warning below, usage of this macro is not recommended.

**NOTE** The substitute character must *not* have been declared before as shorthand (in such a case, `\aliasshorthands` is ignored).

**EXAMPLE** The following example shows how to replace a shorthand by another

```
\aliasshorthand{~}{^}
\AtBeginDocument{\shorthandoff*{~}}
```

**WARNING** Shorthands remember somehow the original character, and the fallback value is that of the latter. So, in this example, if no shorthand is found, ^ expands to a non-breaking space, because this is the value of ~ (internally, ^ still calls `\active@char~` or `\normal@char~`). Furthermore, if you change the system value of ^ with `\defineshorthand` nothing happens.

## 1.11 Package options

**New 3.9a** These package options are processed before language options, so that they are taken into account irrespective of its order. The first three options have been available in previous versions.

**KeepShorthandsActive** Tells babel not to deactivate shorthands after loading a language file, so that they are also available in the preamble.

**activeacute** For some languages babel supports this options to set ' as a shorthand in case it is not done by default.

**activegrave** Same for `.

**shorthands=** <char><char>... | off

The only language shorthands activated are those given, like, eg:

```
\usepackage[esperanto,french,shorthands=:;!]{babel}
```

If ' is included, `activeacute` is set; if ` is included, `activegrave` is set. Active characters (like ~) should be preceded by `\string` (otherwise they will be expanded by  $\TeX$  before they are passed to the package and therefore they will not be recognized); however, t is provided for the common case of ~ (as well as c for not so common case of the comma). With `shorthands=off` no language shorthands are defined, As some languages use this mechanism for tools not available otherwise, a macro `\babelshorthand` is defined, which allows using them; see above.

<sup>7</sup>This declaration serves to nothing, but it is preserved for backward compatibility.



**safe=** none | ref | bib

Some L<sup>A</sup>T<sub>E</sub>X macros are redefined so that using shorthands is safe. With **safe=bib** only `\nocite`, `\bibcite` and `\bibitem` are redefined. With **safe=ref** only `\newlabel`, `\ref` and `\pageref` are redefined (as well as a few macros from `varioref` and `ifthen`).

With **safe=none** no macro is redefined. This option is strongly recommended, because a good deal of incompatibilities and errors are related to these redefinitions. As of

**New 3.34**, in  $\epsilon$ T<sub>E</sub>X based engines (ie, almost every engine except the oldest ones) shorthands can be used in these macros (formerly you could not).

**math=** active | normal

Shorthands are mainly intended for text, not for math. By setting this option with the value **normal** they are deactivated in math mode (default is **active**) and things like `#{a'}` (a closing brace after a shorthand) are not a source of trouble anymore.

**config=** *<file>*

Load *<file>*.`cfg` instead of the default config file `bblopts.cfg` (the file is loaded even with **noconfigs**).

**main=** *<language>*

Sets the main language, as explained above, ie, this language is always loaded last. If it is not given as package or global option, it is added to the list of requested languages.

**headfoot=** *<language>*

By default, headlines and footlines are not touched (only marks), and if they contain language-dependent macros (which is not usual) there may be unexpected results. With this option you may set the language in heads and foots.

**noconfigs** Global and language default config files are not loaded, so you can make sure your document is not spoiled by an unexpected `.cfg` file. However, if the key **config** is set, this file is loaded.

**showlanguages** Prints to the log the list of languages loaded when the format was created: number (remember dialects can share it), name, hyphenation file and exceptions file.

**nocase** **New 3.9l** Language settings for uppercase and lowercase mapping (as set by `\SetCase`) are ignored. Use only if there are incompatibilities with other packages.

**silent** **New 3.9l** No warnings and no *infos* are written to the log file.<sup>8</sup>

**hyphenmap=** off | first | select | other | other\*

**New 3.9g** Sets the behavior of case mapping for hyphenation, provided the language defines it.<sup>9</sup> It can take the following values:

**off** deactivates this feature and no case mapping is applied;

**first** sets it at the first switching commands in the current or parent scope (typically, when the aux file is first read and at `\begin{document}`), but also the first `\selectlanguage` in the preamble), and it's the default if a single language option has been stated;<sup>10</sup>

**select** sets it only at `\selectlanguage`;

**other** also sets it at other language;

<sup>8</sup>You can use alternatively the package `silence`.

<sup>9</sup>Turned off in plain.

<sup>10</sup>Duplicated options count as several ones.

**other\*** also sets it at `other language*` as well as in heads and foots (if the option `headfoot` is used) and in auxiliary files (ie, at `\select@language`), and it's the default if several language options have been stated. The option `first` can be regarded as an optimized version of `other*` for monolingual documents.<sup>11</sup>

**bidi=** `default | basic | basic-r | bidi-l | bidi-r`

**New 3.14** Selects the bidi algorithm to be used in `luatex` and `xetex`. See sec. 1.24.

**layout=**

**New 3.16** Selects which layout elements are adapted in bidi documents. See sec. 1.24.

**provide=** `*`

**New 3.49** An alternative to `\babelprovide` for languages passed as options. See section 1.13, which describes also the variants `provide+=` and `provide*=`.

## 1.12 The base option

With this package option `babel` just loads some basic macros (those in `switch.def`), defines `\AfterBabelLanguage` and exits. It also selects the hyphenation patterns for the last language passed as option (by its name in `language.dat`). There are two main uses: classes and packages, and as a last resort in case there are, for some reason, incompatible languages. It can be used if you just want to select the hyphenation patterns of a single language, too.

**\AfterBabelLanguage** `{<option-name>}{<code>}`

This command is currently the only provided by `base`. Executes `<code>` when the file loaded by the corresponding package option is finished (at `\ldf@finish`). The setting is global. So

```
\AfterBabelLanguage{french}{...}
```

does ... at the end of `french.ldf`. It can be used in `ldf` files, too, but in such a case the code is executed only if `<option-name>` is the same as `\CurrentOption` (which could not be the same as the option name as set in `\usepackage!`).

**EXAMPLE** Consider two languages `foo` and `bar` defining the same `\macro` with `\newcommand`. An error is raised if you attempt to load both. Here is a way to overcome this problem:

```
\usepackage[base]{babel}
\AfterBabelLanguage{foo}{%
  \let\macroFoo\macro
  \let\macro\relax}
\usepackage[foo,bar]{babel}
```

**NOTE** With a recent version of  $\text{\LaTeX}$ , an alternative method to execute some code just after an `ldf` file is loaded is with `\AddToHook` and the hook `file/<language>.ldf/after`. `Babel` does not predeclare it, and you have to do it yourself with `\ActivateGenericHook`.

**WARNING** Currently this option is not compatible with languages loaded on the fly.

<sup>11</sup>Providing foreign is pointless, because the case mapping applied is that at the end of the paragraph, but if either `xetex` or `luatex` change this behavior it might be added. On the other hand, `other` is provided even if I [JBL] think it isn't really useful, but who knows.

### 1.13 ini files

An alternative approach to define a language (or, more precisely, a *locale*) is by means of an ini file. Currently babel provides about 250 of these files containing the basic data required for a locale, plus basic templates for 500 about locales.

ini files are not meant only for babel, and they have been devised as a resource for other packages. To easy interoperability between T<sub>E</sub>X and other systems, they are identified with the BCP 47 codes as preferred by the Unicode Common Locale Data Repository, which was used as source for most of the data provided by these files, too (the main exception being the \...name strings).

Most of them set the date, and many also the captions (Unicode and LICR). They will be evolving with the time to add more features (something to keep in mind if backward compatibility is important). The following section shows how to make use of them by means of \babelprovide. In other words, \babelprovide is mainly meant for auxiliary tasks, and as alternative when the ldf, for some reason, does work as expected.

**EXAMPLE** Although Georgian has its own ldf file, here is how to declare this language with an ini file in Unicode engines.

LUATEX/XETEX

```
\documentclass{book}

\usepackage{babel}
\babelprovide[import, main]{georgian}

\babelfont{rm}[Renderer=Harfbuzz]{DejaVu Sans}

\begin{document}

\tableofcontents

\chapter{სამშარეულო და სუფრის ტრადიციები}

ქართული ტრადიციული სამშარეულო ერთ-ერთი უმდიდრესია მთელ მსოფლიოში.

\end{document}
```

**New 3.49** Alternatively, you can tell babel to load all or some languages passed as options with \babelprovide and not from the ldf file in a few typical cases. Thus, provide=\* means 'load the main language with the \babelprovide mechanism instead of the ldf file' applying the basic features, which in this case means import, main. There are (currently) three options:

- provide=\* is the option just explained, for the main language;
- provide+=\* is the same for additional languages (the main language is still the ldf file);
- provide\*=\* is the same for all languages, ie, main and additional.

**EXAMPLE** The preamble in the previous example can be more compactly written as:

```
\documentclass{book}
\usepackage[georgian, provide=*]{babel}
\babelfont{rm}[Renderer=Harfbuzz]{DejaVu Sans}
```

Or also:

```
\documentclass[georgian]{book}
\usepackage[provide=*]{babel}
\babelfont{rm}[Renderer=Harfbuzz]{DejaVu Sans}
```

**NOTE** The ini files just define and set some parameters, but the corresponding behavior is not always implemented. Also, there are some limitations in the engines. A few remarks follow (which could no longer be valid when you read this manual, if the packages involved have been updated). The Harfbuzz renderer has still some issues, so as a rule of thumb prefer the default renderer, and resort to Harfbuzz only if the former does not work for you. Fortunately, fonts can be loaded twice with different renderers; for example:

```
\babelfont[spanish]{rm}{FreeSerif}
\babelfont[hindi]{rm}[Renderer=Harfbuzz]{FreeSerif}
```

**Arabic** Monolingual documents mostly work in luatex, but it must be fine tuned, particularly math and graphical elements like picture. In xetex babel resorts to the bidi package, which seems to work.

**Hebrew** Niqqud marks seem to work in both engines, but depending on the font cantillation marks might be misplaced (xetex or luatex with Harfbuzz seems better).

**Devanagari** In luatex and the the default renderer many fonts work, but some others do not, the main issue being the ‘ra’. You may need to set explicitly the script to either deva or dev2, eg:

```
\newfontscript{Devanagari}{deva}
```

Other Indic scripts are still under development in the default luatex renderer, but should work with `Renderer=Harfbuzz`. They also work with xetex, although unlike with luatex fine tuning the font behavior is not always possible.

**Southeast scripts** Thai works in both luatex and xetex, but line breaking differs (rules are hard-coded in xetex, but they can be modified in luatex). Lao seems to work, too, but there are no patterns for the latter in luatex. Khemer clusters are rendered wrongly with the default renderer. The comment about Indic scripts and lualatex also applies here. Some quick patterns can help, with something similar to:

```
\babelprovide[import, hyphenrules=+]{lao}
\babelpatterns[lao]{lṇ lṃ lṣ lṅ lṇ lṅ} % Random
```

**East Asia scripts** Settings for either Simplified or Traditional should work out of the box, with basic line breaking with any renderer. Although for a few words and short texts the ini files should be fine, CJK texts are best set with a dedicated framework (CJK, luatexja, kotex, CTeX, etc.). This is what the class `ltjbook` does with luatex, which can be used in conjunction with the `ldf` for japanese, because the following piece of code loads luatexja:

```
\documentclass[japanese]{ltjbook}
\usepackage{babel}
```

**Latin, Greek, Cyrillic** Combining chars with the default luatex font renderer might be wrong; on the other hand, with the Harfbuzz renderer diacritics are stacked correctly, but many hyphenation points are discarded (this bug is related to kerning, so it depends on the font). With xetex both combining characters and hyphenation work as expected (not quite, but in most cases it works; the problem here are font clusters).

**NOTE** Wikipedia defines a *locale* as follows: “In computing, a locale is a set of parameters that defines the user’s language, region and any special variant preferences that the user wants to see in their user interface. Usually a locale identifier consists of at least a language code and a country/region code.” Babel is moving gradually from the old and fuzzy concept of *language* to the more modern of *locale*. Note each locale is by itself a separate “language”, which explains why there are so many files. This is on purpose, so that possible variants can be created and/or redefined easily.

Here is the list (u means Unicode captions, and l means LICR captions):

---

af	Afrikaans <sup>ul</sup>	ar-IQ	Arabic <sup>u</sup>
agq	Aghem	ar-JO	Arabic <sup>u</sup>
ak	Akan	ar-LB	Arabic <sup>u</sup>
am	Amharic <sup>ul</sup>	ar-MA	Arabic <sup>u</sup>
ar-DZ	Arabic <sup>u</sup>	ar-PS	Arabic <sup>u</sup>
ar-EG	Arabic <sup>u</sup>	ar-SA	Arabic <sup>u</sup>

ar-SY	Arabic <sup>u</sup>	en-NZ	English <sup>ul</sup>
ar-TN	Arabic <sup>u</sup>	en-US	American English <sup>ul</sup>
ar	Arabic <sup>u</sup>	en	English <sup>ul</sup>
as	Assamese <sup>u</sup>	eo	Esperanto <sup>ul</sup>
asa	Asu	es-MX	Mexican Spanish <sup>ul</sup>
ast	Asturian <sup>ul</sup>	es	Spanish <sup>ul</sup>
az-Cyrl	Azerbaijani	et	Estonian <sup>ul</sup>
az-Latn	Azerbaijani	eu	Basque <sup>ul</sup>
az	Azerbaijani <sup>ul</sup>	ewo	Ewondo
bas	Basaa	fa	Persian <sup>u</sup>
be	Belarusian <sup>ul</sup>	ff	Fulah
bem	Bemba	fi	Finnish <sup>ul</sup>
bez	Bena	fil	Filipino
bg	Bulgarian <sup>ul</sup>	fo	Faroese
bm	Bambara	fr-BE	French <sup>ul</sup>
bn	Bangla <sup>u</sup>	fr-CA	Canadian French <sup>ul</sup>
bo	Tibetan <sup>u</sup>	fr-CH	Swiss French <sup>ul</sup>
br	Breton <sup>ul</sup>	fr-LU	French <sup>ul</sup>
brx	Bodo	fr	French <sup>ul</sup>
bs-Cyrl	Bosnian	fur	Friulian <sup>ul</sup>
bs-Latn	Bosnian <sup>ul</sup>	fy	Western Frisian
bs	Bosnian <sup>ul</sup>	ga	Irish <sup>ul</sup>
ca	Catalan <sup>ul</sup>	gd	Scottish Gaelic <sup>ul</sup>
ce	Chechen	gl	Galician <sup>ul</sup>
cgg	Chiga	grc	Ancient Greek <sup>ul</sup>
chr	Cherokee	gsw	Swiss German
ckb-Arab	Central Kurdish <sup>u</sup>	gu	Gujarati
ckb-Latn	Central Kurdish <sup>u</sup>	guz	Gusii
ckb	Central Kurdish <sup>u</sup>	gv	Manx
cop	Coptic	ha-GH	Hausa
cs	Czech <sup>ul</sup>	ha-NE	Hausa
cu-Cyrs	Church Slavic <sup>u</sup>	ha	Hausa <sup>ul</sup>
cu-Glag	Church Slavic	haw	Hawaiian
cu	Church Slavic <sup>u</sup>	he	Hebrew <sup>ul</sup>
cy	Welsh <sup>ul</sup>	hi	Hindi <sup>u</sup>
da	Danish <sup>ul</sup>	hr	Croatian <sup>ul</sup>
dav	Taita	hsb	Upper Sorbian <sup>ul</sup>
de-1901	German <sup>ul</sup>	hu	Hungarian <sup>ul</sup>
de-1996	German <sup>ul</sup>	hy	Armenian <sup>ul</sup>
de-AT-1901	Austrian German <sup>ul</sup>	ia	Interlingua <sup>ul</sup>
de-AT-1996	Austrian German <sup>ul</sup>	id	Indonesian <sup>ul</sup>
de-AT	Austrian German <sup>ul</sup>	ig	Igbo
de-CH-1901	Swiss High German <sup>ul</sup>	ii	Sichuan Yi
de-CH-1996	Swiss High German <sup>ul</sup>	is	Icelandic <sup>ul</sup>
de-CH	Swiss High German <sup>ul</sup>	it	Italian <sup>ul</sup>
de	German <sup>ul</sup>	ja	Japanese <sup>u</sup>
dje	Zarma	jgo	Ngomba
dsb	Lower Sorbian <sup>ul</sup>	jmc	Machame
dua	Duala	ka	Georgian <sup>u</sup>
dyo	Jola-Fonyi	kab	Kabyle
dz	Dzongkha	kam	Kamba
ebu	Embu	kde	Makonde
ee	Ewe	kea	Kabuverdianu
el-polyton	Polytonic Greek <sup>ul</sup>	kgp	Kaingang
el	Greek <sup>ul</sup>	khq	Koyra Chiini
en-AU	Australian English <sup>ul</sup>	ki	Kikuyu
en-CA	Canadian English <sup>ul</sup>	kk	Kazakh
en-GB	British English <sup>ul</sup>	kkj	Kako

kl	Kalaallisut	nus	Nuer
klj	Kalenjin	nyn	Nyankole
km	Khmer <sup>u</sup>	oc	Occitan <sup>ul</sup>
kmr-Arab	Northern Kurdish <sup>u</sup>	om	Oromo
kmr-Latn	Northern Kurdish <sup>ul</sup>	or	Odia
kmr	Northern Kurdish <sup>ul</sup>	os	Ossetic
kn	Kannada <sup>u</sup>	pa-Arab	Punjabi
ko-Hani	Korean <sup>u</sup>	pa-Guru	Punjabi <sup>u</sup>
ko	Korean <sup>u</sup>	pa	Punjabi <sup>u</sup>
kok	Konkani	pl	Polish <sup>ul</sup>
ks	Kashmiri	pms	Piedmontese <sup>ul</sup>
ksb	Shambala	ps	Pashto
ksf	Bafia	pt-BR	Brazilian Portuguese <sup>ul</sup>
ksh	Colognian	pt-PT	European Portuguese <sup>ul</sup>
kw	Cornish	pt	Portuguese <sup>ul</sup>
ky	Kyrgyz	qu	Quechua
la-x-classic	Classic Latin <sup>ul</sup>	rm	Romansh <sup>ul</sup>
la-x-ecclesia	Ecclesiastic Latin <sup>ul</sup>	rn	Rundi
la-x-medieval	Medieval Latin <sup>ul</sup>	ro-MD	Moldavian <sup>ul</sup>
la	Latin <sup>ul</sup>	ro	Romanian <sup>ul</sup>
lag	Langi	rof	Rombo
lb	Luxembourgish <sup>ul</sup>	ru	Russian <sup>ul</sup>
lg	Ganda	rw	Kinyarwanda
lkt	Lakota	rwk	Rwa
ln	Lingala	sa-Beng	Sanskrit
lo	Lao <sup>u</sup>	sa-Deva	Sanskrit
lrc	Northern Luri	sa-Gujr	Sanskrit
lt	Lithuanian <sup>ulll</sup>	sa-Knda	Sanskrit
lu	Luba-Katanga	sa-Mlym	Sanskrit
luo	Luo	sa-Telu	Sanskrit
luy	Luyia	sa	Sanskrit
lv	Latvian <sup>ul</sup>	sah	Sakha
mas	Masai	saq	Samburu
mer	Meru	sbp	Sangu
mfe	Morisyen	sc	Sardinian
mg	Malagasy	se	Northern Sami <sup>ul</sup>
mgh	Makhuwa-Meetto	seh	Sena
mgo	Meta'	ses	Koyraboro Senni
mk	Macedonian <sup>ul</sup>	sg	Sango
ml	Malayalam <sup>u</sup>	shi-Latn	Tachelhit
mn	Mongolian	shi-Tfng	Tachelhit
mr	Marathi <sup>u</sup>	shi	Tachelhit
ms-BN	Malay	si	Sinhala <sup>u</sup>
ms-SG	Malay	sk	Slovak <sup>ul</sup>
ms	Malay <sup>ul</sup>	sl	Slovenian <sup>ul</sup>
mt	Maltese	smn	Inari Sami
mua	Mundang	sn	Shona
my	Burmese	so	Somali
mzn	Mazanderani	sq	Albanian <sup>ul</sup>
naq	Nama	sr-Cyrl-BA	Serbian <sup>ul</sup>
nb	Norwegian Bokmål <sup>ul</sup>	sr-Cyrl-ME	Serbian <sup>ul</sup>
nd	North Ndebele	sr-Cyrl-XK	Serbian <sup>ul</sup>
ne	Nepali	sr-Cyrl	Serbian <sup>ul</sup>
nl	Dutch <sup>ul</sup>	sr-Latn-BA	Serbian <sup>ul</sup>
nmg	Kwasio	sr-Latn-ME	Serbian <sup>ul</sup>
nn	Norwegian Nynorsk <sup>ul</sup>	sr-Latn-XK	Serbian <sup>ul</sup>
nnh	Ngiemboon	sr-Latn	Serbian <sup>ul</sup>
no	Norwegian <sup>ul</sup>	sr	Serbian <sup>ul</sup>

sv	Swedish <sup>ul</sup>	vai	Vai
sw	Swahili	vi	Vietnamese <sup>ul</sup>
syr	Syriac	vun	Vunjo
ta	Tamil <sup>u</sup>	wae	Walser
te	Telugu <sup>u</sup>	xog	Soga
teo	Teso	yav	Yangben
th	Thai <sup>ul</sup>	yi	Yiddish
ti	Tigrinya	yo	Yoruba
tk	Turkmen <sup>ul</sup>	yrl	Nheengatu
to	Tongan	yue	Cantonese
tr	Turkish <sup>ul</sup>	zgh	Standard Moroccan Tamazight
twq	Tasawaq	zh-Hans-HK	Chinese
tzm	Central Atlas Tamazight	zh-Hans-MO	Chinese
ug	Uyghur <sup>u</sup>	zh-Hans-SG	Chinese
uk	Ukrainian <sup>ul</sup>	zh-Hans	Chinese <sup>u</sup>
ur	Urdu <sup>u</sup>	zh-Hant-HK	Chinese
uz-Arab	Uzbek	zh-Hant-MO	Chinese
uz-Cyrl	Uzbek	zh-Hant	Chinese <sup>u</sup>
uz-Latn	Uzbek	zh	Chinese <sup>u</sup>
uz	Uzbek	zu	Zulu
vai-Latn	Vai		
vai-Vaii	Vai		

---

In some contexts (currently `\babelfont`) an ini file may be loaded by its name. Here is the list of the names currently supported. With these languages, `\babelfont` loads (if not done before) the language and script names (even if the language is defined as a package option with an ldf file). These are also the names recognized by `\babelprovide` with a valueless `import`.

---

afrikaans	basaa
aghem	basque
akan	belarusian
albanian	bemba
american	bena
amharic	bangla
ancientgreek	bodo
arabic	bosnian-cyrillic
arabic-algeria	bosnian-cyrl
arabic-DZ	bosnian-latin
arabic-morocco	bosnian-latn
arabic-MA	bosnian
arabic-syria	brazilian
arabic-SY	breton
armenian	british
assamese	bulgarian
asturian	burmese
asu	canadian
australian	cantonese
austrian	catalan
azerbaijani-cyrillic	centralatlastamazight
azerbaijani-cyrl	centralkurdish
azerbaijani-latin	chechen
azerbaijani-latn	cherokee
azerbaijani	chiga
bafia	chinese-hans-hk
bambara	chinese-hans-mo

chinese-hans-sg	galician
chinese-hans	ganda
chinese-hant-hk	georgian
chinese-hant-mo	german-at
chinese-hant	german-austria
chinese-simplified-hongkongsarchina	german-ch
chinese-simplified-macausarchina	german-switzerland
chinese-simplified-singapore	german
chinese-simplified	greek
chinese-traditional-hongkongsarchina	gujarati
chinese-traditional-macausarchina	gusii
chinese-traditional	hausa-gh
chinese	hausa-ghana
churchslavic	hausa-ne
churchslavic-cyrs	hausa-niger
churchslavic-oldcyrillic <sup>12</sup>	hausa
churchsslavic-glag	hawaiian
churchsslavic-glagolitic	hebrew
cognian	hindi
cornish	hungarian
croatian	icelandic
czech	igbo
danish	inarisami
duala	indonesian
dutch	interlingua
dzongkha	irish
embu	italian
english-au	japanese
english-australia	jolafonyi
english-ca	kabuverdianu
english-canada	kabyle
english-gb	kako
english-newzealand	kalaallisut
english-nz	kalenjin
english-unitedkingdom	kamba
english-unitedstates	kannada
english-us	kashmiri
english	kazakh
esperanto	khmer
estonian	kikuyu
ewe	kinyarwanda
ewondo	konkani
faroeese	korean
filipino	koyraborosenni
finnish	koyrachiini
french-be	kwasio
french-belgium	kyrgyz
french-ca	lakota
french-canada	langi
french-ch	lao
french-lu	latvian
french-luxembourg	lingala
french-switzerland	lithuanian
french	lowersorbian
friulian	lsorbian
fulah	lubakatanga

<sup>12</sup>The name in the CLDR is Old Church Slavonic Cyrillic, but it has been shortened for practical reasons.



luo  
luxembourgish  
luyia  
macedonian  
machame  
makhuwameetto  
makonde  
malagasy  
malay-bn  
malay-brunei  
malay-sg  
malay-singapore  
malay  
malayalam  
maltese  
manx  
marathi  
masai  
mazanderani  
meru  
meta  
mexican  
mongolian  
morisyen  
mundang  
nama  
nepali  
newzealand  
ngiemboon  
ngomba  
norsk  
northernluri  
northernsami  
northndebele  
norwegianbokmal  
norwegiannynorsk  
nswissgerman  
nuer  
nyankole  
nynorsk  
occitan  
oriya  
oromo  
ossetic  
pashto  
persian  
piedmontese  
polish  
polytonicgreek  
portuguese-br  
portuguese-brazil  
portuguese-portugal  
portuguese-pt  
portuguese  
punjabi-arab  
punjabi-arabic  
punjabi-gurmukhi  
punjabi-guru

punjabi  
quechua  
romanian  
romansh  
rombo  
rundi  
russian  
rwa  
sakha  
samburu  
samin  
sango  
sangu  
sanskrit-beng  
sanskrit-bengali  
sanskrit-deva  
sanskrit-devanagari  
sanskrit-gujarati  
sanskrit-gujr  
sanskrit-kannada  
sanskrit-knda  
sanskrit-malayalam  
sanskrit-mlym  
sanskrit-telu  
sanskrit-telugu  
sanskrit  
scottishgaelic  
sena  
serbian-cyrillic-bosniaherzegovina  
serbian-cyrillic-kosovo  
serbian-cyrillic-montenegro  
serbian-cyrillic  
serbian-cyrl-ba  
serbian-cyrl-me  
serbian-cyrl-xk  
serbian-cyrl  
serbian-latin-bosniaherzegovina  
serbian-latin-kosovo  
serbian-latin-montenegro  
serbian-latin  
serbian-latn-ba  
serbian-latn-me  
serbian-latn-xk  
serbian-latn  
serbian  
shambala  
shona  
sichuanyi  
sinhala  
slovak  
slovene  
slovenian  
soga  
somali  
spanish-mexico  
spanish-mx  
spanish  
standardmoroccantamazight

swahili	uyghur
swedish	uzbek-arab
swissgerman	uzbek-arabic
tachelhit-latin	uzbek-cyrillic
tachelhit-latn	uzbek-cyrl
tachelhit-tfng	uzbek-latin
tachelhit-tifinagh	uzbek-latn
tachelhit	uzbek
taita	vai-latin
tamil	vai-latn
tasawaq	vai-vai
telugu	vai-vaii
teso	vai
thai	vietnam
tibetan	vietnamese
tigrinya	vunjo
tongan	walser
turkish	welsh
turkmen	westernfrisian
ukenglish	yangben
ukrainian	yiddish
uppersorbian	yoruba
urdu	zarma
usenglish	zulu
usorbian	

---

### Modifying and adding values to ini files

**New 3.39** There is a way to modify the values of ini files when they get loaded with `\babelprovide` and `import`. To set, say, `digits.native` in the `numbers` section, use something like `numbers/digits.native=abcdefghijkl`. Keys may be added, too. Without `import` you may modify the identification keys. This can be used to create private variants easily. All you need is to import the same ini file with a different locale name and different parameters.

## 1.14 Selecting fonts

**New 3.15** Babel provides a high level interface on top of `fontspec` to select fonts. There is no need to load `fontspec` explicitly – babel does it for you with the first `\babelfont`.<sup>13</sup>

`\babelfont` [*<language-list>*] {*<font-family>*} [*<font-options>*] {*<font-name>*}

**NOTE** See the note in the previous section about some issues in specific languages.

The main purpose of `\babelfont` is to define at once in a multilingual document the fonts required by the different languages, with their corresponding language systems (script and language). So, if you load, say, 4 languages, `\babelfont{rm}{FreeSerif}` defines 4 fonts (with their variants, of course), which are switched with the language by babel. It is a tool to make things easier and transparent to the user.

Here *font-family* is `rm`, `sf` or `tt` (or newly defined ones, as explained below), and *font-name* is the same as in `fontspec` and the like.

If no language is given, then it is considered the default font for the family, activated when a language is selected.

On the other hand, if there is one or more languages in the optional argument, the font will be assigned to them, overriding the default one. Alternatively, you may set a font for a script – just precede its name (lowercase) with a star (eg, `*devanagari`). With this optional argument, the font is *not* yet defined, but just predeclared. This means you may define as

---

<sup>13</sup>See also the package `combofont` for a complementary approach.

many fonts as you want ‘just in case’, because if the language is never selected, the corresponding `\babelfont` declaration is just ignored. Babel takes care of the font language and the font script when languages are selected (as well as the writing direction); see the recognized languages above. In most cases, you will not need *font-options*, which is the same as in fontspec, but you may add further key/value pairs if necessary.

**EXAMPLE** Usage in most cases is very simple. Let us assume you are setting up a document in Swedish, with some words in Hebrew, with a font suited for both languages.

LUATEX/XETEX

```
\documentclass{article}

\usepackage[swedish, bidi=default]{babel}

\babelprovide[import]{hebrew}

\babelfont{rm}{FreeSerif}

\begin{document}

Svenska \foreignlanguage{hebrew}{עברית} svenska.

\end{document}
```

If on the other hand you have to resort to different fonts, you can replace the red line above with, say:

LUATEX/XETEX

```
\babelfont{rm}{Iwona}
\babelfont[hebrew]{rm}{FreeSerif}
```

`\babelfont` can be used to implicitly define a new font family. Just write its name instead of `rm`, `sf` or `tt`. This is the preferred way to select fonts in addition to the three basic families.

**EXAMPLE** Here is how to do it:

LUATEX/XETEX

```
\babelfont{kai}{FandolKai}
```

Now, `\kaifamily` and `\kaidefault`, as well as `\textkai` are at your disposal.

**NOTE** You may load fontspec explicitly. For example:

LUATEX/XETEX

```
\usepackage{fontspec}
\newfontscript{Devanagari}{deva}
\babelfont[hindi]{rm}{Shobhika}
```

This makes sure the OpenType script for Devanagari is `deva` and not `dev2`, in case it is not detected correctly. You may also pass some options to fontspec: with `silent`, the warnings about unavailable scripts or languages are not shown (they are only really useful when the document format is being set up).

**NOTE** Directionality is a property affecting margins, indentation, column order, etc., not just text. Therefore, it is under the direct control of the language, which applies both the script and the direction to the text. As a consequence, there is no need to set `Script` when declaring a font with `\babelfont` (nor `Language`). In fact, it is even discouraged.

**NOTE** `\fontspec` is not touched at all, only the preset font families (`rm`, `sf`, `tt`, and the like). If a language is switched when an *ad hoc* font is active, or you select the font with this command, neither the script nor the language is passed. You must add them by hand. This is by design, for several reasons—for example, each font has its own set of features and a generic setting for several of them can be problematic, and also preserving a “lower-level” font selection is useful.

**NOTE** The keys `Language` and `Script` just pass these values to the *font*, and do *not* set the script for the *language* (and therefore the writing direction). In other words, the `ini` file or `\babelprovide` provides default values for `\babelfont` if omitted, but the opposite is not true. See the note above for the reasons of this behavior.

**WARNING** Using `\setxxxxfont` and `\babelfont` at the same time is discouraged, but very often works as expected. However, be aware with `\setxxxxfont` the language system will not be set by `babel` and should be set with `fontspec` if necessary.

**TROUBLESHOOTING** *Package babel Info: The following fonts are not babel standard families.*

**This is *not* an error.** `babel` assumes that if you are using `\babelfont` for a family, very likely you want to define the rest of them. If you don’t, you can find some inconsistencies between families. This checking is done at the beginning of the document, at a point where we cannot know which families will be used.

Actually, there is no real need to use `\babelfont` in a monolingual document, if you set the language system in `\setmainfont` (or not, depending on what you want).

As the message explains, *there is nothing intrinsically wrong* with not defining all the families. In fact, there is nothing intrinsically wrong with not using `\babelfont` at all. But you must be aware that this may lead to some problems.

**NOTE** `\babelfont` is a high level interface to `fontspec`, and therefore in `xetex` you can apply Mappings. For example, there is a set of [transliterations for Brahmic scripts](#) by Davis M. Jones. After installing them in you distribution, just set the map as you would do with `fontspec`.

## 1.15 Modifying a language

Modifying the behavior of a language (say, the chapter “caption”), is sometimes necessary, but not always trivial. In the case of caption names a specific macro is provided, because this is perhaps the most frequent change:

`\setlocalecaption`  $\{\langle\textit{language-name}\rangle\}\{\langle\textit{caption-name}\rangle\}\{\langle\textit{string}\rangle\}$

**New 3.51** Here *caption-name* is the name as string without the trailing name. An example, which also shows caption names are often a stylistic choice, is:

```
\setlocalecaption{english}{contents}{Table of Contents}
```

This works not only with existing caption names, because it also serves to define new ones by setting the *caption-name* to the name of your choice (name will be postpended). Captions so defined or redefined behave with the ‘new way’ described in the following note.

**NOTE** There are a few alternative methods:

- With data import’ed from `ini` files, you can modify the values of specific keys, like:

```
\babelprovide[import, captions/listtable = Lista de tablas]{spanish}
```

(In this particular case, instead of the `captions` group you may need to modify the `captions.licr` one.)

- The ‘old way’, still valid for many languages, to redefine a caption is the following:

```
\addto\captionenglish{%
  \renewcommand\contentsname{Foo}%
}
```

As of 3.15, there is no need to hide spaces with `%` (`babel` removes them), but it is advisable to do so. This redefinition is not activated until the language is selected.

- The ‘new way’, which is found in bulgarian, azerbaijani, spanish, french, turkish, icelandic, vietnamese and a few more, as well as in languages created with `\babelprovide` and its key import, is:

```
\renewcommand\spanishchaptername{Foo}
```

This redefinition is immediate.

**NOTE** Do *not* redefine a caption in the following way:

```
\AtBeginDocument{\renewcommand\contentsname{Foo}}
```

The changes may be discarded with a language selector, and the original value restored.

Macros to be run when a language is selected can be add to `\extras⟨lang⟩`:

```
\addto\extrarussian{\mymacro}
```

There is a counterpart for code to be run when a language is unselected: `\noextras⟨lang⟩`.

**NOTE** These macros (`\captions⟨lang⟩`, `\extras⟨lang⟩`) may be redefined, but *must not* be used as such – they just pass information to babel, which executes them in the proper context.

Another way to modify a language loaded as a package or class option is by means of `\babelprovide`, described below in depth. So, something like:

```
\usepackage[danish]{babel}
\babelprovide[captions=da, hyphenrules=nohyphenation]{danish}
```

first loads `danish.ldf`, and then redefines the captions for danish (as provided by the `ini` file) and prevents hyphenation. The rest of the language definitions are not touched. Without the optional argument it just loads some additional tools if provided by the `ini` file, like extra counters.

## 1.16 Creating a language

**New 3.10** And what if there is no style for your language or none fits your needs? You may then define quickly a language with the help of the following macro in the preamble (which may be used to modify an existing language, too, as explained in the previous subsection).

**`\babelprovide`** [`⟨options⟩`]{`⟨language-name⟩`}

If the language `⟨language-name⟩` has not been loaded as class or package option and there are no `⟨options⟩`, it creates an “empty” one with some defaults in its internal structure: the hyphen rules, if not available, are set to the current ones, left and right hyphen mins are set to 2 and 3. In either case, caption, date and language system are not defined.

If no `ini` file is imported with `import`, `⟨language-name⟩` is still relevant because in such a case the hyphenation and like breaking rules (including those for South East Asian and CJK) are based on it as provided in the `ini` file corresponding to that name; the same applies to OpenType language and script.

Conveniently, some options allow to fill the language, and babel warns you about what to do if there is a missing string. Very likely you will find alerts like that in the log file:

```
Package babel Warning: \chaptername not set for 'mylang'. Please,
(babel)                define it after the language has been loaded
(babel)                (typically in the preamble) with:
(babel)                \setlocalecaption{mylang}{chapter}{..}
(babel)                Reported on input line 26.
```

In most cases, you will only need to define a few macros. Note languages loaded on the fly are not yet available in the preamble.

**EXAMPLE** If you need a language named arhinish:

```
\usepackage[danish]{babel}
\babelprovide{arhinish}
\setlocalecaption{arhinish}{chapter}{Chapitula}
\setlocalecaption{arhinish}{refname}{Refirenke}
\renewcommand\arhinishhyphenmins{22}
```

**EXAMPLE** Locales with names based on BCP 47 codes can be created with something like:

```
\babelprovide[import=en-US]{enUS}
```

Note, however, mixing ways to identify locales can lead to problems. For example, is yi the name of the language spoken by the Yi people or is it the code for Yiddish?

The main language is not changed (danish in this example). So, you must add

`\selectlanguage{arhinish}` or other selectors where necessary.

If the language has been loaded as an argument in `\documentclass` or `\usepackage`, then `\babelprovide` redefines the requested data.

**import=** *<language-tag>*

**New 3.13** Imports data from an ini file, including captions and date (also line breaking rules in newly defined languages). For example:

```
\babelprovide[import=hu]{hungarian}
```

Unicode engines load the UTF-8 variants, while 8-bit engines load the LICR (ie, with macros like `\'` or `\ss`) ones.

**New 3.23** It may be used without a value, and that is often the recommended option. In such a case, the ini file set in the corresponding `babel-<language>.tex` (where `<language>` is the last argument in `\babelprovide`) is imported. See the list of recognized languages above. So, the previous example is best written as:

```
\babelprovide[import]{hungarian}
```

There are about 250 ini files, with data taken from the ldf files and the CLDR provided by Unicode. Not all languages in the latter are complete, and therefore neither are the ini files. A few languages may show a warning about the current lack of suitability of some features.

Besides `\today`, this option defines an additional command for dates: `\<language>date`, which takes three arguments, namely, year, month and day numbers. In fact, `\today` calls `\<language>today`, which in turn calls

`\<language>date{\the\year}{\the\month}{\the\day}`. **New 3.44** More convenient is usually `\localedate`, which prints the date for the current locale.

**captions=** *<language-tag>*

Loads only the strings. For example:

```
\babelprovide[captions=hu]{hungarian}
```

**hyphenrules=** *<language-list>*

With this option, with a space-separated list of hyphenation rules, babel assigns to the language the first valid hyphenation rules in the list. For example:

```
\babelprovide[hyphenrules=chavacano spanish italian]{chavacano}
```

If none of the listed hyphenrules exist, the default behavior applies. Note in this example we set chavacano as first option – without it, it would select spanish even if chavacano exists.

A special value is +, which allocates a new language (in the T<sub>E</sub>X sense). It only makes sense as the last value (or the only one; the subsequent ones are silently ignored). It is mostly useful with luatex, because you can add some patterns with `\babelpatterns`, as for example:

```
\babelprovide[hyphenrules=+]{neo}  
\babelpatterns[neo]{a1 e1 i1 o1 u1}
```

In other engines it just suppresses hyphenation (because the pattern list is empty).

**New 3.58** Another special value is `unhyphenated`, which is an alternative to `justification=unhyphenated`.

**main** This valueless option makes the language the main one (thus overriding that set when babel is loaded). Only in newly defined languages.

**EXAMPLE** Let's assume your document (xetex or luatex) is mainly in Polytonic Greek with but with some sections in Italian. Then, the first attempt should be:

```
\usepackage[italian, greek.polutonico]{babel}
```

But if, say, accents in Greek are not shown correctly, you can try

```
\usepackage[italian, polytonicgreek, provide=*]{babel}
```

Remember there is an alternative syntax for the latter:

```
\usepackage[italian]{babel}  
\babelprovide[import, main]{polytonicgreek}
```

Finally, also remember you might not need to load `italian` at all if there are only a few word in this language (see [1.3](#)).

**script=** *<script-name>*

**New 3.15** Sets the script name to be used by fontspec (eg, Devanagari). Overrides the value in the `ini` file. If fontspec does not define it, then babel sets its tag to that provided by the `ini` file. This value is particularly important because it sets the writing direction, so you must use it if for some reason the default value is wrong.

**language=** *<language-name>*

**New 3.15** Sets the language name to be used by fontspec (eg, Hindi). Overrides the value in the `ini` file. If fontspec does not define it, then babel sets its tag to that provided by the `ini` file. Not so important, but sometimes still relevant.

**alph=** *<counter-name>*

Assigns to `\alph` that counter. See the next section.

**Alph=**  $\langle$ counter-name $\rangle$

Same for \Alph.

A few options (only luatex) set some properties of the writing system used by the language. These properties are *always* applied to the script, no matter which language is active. Although somewhat inconsistent, this makes setting a language up easier in most typical cases.

**onchar=** ids | fonts | letters

**New 3.38** This option is much like an ‘event’ called when a character belonging to the script of this locale is found (as its name implies, it acts on characters, not on spaces). There are currently two ‘actions’, which can be used at the same time (separated by a space): with `ids` the `\language` and the `\localeid` are set to the values of this locale; with `fonts`, the fonts are changed to those of this locale (as set with `\babelfont`). Characters can be added or modified with `\babelcharproperty`.

**New 3.81** Option `letters` restricts the ‘actions’ to letters, in the T<sub>E</sub>X sense (i. e., with `catcode 11`). Digits and punctuation are then considered part of current locale (as set by a selector). This option is useful when the main script is non-Latin and there is a secondary one whose script is Latin.

**NOTE** An alternative approach with luatex and Harfbuzz is the `font` option `RawFeature={multiscript=auto}`. It does not switch the babel language and therefore the line breaking rules, but in many cases it can be enough.

**NOTE** There is no general rule to set the font for a punctuation mark, because it is a semantic decision and not a typographical one. Consider the following sentence: “یک, دو, and سه are Persian numbers”. In this case the punctuation font must be the English one, even if the commas are surrounded by non-Latin letters. Quotation marks, parenthesis, etc., are even more complex. Several criteria are possible, like the main language (the default in babel), the first letter in the paragraph, or the surrounding letters, among others, but even so manual switching can be still necessary.

**intraspace=**  $\langle$ base $\rangle$   $\langle$ shrink $\rangle$   $\langle$ stretch $\rangle$

Sets the interword space for the writing system of the language, in em units (so, `0.1 0` is `0em` plus `.1em`). Like `\spaceskip`, the em unit applied is that of the current text (more precisely, the previous glyph). Currently used only in Southeast Asian scripts, like Thai, and CJK.

**intrapenalty=**  $\langle$ penalty $\rangle$

Sets the interword penalty for the writing system of this language. Currently used only in Southeast Asian scripts, like Thai. Ignored if 0 (which is the default value).

**transforms=**  $\langle$ transform-list $\rangle$

See section 1.21.

**justification=** unhyphenated | kashida | elongated | padding

**New 3.59** There are currently 4 options. Note they are language dependent, so that they will not be applied to other languages. The first one (unhyphenated) activates a line breaking mode that allows spaces to be stretched to arbitrary amounts. Although for European standards the result may look odd, in some writing systems, like Malayalam and other Indic scripts, this has been the customary (although not always the desired) practice. Because of that, no locale sets currently this mode by default (Amharic is an exception). Unlike `\sloppy`, the `\hfuzz` and the `\vfuzz` are not changed, because this line breaking mode is not really ‘sloppy’ (in other words, overfull boxes are reported as usual).



The second and the third are for the Arabic script. It sets the linebreaking and justification method, which can be based on the the ARABIC TATWEEL character or in the ‘justification alternatives’ OpenType table (jalt). For an explanation see the [babel site](#).

**New 3.81** The option padding has been devised primarily for Tibetan. It’s still somewhat experimental. Again, there is an explanation in the [babel site](#).

`linebreaking=` **New 3.59** Just a synonymous for justification.

**NOTE** (1) If you need shorthands, you can define them with `\usesshorthands` and `\defineshorthand` as described above. (2) Captions and `\today` are “ensured” with `\babelensure` (this is the default in ini-based languages).

## 1.17 Digits and counters

**New 3.20** About thirty ini files define a field named `digits.native`. When it is present, two macros are created: `\<language>digits` and `\<language>counter` (only xetex and luatex). With the first, a string of ‘Latin’ digits are converted to the native digits of that language; the second takes a counter name as argument. With the option `maparabic` in `\babelprovide`, `\arabic` is redefined to produce the native digits (this is done *globally*, to avoid inconsistencies in, for example, page numbering, and note as well dates do not rely on `\arabic`.)

For example:

```
\babelprovide[import]{telugu}
% Or also, if you want:
% \babelprovide[import, maparabic]{telugu}
\babelfont{rm}{Gautami} % With luatex, better with Harfbuzz
\begin{document}
\telugudigits{1234}
\telugucounter{section}
\end{document}
```

Languages providing native digits in all or some variants are:

Arabic	Persian	Lao	Odia	Urdu
Assamese	Gujarati	Northern Luri	Punjabi	Uzbek
Bangla	Hindi	Malayalam	Pashto	Vai
Tibetar	Khmer	Marathi	Tamil	Cantonese
Bodo	Kannada	Burmese	Telugu	Chinese
Central Kurdish	Konkani	Mazanderani	Thai	
Dzongkha	Kashmiri	Nepali	Uyghur	

**New 3.30** With luatex there is an alternative approach for mapping digits, namely, `mapdigits`. Conversion is based on the language and it is applied to the typeset text (not math, PDF bookmarks, etc.) before bidi and fonts are processed (ie, to the node list as generated by the T<sub>E</sub>X code). This means the local digits have the correct bidirectional behavior (unlike `Numbers=Arabic` in fontspec, which is not recommended).

**NOTE** With xetex you can use the option `Mapping` when defining a font.

`\localnumeral`  $\langle style \rangle \langle number \rangle$   
`\localecounter`  $\langle style \rangle \langle counter \rangle$

**New 3.41** Many ‘ini’ locale files has been extended with information about non-positional numerical systems, based on those predefined in CSS. They only work with xetex and luatex and are fully expendable (even inside an unprotected `\edef`). Currently, they are limited to numbers below 10000.

There are several ways to use them (for the avaiable styles in each language, see the list below):

- `\localenumeral{<style>}{<number>}`, like `\localenumeral{abjad}{15}`
- `\localecounter{<style>}{<counter>}`, like `\localecounter{lower}{section}`
- In `\babelprovide`, as an argument to the keys `alph` and `Alph`, which redefine what `\alph` and `\Alph` print. For example:

```
\babelprovide[alph=alphabetic]{thai}
```

The styles are:

**Ancient Greek** `lower.ancient`, `upper.ancient`  
**Amharic** `afar`, `agaw`, `ari`, `blin`, `dizi`, `gedeo`, `gumuz`, `hadiyya`, `harari`, `kaffa`, `kebena`,  
`kembata`, `konso`, `kunama`, `meen`, `oromo`, `saho`, `sidama`, `silti`, `tigre`, `wolaita`, `yemsa`  
**Arabic** `abjad`, `maghrebi.abjad`  
**Armenian** `lower.letter`, `upper.letter`  
**Belarusan, Bulgarian, Church Slavic, Macedonian, Serbian** `lower`, `upper`  
**Bangla** `alphabetic`  
**Central Kurdish** `alphabetic`  
**Chinese** `cjk-earthly-branch`, `cjk-heavenly-stem`, `circled.ideograph`,  
`parenthesized.ideograph`, `fullwidth.lower.alpha`, `fullwidth.upper.alpha`  
**Church Slavic (Glagolitic)** `letters`  
**Coptic** `epact`, `lower.letters`  
**French** `date.day` (mainly for internal use).  
**Georgian** `letters`  
**Greek** `lower.modern`, `upper.modern`, `lower.ancient`, `upper.ancient` (all with `keraia`)  
**Hebrew** `letters` (neither `geresh` nor `gershayim` yet)  
**Hindi** `alphabetic`  
**Italian** `lower.legal`, `upper.legal`  
**Japanese** `hiragana`, `hiragana.iroha`, `katakana`, `katakana.iroha`, `circled.katakana`,  
`informal`, `formal`, `cjk-earthly-branch`, `cjk-heavenly-stem`, `circled.ideograph`,  
`parenthesized.ideograph`, `fullwidth.lower.alpha`, `fullwidth.upper.alpha`  
**Khmer** `consonant`  
**Korean** `consonant`, `syllabe`, `hanja.informal`, `hanja.formal`, `hangul.formal`,  
`cjk-earthly-branch`, `cjk-heavenly-stem`, `circled.ideograph`,  
`parenthesized.ideograph`, `fullwidth.lower.alpha`, `fullwidth.upper.alpha`  
**Marathi** `alphabetic`  
**Persian** `abjad`, `alphabetic`  
**Russian** `lower`, `lower.full`, `upper`, `upper.full`  
**Syriac** `letters`  
**Tamil** `ancient`  
**Thai** `alphabetic`  
**Ukrainian** `lower`, `lower.full`, `upper`, `upper.full`

**New 3.45** In addition, native digits (in languages defining them) may be printed with the numeral style digits.

## 1.18 Dates

**New 3.45** When the data is taken from an ini file, you may print the date corresponding to the Gregorian calendar and other lunisolar systems with the following command.

`\localedate` [`<calendar=.., variant=.., convert>`]{`<year>`}{`<month>`}{`<day>`}

By default the calendar is the Gregorian, but an ini file may define strings for other calendars (currently `ar`, `ar-*`, `he`, `fa`, `hi`). In the latter case, the three arguments are the year, the month, and the day in those in the corresponding calendar. They are *not* the Gregorian data to be converted (which means, say, 13 is a valid month number with

calendar=hebrew and calendar=coptic). However, with the option convert it's converted (using internally the following command). Even with a certain calendar there may be variants. In Kurmanji the default variant prints something like *30. Çîleya Pêşîn 2019*, but with variant=izafa it prints *31'ê Çîleya Pêşînê 2019*.

**\babelcalendar** [*<date>*]{*<calendar>*}{*<year-macro>*}{*<month-macro>*}{*<day-macro>*}

**New 3.76** Although calendars aren't the primary concern of babel, the package should be able to, at least, generate correctly the current date in the way users would expect in their own culture. Currently, \localdate can print dates in a few calendars (provided the ini locale file has been imported), but year, month and day had to be entered by hand, which is very inconvenient. With this macro, the current date is converted and stored in the three last arguments, which must be macros. Allowed calendars are

buddhist	ethiopic	islamic-civil	persian
coptic	hebrew	islamic-umalqura	

The optional argument converts the given date, in the form '*<year>*-'*<month>*-'*<day>*'. Please, refer to the page on the news for 3.76 in the babel site for further details.

## 1.19 Accessing language info

**\language** The control sequence \language contains the name of the current language.

**WARNING** Due to some internal inconsistencies in catcodes, it should *not* be used to test its value. Use iflang, by Heiko Oberdiek.

**\iflanguage** {*<language>*}{*<true>*}{*<false>*}

If more than one language is used, it might be necessary to know which language is active at a specific time. This can be checked by a call to \iflanguage, but note here "language" is used in the TeX sense, as a set of hyphenation patterns, and *not* as its babel name. This macro takes three arguments. The first argument is the name of a language; the second and third arguments are the actions to take if the result of the test is true or false respectively.

**\localeinfo** \*{*<field>*}

**New 3.38** If an ini file has been loaded for the current language, you may access the information stored in it. This macro is fully expandable, and the available fields are:

name.english as provided by the Unicode CLDR.  
tag.ini is the tag of the ini file (the way this file is identified in its name).  
tag.bcp47 is the full BCP 47 tag (see the warning below). This is the value to be used for the 'real' provided tag (babel may fill other fields if they are considered necessary).  
language.tag.bcp47 is the BCP 47 language tag.  
tag.opentype is the tag used by OpenType (usually, but not always, the same as BCP 47).  
script.name, as provided by the Unicode CLDR.  
script.tag.bcp47 is the BCP 47 tag of the script used by this locale. This is a required field for the fonts to be correctly set up, and therefore it should be always defined.  
script.tag.opentype is the tag used by OpenType (usually, but not always, the same as BCP 47).  
region.tag.bcp47 is the BCP 47 tag of the region or territory. Defined only if the locale loaded actually contains it (eg, es-MX does, but es doesn't), which is how locales behave in the CLDR. **New 3.75**  
variant.tag.bcp47 is the BCP 47 tag of the variant (in the BCP 47 sense, like 1901 for German). **New 3.75**

extension.⟨s⟩.tag.bcp47 is the BCP 47 value of the extension whose singleton is ⟨s⟩ (currently the recognized singletons are x, t and u). The internal syntax can be somewhat complex, and this feature is still somewhat tentative. An example is classiclatin which sets extension.x.tag.bcp47 to classic. **New 3.75**

**WARNING** **New 3.46** As of version 3.46 tag.bcp47 returns the full BCP 47 tag. Formerly it returned just the language subtag, which was clearly counterintuitive.

**New 3.75** Sometimes, it comes in handy to be able to use \localeinfo in an expandable way even if something went wrong (for example, the locale currently active is undefined). For these cases, localeinfo\* just returns an empty string instead of raising an error. Bear in mind that babel, following the CLDR, may leave the region unset, which means \getlocaleproperty\*, described below, is the preferred command, so that the existence of a field can be checked before. This also means building a string with the language and the region with \localeinfo\*{language.tab.bcp47}-\localeinfo\*{region.tab.bcp47} is not usually a good idea (because of the hyphen).

**\getlocaleproperty** \*{⟨macro⟩}{⟨locale⟩}{⟨property⟩}

**New 3.42** The value of any locale property as set by the ini files (or added/modified with \babelprovide) can be retrieved and stored in a macro with this command. For example, after:

```
\getlocaleproperty\hechap{hebrew}{captions/chapter}
```

the macro \hechap will contain the string פרק.

If the key does not exist, the macro is set to \relax and an error is raised. **New 3.47** With the starred version no error is raised, so that you can take your own actions with undefined properties.

**\localeid** Each language in the babel sense has its own unique numeric identifier, which can be retrieved with \localeid.

The \localeid is not the same as the \language identifier, which refers to a set of hyphenation patterns (which, in turn, is just a component of the line breaking algorithm described in the next section). The data about preloaded patterns are stored in an internal macro named \bbl@languages (see the code for further details), but note several locales may share a single \language, so they are separated concepts. In luatex, the \localeid is saved in each node (when it makes sense) as an attribute, too.

**\LocaleForEach** {⟨code⟩}

Babel remembers which ini files have been loaded. There is a loop named \LocaleForEach to traverse the list, where #1 is the name of the current item, so that \LocaleForEach{\message{ \*\*#1\*\* }} just shows the loaded ini's.

**ensureinfo=off** **New 3.75** Previously, ini files were loaded only with \babelprovide and also when languages are selected if there is a \babel font or they have not been explicitly declared. Now the ini files are loaded (and therefore the corresponding data) even if these two conditions are not met (in previous versions you had to enable it with \BabelEnsureInfo in the preamble). Because of the way this feature works, problems are very unlikely, but there is a switch as a package option to turn the new behavior off (ensureinfo=off).

## 1.20 Hyphenation and line breaking

Babel deals with three kinds of line breaking rules: Western, typically the LGC group, South East Asian, like Thai, and CJK, but support depends on the engine: pdftex only deals with the former; xetex also with the second one (although in a limited way), while luatex provides basic rules for the latter, too. With luatex there are also tools for non-standard hyphenation rules, explained in the next section.

`\babelhyphen` \*{<type>}  
`\babelhyphen` \*{<text>}

**New 3.9a** It is customary to classify hyphens in two types: (1) *explicit* or *hard hyphens*, which in  $\TeX$  are entered as `-`, and (2) *optional* or *soft hyphens*, which are entered as `\-`. Strictly, a *soft hyphen* is not a hyphen, but just a breaking opportunity or, in  $\TeX$  terms, a “discretionary”; a *hard hyphen* is a hyphen with a breaking opportunity after it. A further type is a *non-breaking hyphen*, a hyphen without a breaking opportunity. In  $\TeX$ , `-` and `\-` forbid further breaking opportunities in the word. This is the desired behavior very often, but not always, and therefore many languages provide shorthands for these cases. Unfortunately, this has not been done consistently: for example, `-` in Dutch, Portuguese, Catalan or Danish is a hard hyphen, while in German, Spanish, Norwegian, Slovak or Russian is a soft hyphen. Furthermore, some of them even redefine `\-`, so that you cannot insert a soft hyphen without breaking opportunities in the rest of the word. Therefore, some macros are provided with a set of basic “hyphens” which can be used by themselves, to define a user shorthand, or even in language files.

- `\babelhyphen{soft}` and `\babelhyphen{hard}` are self explanatory.
- `\babelhyphen{repeat}` inserts a hard hyphen which is repeated at the beginning of the next line, as done in languages like Polish, Portuguese and Spanish.
- `\babelhyphen{nobreak}` inserts a hard hyphen without a break after it (even if a space follows).
- `\babelhyphen{empty}` inserts a break opportunity without a hyphen at all.
- `\babelhyphen{<text>}` is a hard “hyphen” using `<text>` instead. A typical case is `\babelhyphen{/}`.

With all of them, hyphenation in the rest of the word is enabled. If you don’t want to enable it, there is a starred counterpart: `\babelhyphen*{soft}` (which in most cases is equivalent to the original `\-`), `\babelhyphen*{hard}`, etc.

Note `hard` is also good for isolated prefixes (eg, *anti-*) and `nobreak` for isolated suffixes (eg, *-ism*), but in both cases `\babelhyphen*{nobreak}` is usually better.

There are also some differences with  $\LaTeX$ : (1) the character used is that set for the current font, while in  $\LaTeX$  it is hardwired to `-` (a typical value); (2) the hyphen to be used in fonts with a negative `\hyphenchar` is `-`, like in  $\LaTeX$ , but it can be changed to another value by redefining `\babelnullhyphen`; (3) a break after the hyphen is forbidden if preceded by a glue  $>0$  pt (at the beginning of a word, provided it is not immediately preceded by, say, a parenthesis).

`\babelhyphenation` [`<language>`, `<language>`, ...]{<exceptions>}

**New 3.9a** Sets hyphenation exceptions for the languages given or, without the optional argument, for *all* languages (eg, proper nouns or common loan words, and of course monolingual documents). Multiple declarations work much like `\hyphenation` (last wins), but language exceptions take precedence over global ones.

It can be used only in the preamble, and exceptions are set when the language is first selected, thus taking into account changes of `\lccodes`’s done in `\extras<lang>` as well as the language-specific encoding (not set in the preamble by default). Multiple `\babelhyphenation`’s are allowed. For example:

```
\babelhyphenation{Wal-hal-la Dar-bhan-ga}
```

Listed words are saved expanded and therefore it relies on the LICR. Of course, it also works without the LICR if the input and the font encodings are the same, like in Unicode based engines.

**NOTE** Using `\babelhyphenation` with Southeast Asian scripts is mostly pointless. But with `\babelpatterns` (below) you may fine-tune line breaking (only `luatex`). Even if there are no patterns for the language, you can add at least some typical cases.

**NOTE** Use `\babelhyphenation` instead of `\hyphenation` to set hyphenation exceptions in the preamble before any language is explicitly set with a selector. In the preamble the hyphenation rules are not always fully set up and an error can be raised.

`\begin{hyphenrules} {<language>} ... \end{hyphenrules}`

The environment `hyphenrules` can be used to select *only* the hyphenation rules to be used (it can be used as command, too). This can for instance be used to select ‘nohyphenation’, provided that in `language.dat` the ‘language’ nohyphenation is defined by loading `zerohyph.tex`. It deactivates language shorthands, too (but not user shorthands). Except for these simple uses, `hyphenrules` is deprecated and other `language*` (the starred version) is preferred, because the former does not take into account possible changes in encodings of characters like, say, ‘ ’ done by some languages (eg, italian, french, ukraineb).

`\babelpatterns [ <language> , <language> , ... ] { <patterns> }`

**New 3.9m** *In luatex only*,<sup>14</sup> adds or replaces patterns for the languages given or, without the optional argument, for *all* languages. If a pattern for a certain combination already exists, it gets replaced by the new one.

It can be used only in the preamble, and patterns are added when the language is first selected, thus taking into account changes of `\lccodes`’s done in `\extras<lang>` as well as the language-specific encoding (not set in the preamble by default). Multiple `\babelpatterns`’s are allowed.

Listed patterns are saved expanded and therefore it relies on the LICR. Of course, it also works without the LICR if the input and the font encodings are the same, like in Unicode based engines.

**New 3.31** (Only luatex.) With `\babelprovide` and imported CJK languages, a simple generic line breaking algorithm (push-out-first) is applied, based on a selection of the Unicode rules (**New 3.32** it is disabled in verbatim mode, or more precisely when the `hyphenrules` are set to `nohyphenation`). It can be activated alternatively by setting explicitly the `intraspace`.

**New 3.27** Interword spacing for Thai, Lao and Khemer is activated automatically if a language with one of those scripts are loaded with `\babelprovide`. See the sample on the babel repository. With both Unicode engines, spacing is based on the “current” em unit (the size of the previous char in luatex, and the font size set by the last `\selectfont` in xetex).

## 1.21 Transforms

Transforms (only luatex) provide a way to process the text on the typesetting level in several language-dependent ways, like non-standard hyphenation, special line breaking rules, script to script conversion, spacing conventions and so on.<sup>15</sup>

It currently embraces `\babelprehyphenation` and `\babelposthyphenation`.

**New 3.57** Several ini files predefine some transforms. They are activated with the key transforms in `\babelprovide`, either if the locale is being defined with this macro or the languages has been previously loaded as a class or package option, as the following example illustrates:

```
\usepackage[magyar]{babel}
\babelprovide[transforms = digraphs.hyphen]{magyar}
```

**New 3.67** Transforms predefined in the ini locale files can be made attribute-dependent, too. When an attribute between parenthesis is inserted subsequent transforms will be assigned to it (up to the list end or another attribute). For example, and provided an attribute called `\withsigmafinal` has been declared:

<sup>14</sup>With luatex exceptions and patterns can be modified almost freely. However, this is very likely a task for a separate package and babel only provides the most basic tools.

<sup>15</sup>They are similar in concept, but not the same, as those in Unicode. The main inspiration for this feature is the Omega transformation processes.

```
transforms = transliteration.omega (\withsigmafinal) sigma.final
```

This applies `transliteration.omega` always, but `sigma.final` only when `\withsigmafinal` is set.

Here are the transforms currently predefined. (A few may still require some fine-tuning. More to follow in future releases.)

Arabic	<code>transliteration.dad</code>	Applies the transliteration system devised by Yannis Haralambous for dad (simple and T <sub>E</sub> X-friendly). Not yet complete, but sufficient for most texts.
Croatian	<code>digraphs.ligatures</code>	Ligatures <i>DŽ, Dž, dž, LJ, Lj, lj, NJ, Nj, nj</i> . It assumes they exist. This is not the recommended way to make these transformations (the best way is with OTF features), but it can get you out of a hurry.
Czech, Polish, Portuguese, Slovak, Spanish	<code>hyphen.repeat</code>	Explicit hyphens behave like <code>\babelhyphen{repeat}</code> .
Czech, Polish, Slovak	<code>oneletter.nobreak</code>	Converts a space after a non-syllabic preposition or conjunction into a non-breaking space.
Finnish	<code>prehyphen.nobreak</code>	Line breaks just after hyphens prepended to words are prevented, like in “pakastekaapit ja -arkut”.
Greek	<code>diaeresis.hyphen</code>	Removes the diaeresis above iota and upsilon if hyphenated just before. It works with the three variants.
Greek	<code>transliteration.omega</code>	Although the provided combinations are not the full set, this transform follows the syntax of Omega: = for the circumflex, v for digamma, and so on. For better compatibility with Levy’s system, ~ (as ‘string’) is an alternative to =. ' is tonos in Monotonic Greek, but oxia in Polytonic and Ancient Greek.
Greek	<code>sigma.final</code>	The transliteration system above does not convert the sigma at the end of a word (on purpose). This transforms does it. To prevent the conversion (an abbreviation, for example), write "s.
Hindi, Sanskrit	<code>transliteration.hk</code>	The Harvard-Kyoto system to romanize Devanagari.
Hindi, Sanskrit	<code>punctuation.space</code>	Inserts a space before the following four characters: !?;.
Hungarian	<code>digraphs.hyphen</code>	Hyphenates the long digraphs <i>ccs, ddz, ggy, lly, nny, ssz, tty</i> and <i>zzs</i> as <i>cs-cs, dz-dz</i> , etc.
Indic scripts	<code>danda.nobreak</code>	Prevents a line break before a danda or double danda if there is a space. For Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Odia, Tamil, Telugu.
Latin	<code>digraphs.ligatures</code>	Replaces the groups <i>ae, AE, oe, OE</i> with <i>æ, Æ, œ, Æ</i> .



Latin	letters.noj	Replaces <i>j, J</i> with <i>i, I</i> .
Latin	letters.uv	Replaces <i>v, U</i> with <i>u, V</i> .
Sanskrit	transliteration.iast	The IAST system to romanize Devanagari. <sup>16</sup>
Serbian	transliteration.gajica	(Note serbian with ini files refers to the Cyrillic script, which is here the target.) The standard system devised by Ljudevit Gaj.
Arabic, Persian	kashida.plain	Experimental. A very simple and basic transform for ‘plain’ Arabic fonts, which attempts to distribute the tatwil as evenly as possible (starting at the end of the line). See the news for version 3.59.

**\babelposthyphenation** [*options*]{*hyphenrules-name*}{*lua-pattern*}{*replacement*}

**New 3.37-3.39** With *luatex* it is possible to define non-standard hyphenation rules, like  $f-f \rightarrow ff-f$ , repeated hyphens, ranked ruled (or more precisely, ‘penalized’ hyphenation points), and so on. A few rules are currently provided (see above), but they can be defined as shown in the following example, where {1} is the first captured char (between ( ) in the pattern):

```
\babelposthyphenation{german}{([fmtrp]) | {1}}
{
  { no = {1}, pre = {1}{1}- }, % Replace first char with disc
  remove,                    % Remove automatic disc (2nd node)
  {}                         % Keep last char, untouched
}
```

In the replacements, a captured char may be mapped to another, too. For example, if the first capture reads ([*ıû*]), the replacement could be {1|*ıû*|*ıû*}, which maps *ı* to *ı*, and *û* to *ı*, so that the diaeresis is removed.

This feature is activated with the first `\babelposthyphenation` or `\babelprehyphenation`.

**New 3.85** Another option is `label`, which takes a value similar to those in `\babelprovide` key transforms (in fact, the latter just applies this option). This label can be used to turn on and off transforms with a higher level interface, by means of `\enablelocaletransform` and `\disablelocaletransform` (see below).

**New 3.85** When used in conjunction with `label`, this key makes a transform font dependent. As an example, the rules for Arabic kashida can differ depending on the font design. The value consists in a list of space-separated font tags:

```
\babelprehyphenation[label=transform.name, fonts=rm sf]{...}{...}
```

Tags can adopt two forms: a family, such as `rm` or `tt`, or the set family/series/shape. If a font matches one of these conditions, the transform is enabled. The second tag in `rm rm/n/it` is redundant. There are no wildcards; so, for italics you may want to write something like `sf/m/it sf/b/it`.

Transforms set for specific fonts (at least once in any language) are always reset with a font selector.

In `\babelprovide`, transform labels can be tagged before its name, with a list separated with colons, like:

```
transforms = rm:sf:transform.name
```

**New 3.67** With the optional argument you can associate a user defined transform to an attribute, so that it's active only when it's set (currently its attribute value is ignored). With this mechanism transforms can be set or unset even in the middle of paragraphs, and applied to single words. To define, set and unset the attribute, the LaTeX kernel provides



the macros `\newattribute`, `\setattribute` and `\unsetattribute`. The following example shows how to use it, provided an attribute named `\latinnoj` has been declared:

```
\babelprehyphenation[attribute=\latinnoj]{latin}{ J }{ string = I }
```

See the [babel site](#) for a more detailed description and some examples. It also describes a few additional replacement types (`string`, `penalty`).

Although the main purpose of this command is non-standard hyphenation, it may actually be used for other transformations (after hyphenation is applied, so you must take discretionaries into account).

You are limited to substitutions as done by `lua`, although a future implementation may alternatively accept `lpeg`.

**`\babelprehyphenation`** [*options*] {*locale-name*} {*lua-pattern*} {*replacement*}

**New 3.44-3-52** It is similar to the latter, but (as its name implies) applied before hyphenation, which is particularly useful in transliterations. There are other differences: (1) the first argument is the locale instead of the name of the hyphenation patterns; (2) in the search patterns `=` has no special meaning, while `|` stands for an ordinary space; (3) in the replacement, discretionaries are not accepted.

See the description above for the optional argument.

This feature is activated with the first `\babelposthyphenation` or `\babelprehyphenation`.

**EXAMPLE** You can replace a character (or series of them) by another character (or series of them). Thus, to enter *ž* as *zh* and *š* as *sh* in a newly created locale for transliterated Russian:

```
\babelprovide[hyphenrules=+]{russian-latin} % Create locale
\babelprehyphenation{russian-latin}{([sz])h} % Create rule
{
  string = {1|sz|šž},
  remove
}
```

**EXAMPLE** The following rule prevent the word “a” from being at the end of a line:

```
\babelprehyphenation{english}{|a|}
{ }, { }, % Keep first space and a
{ insert, penalty = 10000 }, % Insert penalty
{ } % Keep last space
}
```

**NOTE** With `luatex` there is another approach to make text transformations, with the function `fonts.handlers.otf.addfeature`, which adds new features to an OTF font (substitution and positioning). These features can be made language-dependent, and `babel` by default recognizes this setting if the font has been declared with `\babelfont`. The *transforms* mechanism supplements rather than replaces OTF features.

With `xetex`, where *transforms* are not available, there is still another approach, with font mappings, mainly meant to perform encoding conversions and transliterations. Mappings, however, are linked to fonts, not to languages.

**`\enablelocaletransform`** {*label*}

**`\disablelocaletransform`** {*label*}

**New 3.85** Enables and disables the transform with the given label in the current language.

## 1.22 Selection based on BCP 47 tags

**New 3.43** The recommended way to select languages is that described at the beginning of this document. However, BCP 47 tags are becoming customary, particularly in documents (or parts of documents) generated by external sources, and therefore babel will provide a set of tools to select the locales in different situations, adapted to the particular needs of each case. Currently, babel provides autoloading of locales as described in this section. In these contexts autoloading is particularly important because we may not know on beforehand which languages will be requested.

It must be activated explicitly, because it is primarily meant for special tasks. Mapping from BCP 47 codes to locale names are not hardcoded in babel. Instead the data is taken from the ini files, which means currently about 250 tags are already recognized. Babel performs a simple lookup in the following way: fr-Latn-FR → fr-Latn → fr-FR → fr. Languages with the same resolved name are considered the same. Case is normalized before, so that fr-latn-fr → fr-Latn-FR. If a tag and a name overlap, the tag takes precedence.

Here is a minimal example:

```
\documentclass{article}

\usepackage[danish]{babel}

\babeladjust{
  autoload.bcp47 = on,
  autoload.bcp47.options = import
}

\begin{document}

Chapter in Danish: \chaptername.

\selectlanguage{de-AT}

\localedate{2020}{1}{30}

\end{document}
```

Currently the locales loaded are based on the ini files and decoupled from the main ldf files. This is by design, to ensure code generated externally produces the same result regardless of the languages requested in the document, but an option to use the ldf instead will be added in a future release, because both options make sense depending on the particular needs of each document (there will be some restrictions, however).

The behaviour is adjusted with \babeladjust with the following parameters:

autoload.bcp47 with values on and off.

autoload.bcp47.options, which are passed to \babelprovide; empty by default, but you may add import (features defined in the corresponding babel-...tex file might not be available).

autoload.bcp47.prefix. Although the public name used in selectors is the tag, the internal name will be different and generated by prepending a prefix, which by default is bcp47-. You may change it with this key.

**New 3.46** If an ldf file has been loaded, you can enable the corresponding language tags as selector names with:

```
\babeladjust{ bcp47.toname = on }
```

(You can deactivate it with off.) So, if dutch is one of the package (or class) options, you can write \selectlanguage{nl}. Note the language name does not change (in this

example is still dutch), but you can get it with `\localeinfo` or `\getlocaleproperty`. It must be turned on explicitly for similar reasons to those explained above.

### 1.23 Selecting scripts

Currently babel provides no standard interface to select scripts, because they are best selected with either `\fontencoding` (low-level) or a language name (high-level). Even the Latin script may require different encodings (ie, sets of glyphs) depending on the language, and therefore such a switch would be in a sense incomplete.<sup>17</sup>

Some languages sharing the same script define macros to switch it (eg, `\textcyrillic`), but be aware they may also set the language to a certain default. Even the babel core defined `\textlatin`, but it was somewhat buggy because in some cases it messed up encodings and fonts (for example, if the main Latin encoding was LY1), and therefore it has been deprecated.<sup>18</sup>

`\ensureascii`  $\langle text \rangle$

**New 3.9i** This macro makes sure  $\langle text \rangle$  is typeset with a LICR-savvy encoding in the ASCII range. It is used to redefine `\TeX` and `\LaTeX` so that they are correctly typeset even with LGR or X2 (the complete list is stored in `\BabelNonASCII`, which by default is LGR, X2, OT2, OT3, OT6, LHE, LWN, LMA, LMC, LMS, LMU, but you can modify it). So, in some sense it fixes the bug described in the previous paragraph.

If non-ASCII encodings are not loaded (or no encoding at all), it is no-op (also `\TeX` and `\LaTeX` are not redefined); otherwise, `\ensureascii` switches to the encoding at the beginning of the document if ASCII-savvy, or else the last ASCII-savvy encoding loaded. For example, if you load LY1, LGR, then it is set to LY1, but if you load LY1, T2A it is set to T2A. The symbol encodings TS1, T3, and TS3 are not taken into account, since they are not used for “ordinary” text (they are stored in `\BabelNonText`, used in some special cases when no Latin encoding is explicitly set).

The foregoing rules (which are applied “at begin document”) cover most of the cases. No assumption is made on characters above 127, which may not follow the LICR conventions – the goal is just to ensure most of the ASCII letters and symbols are the right ones.

### 1.24 Selecting directions

No macros to select the writing direction are provided, either – writing direction is intrinsic to each script and therefore it is best set by the language (which can be a dummy one). Furthermore, there are in fact two right-to-left modes, depending on the language, which differ in the way ‘weak’ numeric characters are ordered (eg, Arabic %123 vs Hebrew 123%).

**WARNING** The current code for `text` in luatex should be considered essentially stable, but, of course, it is not bug-free and there can be improvements in the future, because setting bidi text has many subtleties (see for example <https://www.w3.org/TR/html-bidi/>). A basic stable version for other engines must wait. This applies to text; there is a basic support for **graphical** elements, including the picture environment (with `pict2e`) and `pfg/tikz`. Also, indexes and the like are under study, as well as math (there are progresses in the latter, including `amsmath` and `mathtools` too, but for example gathered may fail).

An effort is being made to avoid incompatibilities in the future (this one of the reason currently bidi must be explicitly requested as a package option, with a certain bidi model, and also the layout options described below).

**WARNING** If characters to be mirrored are shown without changes with luatex, try with the following line:

---

<sup>17</sup>The so-called Unicode fonts do not improve the situation either. So, a font suited for Vietnamese is not necessarily suited for, say, the romanization of Indic languages, and the fact it contains glyphs for Modern Greek does not mean it includes them for Classic Greek.

<sup>18</sup>But still defined for backwards compatibility.

```
\babeladjust{bidi.mirroring=off}
```

There are some package options controlling bidi writing.

**bidi=** default | basic | basic-r | bidi-l | bidi-r

**New 3.14** Selects the bidi algorithm to be used. With default the bidi mechanism is just activated (by default it is not), but every change must be marked up. In xetex and pdftex this is the only option.

In luatex, **basic-r** provides a simple and fast method for R text, which handles numbers and unmarked L text within an R context many in typical cases. **New 3.19** Finally, **basic** supports both L and R text, and it is the preferred method (support for **basic-r** is currently limited). (They are named **basic** mainly because they only consider the intrinsic direction of scripts and weak directionality.)

**New 3.29** In xetex, **bidi-r** and **bidi-l** resort to the package **bidi** (by Vafa Khalighi). Integration is still somewhat tentative, but it mostly works. For RL documents use the former, and for LR ones use the latter.

There are samples on GitHub, under `/required/babel/samples`. See particularly `lua-bidibasic.tex` and `lua-secenum.tex`.

**EXAMPLE** The following text comes from the Arabic Wikipedia (article about Arabia). Copy-pasting some text from the Wikipedia is a good way to test this feature. Remember **basic** is available in luatex only.

```
\documentclass{article}

\usepackage[bidi=basic]{babel}

\babelprovide[import, main]{arabic}

\babelfont{rm}{FreeSerif}

\begin{document}

    وقد عرفت شبه جزيرة العرب طيلة العصر الهيليني (الآغريقي) بـ
    Arabia أو Aravia (بالآغريقية Ἀραβία)، استخدم الرومان ثلاث
    بادئات بـ“Arabia” على ثلاث مناطق من شبه الجزيرة العربية، إلا أنها
    حقيقةً كانت أكبر مما تعرف عليه اليوم.

\end{document}
```

**EXAMPLE** With **bidi=basic** both L and R text can be mixed without explicit markup (the latter will be only necessary in some special cases where the Unicode algorithm fails). It is used much like **bidi=basic-r**, but with R text inside L text you may want to map the font so that the correct features are in force. This is accomplished with an option in `\babelprovide`, as illustrated:

```
\documentclass{book}

\usepackage[english, bidi=basic]{babel}

\babelprovide[onchar=ids fonts]{arabic}

\babelfont{rm}{Crimson}
\babelfont[*arabic]{rm}{FreeSerif}

\begin{document}

    Most Arabic speakers consider the two varieties to be two registers
```

```
of one language, although the two registers can be referred to in
Arabic as فصحي العصر \textit{fuṣḥā l-‘aṣr} (MSA) and
فصحي التراث \textit{fuṣḥā t-turāth} (CA).
```

```
\end{document}
```

In this example, and thanks to `onchar=ids` fonts, any Arabic letter (because the language is arabic) changes its font to that set for this language (here defined via `*arabic`, because Crimson does not provide Arabic letters).

**NOTE** Boxes are “black boxes”. Numbers inside an `\hbox` (for example in a `\ref`) do not know anything about the surrounding chars. So, `\ref{A}-\ref{B}` are not rendered in the visual order A-B, but in the wrong one B-A (because the hyphen does not “see” the digits inside the `\hbox`’es). If you need `\ref` ranges, the best option is to define a dedicated macro like this (to avoid explicit direction changes in the body; here `\texthe` must be defined to select the main language):

```
\newcommand\refrange[2]{\babelsublr{\texthe{\ref{#1}}-\texthe{\ref{#2}}}}
```

In the future a more complete method, reading recursively boxed text, may be added.

**layout=** sectioning | counters | lists | contents | footnotes | captions | columns | graphics | extras

**New 3.16** *To be expanded.* Selects which layout elements are adapted in bidi documents, including some text elements (except with options loading the `bidi` package, which provides its own mechanism to control these elements). You may use several options with a space-separated list, like `layout=counters contents sectioning` (in **New 3.85** spaces are to be preferred over dots, which was the former syntax). This list will be expanded in future releases. Note not all options are required by all engines.

**sectioning** makes sure the sectioning macros are typeset in the main language, but with the title text in the current language (see below `\BabelPatchSection` for further details).

**counters** required in all engines (except `luatex` with `bidi=basic`) to reorder section numbers and the like (eg, `<subsection>.<section>`); required in `xetex` and `pdftex` for counters in general, as well as in `luatex` with `bidi=default`; required in `luatex` for numeric footnote marks `>9` with `bidi=basic-r` (but *not* with `bidi=basic`); note, however, it can depend on the counter format.

With counters, `\arabic` is not only considered L text always (with `\babelsublr`, see below), but also an “isolated” block which does not interact with the surrounding chars. So, while `1.2` in R text is rendered in that order with `bidi=basic` (as a decimal number), in `\arabic{c1}.\arabic{c2}` the visual order is `c2.c1`. Of course, you may always adjust the order by changing the language, if necessary.

**New 3.84** Since `\thepage` is (indirectly) redefined, `makeindex` will reject many entries as invalid. With `counters*` `babel` attempts to remove the conflicting macros.

**lists** required in `xetex` and `pdftex`, but only in bidirectional (with both R and L paragraphs) documents in `luatex`.

**WARNING** As of April 2019 there is a bug with `\parshape` in `luatex` (a `TEX` primitive) which makes lists to be horizontally misplaced if they are inside a `\vbox` (like `minipage`) and the current direction is different from the main one. A workaround is to restore the main language before the box and then set the local one inside.

**contents** required in `xetex` and `pdftex`; in `luatex` toc entries are R by default if the main language is R.

**columns** required in `xetex` and `pdftex` to reverse the column order (currently only the standard two-column mode); in `luatex` they are R by default if the main language is R (including `multicol`).

**footnotes** not required in monolingual documents, but it may be useful in bidirectional documents (with both R and L paragraphs) in all engines; you may use alternatively `\BabelFootnote` described below (what this option does exactly is also explained there).

**captions** is similar to sectioning, but for `\caption`; not required in monolingual documents with `luatex`, but may be required in `xetex` and `pdfTeX` in some styles (support for the latter two engines is still experimental) **New 3.18** .

**tabular** required in `luatex` for R tabular, so that the first column is the right one (it has been tested only with simple tables, so expect some readjustments in the future); ignored in `pdfTeX` or `xetex` (which will not support a similar option in the short term). It patches an internal command, so it might be ignored by some packages and classes (or even raise an error). **New 3.18** .

**graphics** modifies the `picture` environment so that the whole figure is L but the text is R. It *does not* work with the standard `picture`, and `pict2e` is required. It attempts to do the same for `pgf/tikz`. Somewhat experimental. **New 3.32** .

**extras** is used for miscellaneous readjustments which do not fit into the previous groups. Currently redefines in `luatex` `\underline` and `\LaTeXe` **New 3.19** .

**EXAMPLE** Typically, in an Arabic document you would need:

```
\usepackage[bidi=basic,
             layout=counters tabular]{babel}
```

**\babelsublr** `{\langle lr-text \rangle}`

Digits in `pdfTeX` must be marked up explicitly (unlike `luatex` with `bidi=basic` or `bidi=basic-r` and, usually, `xetex`). This command is provided to set `{\langle lr-text \rangle}` in L mode if necessary. It's intended for what Unicode calls weak characters, because words are best set with the corresponding language. For this reason, there is no `r1` counterpart. Any `\babelsublr` in *explicit* L mode is ignored. However, with `bidi=basic` and *implicit* L, it first returns to R and then switches to explicit L. To clarify this point, consider, in an R context:

```
RTL A ltr text \thechapter{} and still ltr RTL B
```

There are *three* R blocks and *two* L blocks, and the order is *RTL B and still ltr 1 ltr text RTL A*. This is by design to provide the proper behavior in the most usual cases — but if you need to use `\ref` in an L text inside R, the L text must be marked up explicitly; for example:

```
RTL A \foreignlanguage{english}{ltr text \thechapter{} and still ltr} RTL B
```

**\BabelPatchSection** `{\langle section-name \rangle}`

Mainly for `bidi` text, but it can be useful in other cases. `\BabelPatchSection` and the corresponding option `layout=sectioning` takes a more logical approach (at least in many cases) because it applies the global language to the section format (including the `\chaptername` in `\chapter`), while the section text is still the current language. The latter is passed to `tocs` and `marks`, too, and with `sectioning` in `layout` they both reset the “global” language to the main one, while the text uses the “local” language. With `layout=sectioning` all the standard sectioning commands are redefined (it also “isolates” the page number in heads, for a proper `bidi` behavior), but with this command you can set them individually if necessary (but note then `tocs` and `marks` are not touched).

**\BabelFootnote** `{\langle cmd \rangle}{\langle local-language \rangle}{\langle before \rangle}{\langle after \rangle}`

**New 3.17** Something like:

```
\BabelFootnote{\parsfootnote}{\language}\{({})}
```

defines `\parsfootnote` so that `\parsfootnote{note}` is equivalent to:

```
\footnote{(\foreignlanguage{\language}{note})}
```

but the footnote itself is typeset in the main language (to unify its direction). In addition, `\parsfootnotetext` is defined. The option `footnotes just` does the following:

```
\BabelFootnote{\footnote}{\language}\{({})%
\BabelFootnote{\localfootnote}{\language}\{({})%
\BabelFootnote{\mainfootnote}\{({})}
```

(which also redefine `\footnotetext` and define `\localfootnotetext` and `\mainfootnotetext`). If the language argument is empty, then no language is selected inside the argument of the footnote. Note this command is available always in bidi documents, even without `layout=footnotes`.

**EXAMPLE** If you want to preserve directionality in footnotes and there are many footnotes entirely in English, you can define:

```
\BabelFootnote{\enfootnote}{english}\{({}){.}
```

It adds a period outside the English part, so that it is placed at the left in the last line. This means the dot the end of the footnote text should be omitted.

## 1.25 Language attributes

### `\languageattribute`

This is a user-level command, to be used in the preamble of a document (after `\usepackage[...]{babel}`), that declares which attributes are to be used for a given language. It takes two arguments: the first is the name of the language; the second, a (list of) attribute(s) to be used. Attributes must be set in the preamble and only once – they cannot be turned on and off. The command checks whether the language is known in this document and whether the attribute(s) are known for this language.

Very often, using a *modifier* in a package option is better.

Several language definition files use their own methods to set options. For example, `french` uses `\frenchsetup`, `magyar` (1.5) uses `\magyarOptions`; modifiers provided by `spanish` have no attribute counterparts. Macros setting options are also used (eg, `\ProsodicMarksOn` in `latin`).

## 1.26 Hooks

**New 3.9a** A hook is a piece of code to be executed at certain events. Some hooks are predefined when `luatex` and `xetex` are used.

**New 3.64** This is not the only way to inject code at those points. The events listed below can be used as a hook name in `\AddToHook` in the form `babel/⟨language-name⟩/⟨event-name⟩` (with `*` it's applied to all languages), but there is a limitation, because the parameters passed with the `babel` mechanism are not allowed. The `\AddToHook` mechanism does *not* replace the current one in 'babel'. Its main advantage is you can reconfigure 'babel' even before loading it. See the example below.



**\AddBabelHook** [*<lang>*]{*<name>*}{*<event>*}{*<code>*}

The same name can be applied to several events. Hooks with a certain *<name>* may be enabled and disabled for all defined events with `\EnableBabelHook{<name>}`, `\DisableBabelHook{<name>}`. Names containing the string `babel` are reserved (they are used, for example, by `\usesshortands*` to add a hook for the event `afterextras`).

**New 3.33** They may be also applied to a specific language with the optional argument; language-specific settings are executed after global ones.

Current events are the following; in some of them you can use one to three  $\TeX$  parameters (`#1`, `#2`, `#3`), with the meaning given:

**addialect** (language name, dialect name) Used by `luababel.def` to load the patterns if not preloaded.

**patterns** (language name, language with encoding) Executed just after the `\language` has been set. The second argument has the patterns name actually selected (in the form of either `lang:ENC` or `lang`).

**hyphenation** (language name, language with encoding) Executed locally just before exceptions given in `\babelhyphenation` are actually set.

**defaultcommands** Used (locally) in `\StartBabelCommands`.

**encodedcommands** (input, font encodings) Used (locally) in `\StartBabelCommands`. Both `xetex` and `luatex` make sure the encoded text is read correctly.

**stopcommands** Used to reset the above, if necessary.

**write** This event comes just after the switching commands are written to the aux file.

**beforeextras** Just before executing `\extras<language>`. This event and the next one should not contain language-dependent code (for that, add it to `\extras<language>`).

**afterextras** Just after executing `\extras<language>`. For example, the following deactivates shorthands in all languages:

```
\AddBabelHook{noshort}{afterextras}{\languageshorthands{none}}
```

**stringprocess** Instead of a parameter, you can manipulate the macro `\BabelString` containing the string to be defined with `\SetString`. For example, to use an expanded version of the string in the definition, write:

```
\AddBabelHook{myhook}{stringprocess}{%  
  \protected@edef\BabelString{\BabelString}}
```

**initiateactive** (char as active, char as other, original char) **New 3.9i** Executed just after a shorthand has been ‘initiated’. The three parameters are the same character with different catcodes: active, other (`\string’ed`) and the original one.

**afterreset** **New 3.9i** Executed when selecting a language just after `\originalTeX` is run and reset to its base value, before executing `\captions<language>` and `\date<language>`.

Four events are used in `hyphen.cfg`, which are handled in a quite different way for efficiency reasons – unlike the precedent ones, they only have a single hook and replace a default definition.

**everylanguage** (language) Executed before every language patterns are loaded.

**loadkernel** (file) By default just defines a few basic commands. It can be used to define different versions of them or to load a file.

**loadpatterns** (patterns file) Loads the patterns file. Used by `luababel.def`.

**loadexceptions** (exceptions file) Loads the exceptions file. Used by `luababel.def`.

**EXAMPLE** The generic unlocalized  $\TeX$  hooks are predefined, so that you can write:

```
\AddToHook{babel/*}{afterextras}{\frenchspacing}
```



which is executed always after the extras for the language being selected (and just before the non-localized hooks defined with `\AddBabelHook`).

In addition, locale-specific hooks in the form `babel/⟨language-name⟩/⟨event-name⟩` are *recognized* (executed just before the localized babel hooks), but they are *not predefined*. You have to do it yourself. For example, to set `\frenchspacing` only in bengali:

```
\ActivateGenericHook{babel/bengali/afterextras}
\AddToHook{babel/bengali/afterextras}{\frenchspacing}
```

**\BabelContentsFiles** New 3.9a This macro contains a list of “toc” types requiring a command to switch the language. Its default value is `toc,lof,lot`, but you may redefine it with `\renewcommand` (it’s up to you to make sure no toc type is duplicated).

## 1.27 Languages supported by babel with ldf files

In the following table most of the languages supported by babel with and .ldf file are listed, together with the names of the option which you can load babel with for each language. Note this list is open and the current options may be different. It does not include ini files.

<b>Afrikaans</b>	afrikaans
<b>Azerbaijani</b>	azerbaijani
<b>Basque</b>	basque
<b>Breton</b>	breton
<b>Bulgarian</b>	bulgarian
<b>Catalan</b>	catalan
<b>Croatian</b>	croatian
<b>Czech</b>	czech
<b>Danish</b>	danish
<b>Dutch</b>	dutch
<b>English</b>	english, USenglish, american, UKenglish, british, canadian, australian, newzealand
<b>Esperanto</b>	esperanto
<b>Estonian</b>	estonian
<b>Finnish</b>	finnish
<b>French</b>	french, francais, canadien, acadian
<b>Galician</b>	galician
<b>German</b>	austrian, german, germanb, ngerman, naustrian
<b>Greek</b>	greek, polutonikogreek
<b>Hebrew</b>	hebrew
<b>Icelandic</b>	icelandic
<b>Indonesian</b>	indonesian (bahasa, indon, bahasai)
<b>Interlingua</b>	interlingua
<b>Irish Gaelic</b>	irish
<b>Italian</b>	italian
<b>Latin</b>	latin
<b>Lower Sorbian</b>	lowersorbian
<b>Malay</b>	malay, melayu (bahasam)
<b>North Sami</b>	samin
<b>Norwegian</b>	norsk, nynorsk
<b>Polish</b>	polish
<b>Portuguese</b>	portuguese, brazilian (portuges, brazil) <sup>19</sup>
<b>Romanian</b>	romanian
<b>Russian</b>	russian
<b>Scottish Gaelic</b>	scottish
<b>Spanish</b>	spanish

<sup>19</sup>The two last name comes from the times when they had to be shortened to 8 characters

**Slovakian** slovak  
**Slovenian** slovene  
**Swedish** swedish  
**Serbian** serbian  
**Turkish** turkish  
**Ukrainian** ukrainian  
**Upper Sorbian** uppersorbian  
**Welsh** welsh

There are more languages not listed above, including hindi, thai, thaicjk, latvian, turkmen, magyar, mongolian, romansh, lithuanian, spanglish, vietnamese, japanese, pinyin, arabic, farsi, ibygreek, bgreek, serbianc, frenchle, ethiop and friulan.

Most of them work out of the box, but some may require extra fonts, encoding files, a preprocessor or even a complete framework (like CJK or luatexja). For example, if you have got the velthuis/devnag package, you can create a file with extension .dn:

```

\documentclass{article}
\usepackage[hindi]{babel}
\begin{document}
{\dn devaanaa.m priya.h}
\end{document}

```

Then you preprocess it with devnag  $\langle file \rangle$ , which creates  $\langle file \rangle$ .tex; you can then typeset the latter with  $\text{\LaTeX}$ .

## 1.28 Unicode character properties in luatex

**New 3.32** Part of the babel job is to apply Unicode rules to some script-specific features based on some properties. Currently, they are 3, namely, direction (ie, bidi class), mirroring glyphs, and line breaking for CJK scripts. These properties are stored in lua tables, which you can modify with the following macro (for example, to set them for glyphs in the PUA).

**$\backslash\text{babelcharproperty}$**   $\{\langle char-code \rangle\}[\langle to-char-code \rangle]\{\langle property \rangle\}\{\langle value \rangle\}$

**New 3.32** Here,  $\{\langle char-code \rangle\}$  is a number (with  $\text{\TeX}$  syntax). With the optional argument, you can set a range of values. There are three properties (with a short name, taken from Unicode): direction (bc), mirror (bmg), linebreak (lb). The settings are global, and this command is allowed only in vertical mode (the preamble or between paragraphs). For example:

```

\babelcharproperty{\_}{mirror}{\_}
\babelcharproperty{\_}{direction}{1} % or al, r, en, an, on, et, cs
\babelcharproperty{\_}{linebreak}{cl} % or id, op, cl, ns, ex, in, hy

```

Please, refer to the Unicode standard (Annex #9 and Annex #14) for the meaning of the available codes. For example, en is ‘European number’ and id is ‘ideographic’.

**New 3.39** Another property is locale, which adds characters to the list used by onchar in  $\backslash\text{babelprovide}$ , or, if the last argument is empty, removes them. The last argument is the locale name:

```

\babelcharproperty{\_,}{locale}{english}

```

## 1.29 Tweaking some features

**$\backslash\text{babeladjust}$**   $\{\langle key-value-list \rangle\}$

**New 3.36** Sometimes you might need to disable some babel features. Currently this macro understands the following keys [to be documented], with values on or off:

<code>bidi.mirroring</code>	<code>linebreak.cjk</code>	<code>autoload.bcp47</code>
<code>bidi.text</code>	<code>justify.arabic</code>	<code>bcp47.toname</code>
<code>bidi.math</code>	<code>layout.tabular</code>	
<code>linebreak.sea</code>	<code>layout.lists</code>	

Other keys [to be documented] are:

<code>autoload.options</code>	<code>autoload.bcp47.options</code>	<code>select.write</code>
<code>autoload.bcp47.prefix</code>	<code>prehyphenation.disable</code>	<code>select.encoding</code>

For example, you can set `\babeladjust{bidi.text=off}` if you are using an alternative algorithm or with large sections not requiring it. Use with care, because these options do not deactivate other related options (like paragraph direction with `bidi.text`).

### 1.30 Tips, workarounds, known issues and notes

- If you use the document class *book* and you use `\ref` inside the argument of `\chapter` (or just use `\ref` inside `\MakeUppercase`),  $\LaTeX$  will keep complaining about an undefined label. To prevent such problems, you can revert to using uppercase labels, you can use `\lowercase{\ref{foo}}` inside the argument of `\chapter`, or, if you will not use shorthands in labels, set the safe option to `none` or `bib`.
- Both `ltxdoc` and `babel` use `\AtBeginDocument` to change some catcodes, and `babel` reloads `hline` to make sure `:` has the right one, so if you want to change the catcode of `|` it has to be done using the same method at the proper place, with

```
\AtBeginDocument{\DeleteShortVerb{\|}}
```

*before* loading `babel`. This way, when the document begins the sequence is (1) make `|` active (`ltxdoc`); (2) make it unactive (your settings); (3) make `babel` shorthands active (`babel`); (4) reload `hline` (`babel`, now with the correct catcodes for `|` and `:`).

- Documents with several input encodings are not frequent, but sometimes are useful. You can set different encodings for different languages as the following example shows:

```
\addto\extrasfrench{\inputencoding{latin1}}
\addto\extrasrussian{\inputencoding{koi8-r}}
```

- For the hyphenation to work correctly, `lccodes` cannot change, because  $\TeX$  only takes into account the values when the paragraph is hyphenated, i.e., when it has been finished.<sup>20</sup> So, if you write a chunk of French text with `\foreignlanguage`, the apostrophes might not be taken into account. This is a limitation of  $\TeX$ , not of `babel`. Alternatively, you may use `\usesshorthands` to activate `'` and `\defineshortand`, or redefine `\textquoteright` (the latter is called by the non-ASCII right quote).
- `\bibitem` is out of sync with `\selectlanguage` in the `.aux` file. The reason is `\bibitem` uses `\immediate` (and others, in fact), while `\selectlanguage` doesn't. There is a similar issue with floats, too. There is no known workaround.
- `Babel` does not take into account `\normalsfcodes` and (non-)French spacing is not always properly (un)set by languages. However, problems are unlikely to happen and therefore this part remains untouched in version 3.9 (but it is in the 'to do' list).
- Using a character mathematically active (ie, with math code "8000) as a shorthand can make  $\TeX$  enter in an infinite loop in some rare cases. (Another issue in the 'to do' list, although there is a partial solution.)

<sup>20</sup>This explains why  $\LaTeX$  assumes the lowercase mapping of T1 and does not provide a tool for multiple mappings. Unfortunately, `\savingshyphcodes` is not a solution either, because `lccodes` for hyphenation are frozen in the format and cannot be changed.

The following packages can be useful, too (the list is still far from complete):

**csquotes** Logical markup for quotes.

**iflang** Tests correctly the current language.

**hyphsubst** Selects a different set of patterns for a language.

**translator** An open platform for packages that need to be localized.

**siunitx** Typesetting of numbers and physical quantities.

**biblatex** Programmable bibliographies and citations.

**bicaption** Bilingual captions.

**babelbib** Multilingual bibliographies.

**microtype** Adjusts the typesetting according to some languages (kerning and spacing).  
Ligatures can be disabled.

**substitutefont** Combines fonts in several encodings.

**mkpattern** Generates hyphenation patterns.

**tracklang** Tracks which languages have been requested.

**ucharclasses** (xetex) Switches fonts when you switch from one Unicode block to another.

**zhspacing** Spacing for CJK documents in xetex.

### 1.31 Current and future work

The current work is focused on the so-called complex scripts in luatex. In 8-bit engines, babel provided a basic support for bidi text as part of the style for Hebrew, but it is somewhat unsatisfactory and internally replaces some hardwired commands by other hardwired commands (generic changes would be much better).

Useful additions would be, for example, time, currency, addresses and personal names.<sup>21</sup>. But that is the easy part, because they don't require modifying the  $\LaTeX$  internals.

Calendars (Arabic, Persian, Indic, etc.) are under study.

Also interesting are differences in the sentence structure or related to it. For example, in Basque the number precedes the name (including chapters), in Hungarian “from (1)” is “(1)-ből”, but “from (3)” is “(3)-ből”, in Spanish an item labelled “3.” may be referred to as either “ítem 3.” or “3.<sup>er</sup> ítem”, and so on.

An option to manage bidirectional document layout in luatex (lists, footnotes, etc.) is almost finished, but xetex required more work. Unfortunately, proper support for xetex requires patching somehow lots of macros and packages (and some issues related to `\specials` remain, like color and hyperlinks), so babel resorts to the bidi package (by Vafa Khalighi). See the babel repository for a small example (xe-bidi).

### 1.32 Tentative and experimental code

See the code section for `\foreignlanguage*` (a new starred version of `\foreignlanguage`). For old an deprecated functions, see the babel site.

#### Options for locales loaded on the fly

**New 3.51** `\babeladjust{ autoloader.options = ... }` sets the options when a language is loaded on the fly (by default, no options). A typical value would be `import`, which defines captions, date, numerals, etc., but ignores the code in the tex file (for example, extended numerals in Greek).

#### Labels

**New 3.48** There is some work in progress for babel to deal with labels, both with the relation to captions (chapters, part), and how counters are used to define them. It is still somewhat tentative because it is far from trivial – see the babel site for further details.

## 2 Loading languages with `language.dat`

$\TeX$  and most engines based on it (pdf $\TeX$ , xetex,  $\epsilon\text{-}\TeX$ , the main exception being luatex) require hyphenation patterns to be preloaded when a format is created (eg,  $\LaTeX$ , Xe $\LaTeX$ ,

<sup>21</sup>See for example POSIX, ISO 14652 and the Unicode Common Locale Data Repository (CLDR). Those systems, however, have limited application to  $\TeX$  because their aim is just to display information and not fine typesetting.

pdf<sub>La</sub>TeX). babel provides a tool which has become standard in many distributions and based on a “configuration file” named `language.dat`. The exact way this file is used depends on the distribution, so please, read the documentation for the latter (note also some distributions generate the file with some tool).

**New 3.9q** With luatex, however, patterns are loaded on the fly when requested by the language (except the “0th” language, typically english, which is preloaded always).<sup>22</sup> Until 3.9n, this task was delegated to the package `luatex-hyphen`, by Khaled Hosny, Élie Roux, and Manuel Pégourié-Gonnard, and required an extra file named `language.dat.lua`, but now a new mechanism has been devised based solely on `language.dat`. **You must rebuild the formats** if upgrading from a previous version. You may want to have a local `language.dat` for a particular project (for example, a book on Chemistry).<sup>23</sup>

## 2.1 Format

In that file the person who maintains a T<sub>E</sub>X environment has to record for which languages he has hyphenation patterns *and* in which files these are stored<sup>24</sup>. When hyphenation exceptions are stored in a separate file this can be indicated by naming that file *after* the file with the hyphenation patterns.

The file can contain empty lines and comments, as well as lines which start with an equals (=) sign. Such a line will instruct L<sub>A</sub>T<sub>E</sub>X that the hyphenation patterns just processed have to be known under an alternative name. Here is an example:

```
% File      : language.dat
% Purpose   : tell iniTeX what files with patterns to load.
english     english.hyphenations
=british

dutch       hyphen.dutch exceptions.dutch % Nederlands
german      hyphen.ger
```

You may also set the font encoding the patterns are intended for by following the language name by a colon and the encoding code.<sup>25</sup> For example:

```
german:T1 hyphenT1.ger
german hyphen.ger
```

With the previous settings, if the encoding when the language is selected is T1 then the patterns in `hyphenT1.ger` are used, but otherwise use those in `hyphen.ger` (note the encoding can be set in `\extras{lang}`).

A typical error when using babel is the following:

```
No hyphenation patterns were preloaded for
the language '<lang>' into the format.
Please, configure your TeX system to add them and
rebuild the format. Now I will use the patterns
preloaded for english instead}}
```

It simply means you must reconfigure `language.dat`, either by hand or with the tools provided by your distribution.

<sup>22</sup>This feature was added to 3.9o, but it was buggy. Both 3.9o and 3.9p are deprecated.

<sup>23</sup>The loader for lua(e)tex is slightly different as it's not based on babel but on `etex.src`. Until 3.9p it just didn't work, but thanks to the new code it works by reloading the data in the babel way, i.e., with `language.dat`.

<sup>24</sup>This is because different operating systems sometimes use very different file-naming conventions.

<sup>25</sup>This is not a new feature, but in former versions it didn't work correctly.

### 3 The interface between the core of babel and the language definition files

The *language definition files* (ldf) must conform to a number of conventions, because these files have to fill in the gaps left by the common code in `babel.def`, i. e., the definitions of the macros that produce texts. Also the language-switching possibility which has been built into the babel system has its implications.

The following assumptions are made:

- Some of the language-specific definitions might be used by plain  $\TeX$  users, so the files have to be coded so that they can be read by both  $\LaTeX$  and plain  $\TeX$ . The current format can be checked by looking at the value of the macro `\fmtname`.
- The common part of the babel system redefines a number of macros and environments (defined previously in the document style) to put in the names of macros that replace the previously hard-wired texts. These macros have to be defined in the language definition files.
- The language definition files must define five macros, used to activate and deactivate the language-specific definitions. These macros are `\langle lang \rangle hyphenmins`, `\captions\langle lang \rangle`, `\date\langle lang \rangle`, `\extras\langle lang \rangle` and `\noextras\langle lang \rangle` (the last two may be left empty); where `\langle lang \rangle` is either the name of the language definition file or the name of the  $\LaTeX$  option that is to be used. These macros and their functions are discussed below. You must define all or none for a language (or a dialect); defining, say, `\date\langle lang \rangle` but not `\captions\langle lang \rangle` does not raise an error but can lead to unexpected results.
- When a language definition file is loaded, it can define `\l@\langle lang \rangle` to be a dialect of `\language0` when `\l@\langle lang \rangle` is undefined.
- Language names must be all lowercase. If an unknown language is selected, babel will attempt setting it after lowercasing its name.
- The semantics of modifiers is not defined (on purpose). In most cases, they will just be simple separated options (eg, `spanish`), but a language might require, say, a set of options organized as a tree with suboptions (in such a case, the recommended separator is `/`).

Some recommendations:

- The preferred shorthand is `"`, which is not used in  $\LaTeX$  (quotes are entered as `` `` and `' '`). Other good choices are characters which are not used in a certain context (eg, `=` in an ancient language). Note however `=`, `<`, `>`, `:` and the like can be dangerous, because they may be used as part of the syntax of some elements (numeric expressions, key/value pairs, etc.).
- Captions should not contain shorthands or encoding-dependent commands (the latter is not always possible, but should be clearly documented). They should be defined using the LICR. You may also use the new tools for encoded strings, described below.
- Avoid adding things to `\noextras\langle lang \rangle` except for `umlauthigh` and friends, `\bbl@deactivate`, `\bbl@(non)frenchspacing`, and language-specific macros. Use always, if possible, `\babel@save` and `\babel@savevariable` (except if you still want to have access to the previous value). Do not reset a macro or a setting to a hardcoded value. Never. Instead save its value in `\extras\langle lang \rangle`.
- Do not switch scripts. If you want to make sure a set of glyphs is used, switch either the font encoding (low-level) or the language (high-level, which in turn may switch the font encoding). Usage of things like `\latintext` is deprecated.<sup>26</sup>

---

<sup>26</sup>But not removed, for backward compatibility.

- Please, for “private” internal macros do not use the `\bb1@` prefix. It is used by babel and it can lead to incompatibilities.

There are no special requirements for documenting your language files. Now they are not included in the base babel manual, so provide a standalone document suited for your needs, as well as other files you think can be useful. A PDF and a “readme” are strongly recommended.

### 3.1 Guidelines for contributed languages

Currently, the easiest way to contribute a new language is by taking one of the 500 or so `ini` templates available on GitHub as a basis. Just make a pull request or download it and then, after filling the fields, send it to me. Feel free to ask for help or to make feature requests.

As to `ldf` files, now language files are “outsourced” and are located in a separate directory (`/macros/latex/contrib/babel-contrib`), so that they are contributed directly to CTAN (please, do not send to me language styles just to upload them to CTAN). Of course, placing your style files in this directory is not mandatory, but if you want to do it, here are a few guidelines.

- Do not hesitate stating on the file heads you are the author and the maintainer, if you actually are. There is no need to state the babel maintainer(s) as authors if they have not contributed significantly to your language files.
- Fonts are not strictly part of a language, so they are best placed in the corresponding TeX tree. This includes not only `tfm`, `vf`, `ps1`, `otf`, `mf` files and the like, but also `fd` ones.
- Font and input encodings are usually best placed in the corresponding tree, too, but sometimes they belong more naturally to the babel style. Note you may also need to define a LICR.
- Babel `ldf` files may just interface a framework, as it happens often with Oriental languages/scripts. This framework is best placed in its own directory.

The following page provides a starting point for `ldf` files:

<http://www.texnia.com/incubator.html>. See also

<https://latex3.github.io/babel/guides/list-of-locale-templates.html>.

If you need further assistance and technical advice in the development of language styles, I am willing to help you. And of course, you can make any suggestion you like.

### 3.2 Basic macros

In the core of the babel system, several macros are defined for use in language definition files. Their purpose is to make a new language known. The first two are related to hyphenation patterns.

**`\addlanguage`** The macro `\addlanguage` is a non-outer version of the macro `\newlanguage`, defined in `plain.tex` version 3.x. Here “language” is used in the TeX sense of set of hyphenation patterns.

**`\adddialect`** The macro `\adddialect` can be used when two languages can (or must) use the same hyphenation patterns. This can also be useful for languages for which no patterns are preloaded in the format. In such cases the default behavior of the babel system is to define this language as a ‘dialect’ of the language for which the patterns were loaded as `\language0`. Here “language” is used in the TeX sense of set of hyphenation patterns.

**`\<lang>hyphenmins`** The macro `\<lang>hyphenmins` is used to store the values of the `\lefthyphenmin` and `\righthyphenmin`. Redefine this macro to set your own values, with two numbers corresponding to these two parameters. For example:

```
\renewcommand\spanishhyphenmins{34}
```



	(Assigning <code>\lefthyphenmin</code> and <code>\righthyphenmin</code> directly in <code>\extras&lt;lang&gt;</code> has no effect.)
<code>\providehyphenmins</code>	The macro <code>\providehyphenmins</code> should be used in the language definition files to set <code>\lefthyphenmin</code> and <code>\righthyphenmin</code> . This macro will check whether these parameters were provided by the hyphenation file before it takes any action. If these values have been already set, this command is ignored (currently, default pattern files do <i>not</i> set them).
<code>\captions&lt;lang&gt;</code>	The macro <code>\captions&lt;lang&gt;</code> defines the macros that hold the texts to replace the original hard-wired texts.
<code>\date&lt;lang&gt;</code>	The macro <code>\date&lt;lang&gt;</code> defines <code>\today</code> .
<code>\extras&lt;lang&gt;</code>	The macro <code>\extras&lt;lang&gt;</code> contains all the extra definitions needed for a specific language. This macro, like the following, is a hook – you can add things to it, but it must not be used directly.
<code>\noextras&lt;lang&gt;</code>	Because we want to let the user switch between languages, but we do not know what state $\TeX$ might be in after the execution of <code>\extras&lt;lang&gt;</code> , a macro that brings $\TeX$ into a predefined state is needed. It will be no surprise that the name of this macro is <code>\noextras&lt;lang&gt;</code> .
<code>\bbl@declare@ttribute</code>	This is a command to be used in the language definition files for declaring a language attribute. It takes three arguments: the name of the language, the attribute to be defined, and the code to be executed when the attribute is to be used.
<code>\main@language</code>	To postpone the activation of the definitions needed for a language until the beginning of a document, all language definition files should use <code>\main@language</code> instead of <code>\selectlanguage</code> . This will just store the name of the language, and the proper language will be activated at the start of the document.
<code>\ProvidesLanguage</code>	The macro <code>\ProvidesLanguage</code> should be used to identify the language definition files. Its syntax is similar to the syntax of the $\LaTeX$ command <code>\ProvidesPackage</code> .
<code>\LdfInit</code>	The macro <code>\LdfInit</code> performs a couple of standard checks that must be made at the beginning of a language definition file, such as checking the category code of the <code>@</code> -sign, preventing the <code>.ldf</code> file from being processed twice, etc.
<code>\ldf@quit</code>	The macro <code>\ldf@quit</code> does work needed if a <code>.ldf</code> file was processed earlier. This includes resetting the category code of the <code>@</code> -sign, preparing the language to be activated at <code>\begin{document}</code> time, and ending the input stream.
<code>\ldf@finish</code>	The macro <code>\ldf@finish</code> does work needed at the end of each <code>.ldf</code> file. This includes resetting the category code of the <code>@</code> -sign, loading a local configuration file, and preparing the language to be activated at <code>\begin{document}</code> time.
<code>\loadlocalcfg</code>	After processing a language definition file, $\LaTeX$ can be instructed to load a local configuration file. This file can, for instance, be used to add strings to <code>\captions&lt;lang&gt;</code> to support local document classes. The user will be informed that this configuration file has been loaded. This macro is called by <code>\ldf@finish</code> .
<code>\substitutefontfamily</code>	(Deprecated.) This command takes three arguments, a font encoding and two font family names. It creates a font description file for the first font in the given encoding. This <code>.fd</code> file will instruct $\LaTeX$ to use a font from the second family when a font from the first family in the given encoding seems to be needed.

### 3.3 Skeleton

Here is the basic structure of an `ldf` file, with a language, a dialect and an attribute. Strings are best defined using the method explained in sec. 3.8 (babel 3.9 and later).

```

\ProvidesLanguage{<language>}
[2016/04/23 v0.0 <Language> support from the babel system]
\LdfInit{<language>}{captions<language>}

\ifx\undefined\l@<language>
  \nopatterns{<Language>}
  \adddialect\l@<language>0
\fi

\adddialect\l@<dialect>\l@<language>

```



```

\bb1@declare@ttribute{<language>}{<attrib>}{%
  \expandafter\addto\expandafter\extras<language>
  \expandafter{\extras<attrib><language>}%
  \let\captions<language>\captions<attrib><language>}

\providehyphenmins{<language>}{\tw@\thr@@}

\StartBabelCommands*{<language>}{captions}
\SetString\chaptername{<chapter name>}
% More strings

\StartBabelCommands*{<language>}{date}
\SetString\monthinname{<name of first month>}
% More strings

\StartBabelCommands*{<dialect>}{captions}
\SetString\chaptername{<chapter name>}
% More strings

\StartBabelCommands*{<dialect>}{date}
\SetString\monthinname{<name of first month>}
% More strings

\EndBabelCommands

\addto\extras<language>{}
\addto\noextras<language>{}
\let\extras<dialect>\extras<language>
\let\noextras<dialect>\noextras<language>

\ldf@finish{<language>}

```

**NOTE** If for some reason you want to load a package in your style, you should be aware it cannot be done directly in the ldf file, but it can be delayed with `\AtEndOfPackage`. Macros from external packages can be used *inside* definitions in the ldf itself (for example, `\extras<language>`), but if executed directly, the code must be placed inside `\AtEndOfPackage`. A trivial example illustrating these points is:

```

\AtEndOfPackage{%
  \RequirePackage{dingbat}%      Delay package
  \savebox{\myeye}{\eye}}%      And direct usage
\newsavebox{\myeye}
\newcommand\myanchor{\anchor}%  But OK inside command

```

### 3.4 Support for active characters

In quite a number of language definition files, active characters are introduced. To facilitate this, some support macros are provided.

- `\initiate@active@char` The internal macro `\initiate@active@char` is used in language definition files to instruct  $\TeX$  to give a character the category code ‘active’. When a character has been made active it will remain that way until the end of the document. Its definition may vary.
- `\bb1@activate` The command `\bb1@activate` is used to change the way an active character expands.
- `\bb1@deactivate` `\bb1@activate` ‘switches on’ the active behavior of the character. `\bb1@deactivate` lets the active character expand to its former (mostly) non-active self.
- `\declare@shorthand` The macro `\declare@shorthand` is used to define the various shorthands. It takes three arguments: the name for the collection of shorthands this definition belongs to; the character (sequence) that makes up the shorthand, i.e. `~` or `"a`; and the code to be executed when the shorthand is encountered. (It does *not* raise an error if the shorthand character has not been “initiated”.)

`\bbl@add@special` The  $\TeX$ book states: “Plain  $\TeX$  includes a macro called `\dospecials` that is essentially a set macro, representing the set of all characters that have a special category code.” [4, p. 380]

`\bbl@remove@special` It is used to set text ‘verbatim’. To make this work if more characters get a special category code, you have to add this character to the macro `\dospecial`.  $\LaTeX$  adds another macro called `\@sanitize` representing the same character set, but without the curly braces. The macros `\bbl@add@special⟨char⟩` and `\bbl@remove@special⟨char⟩` add and remove the character `⟨char⟩` to these two sets.

`\@safe@activetrue` Enables and disables the “safe” mode. It is a tool for package and class authors. See the

`\@safe@activetrue` description below.

### 3.5 Support for saving macro definitions

Language definition files may want to *redefine* macros that already exist. Therefore a mechanism for saving (and restoring) the original definition of those macros is provided. We provide two macros for this<sup>27</sup>.

`\babel@save` To save the current meaning of any control sequence, the macro `\babel@save` is provided. It takes one argument, `⟨cname⟩`, the control sequence for which the meaning has to be saved.

`\babel@savevariable` A second macro is provided to save the current value of a variable. In this context, anything that is allowed after the `\` the primitive is considered to be a variable. The macro takes one argument, the `⟨variable⟩`.

The effect of the preceding macros is to append a piece of code to the current definition of `\originalTeX`. When `\originalTeX` is expanded, this code restores the previous definition of the control sequence or the previous value of the variable.

### 3.6 Support for extending macros

`\addto` The macro `\addto{⟨control sequence⟩}{⟨ $\TeX$  code⟩}` can be used to extend the definition of a macro. The macro need not be defined (ie, it can be undefined or `\relax`). This macro can, for instance, be used in adding instructions to a macro like `\extrasenglish`. Be careful when using this macro, because depending on the case the assignment can be either global (usually) or local (sometimes). That does not seem very consistent, but this behavior is preserved for backward compatibility. If you are using `etoolbox`, by Philipp Lehman, consider using the tools provided by this package instead of `\addto`.

### 3.7 Macros common to a number of languages

`\bbl@allowhyphens` In several languages compound words are used. This means that when  $\TeX$  has to hyphenate such a compound word, it only does so at the ‘-’ that is used in such words. To allow hyphenation in the rest of such a compound word, the macro `\bbl@allowhyphens` can be used.

`\allowhyphens` Same as `\bbl@allowhyphens`, but does nothing if the encoding is T1. It is intended mainly for characters provided as real glyphs by this encoding but constructed with `\accent` in OT1.

Note the previous command (`\bbl@allowhyphens`) has different applications (hyphens and discretionaries) than this one (composite chars). Note also prior to version 3.7, `\allowhyphens` had the behavior of `\bbl@allowhyphens`.

`\set@low@box` For some languages, quotes need to be lowered to the baseline. For this purpose the macro `\set@low@box` is available. It takes one argument and puts that argument in an `\hbox`, at the baseline. The result is available in `\box0` for further processing.

`\save@sf@q` Sometimes it is necessary to preserve the `\spacefactor`. For this purpose the macro `\save@sf@q` is available. It takes one argument, saves the current `\spacefactor`, executes the argument, and restores the `\spacefactor`.

`\bbl@frenchspacing` The commands `\bbl@frenchspacing` and `\bbl@nonfrenchspacing` can be used to

`\bbl@nonfrenchspacing` properly switch French spacing on and off.

<sup>27</sup>This mechanism was introduced by Bernd Raichle.

### 3.8 Encoding-dependent strings

**New 3.9a** Babel 3.9 provides a way of defining strings in several encodings, intended mainly for `luatex` and `xetex`. This is the only new feature requiring changes in language files if you want to make use of it.

Furthermore, it must be activated explicitly, with the package option `strings`. If there is no `strings`, these blocks are ignored, except `\SetCases` (and except if forced as described below). In other words, the old way of defining/switching strings still works and it's used by default.

It consists of a series of blocks started with `\StartBabelCommands`. The last block is closed with `\EndBabelCommands`. Each block is a single group (ie, local declarations apply until the next `\StartBabelCommands` or `\EndBabelCommands`). An `ldf` may contain several series of this kind.

Thanks to this new feature, string values and string language switching are not mixed any more. No need of `\addto`. If the language is `french`, just redefine `\frenchchaptername`.

`\StartBabelCommands`  $\langle\textit{language-list}\rangle\{\langle\textit{category}\rangle\}[\langle\textit{selector}\rangle]$

The  $\langle\textit{language-list}\rangle$  specifies which languages the block is intended for. A block is taken into account only if the `\CurrentOption` is listed here. Alternatively, you can define `\BabelLanguages` to a comma-separated list of languages to be defined (if undefined, `\StartBabelCommands` sets it to `\CurrentOption`). You may write `\CurrentOption` as the language, but this is discouraged – a explicit name (or names) is much better and clearer. A “selector” is a name to be used as value in package option `strings`, optionally followed by extra info about the encodings to be used. The name `unicode` must be used for `xetex` and `luatex` (the key `strings` has also other two special values: `generic` and `encoded`). If a string is set several times (because several blocks are read), the first one takes precedence (ie, it works much like `\providecommand`).

Encoding info is `charset=` followed by a `charset`, which if given sets how the strings should be translated to the internal representation used by the engine, typically `utf8`, which is the only value supported currently (default is no translations). Note `charset` is applied by `luatex` and `xetex` when reading the file, not when the macro or string is used in the document.

A list of font encodings which the strings are expected to work with can be given after `fontenc=` (separated with spaces, if two or more) – recommended, but not mandatory, although blocks without this key are not taken into account if you have requested `strings=encoded`.

Blocks without a selector are read always if the key `strings` has been used. They provide fallback values, and therefore must be the last blocks; they should be provided always if possible and all strings should be defined somehow inside it; they can be the only blocks (mainly LGC scripts using the LICR). Blocks without a selector can be activated explicitly with `strings=generic` (no block is taken into account except those). With `strings=encoded`, strings in those blocks are set as default (internally, `?`). With `strings=encoded` strings are protected, but they are correctly expanded in `\MakeUppercase` and the like. If there is no key `strings`, string definitions are ignored, but `\SetCases` are still honored (in an encoded way).

The  $\langle\textit{category}\rangle$  is either `captions`, `date` or `extras`. You must stick to these three categories, even if no error is raised when using other name.<sup>28</sup> It may be empty, too, but in such a case using `\SetString` is an error (but not `\SetCase`).

```
\StartBabelCommands{language}{captions}
  [unicode, fontenc=TU EU1 EU2, charset=utf8]
\SetString{chaptername}{utf8-string}

\StartBabelCommands{language}{captions}
\SetString{chaptername}{ascii-maybe-LICR-string}
```

<sup>28</sup>In future releases further categories may be added.

```
\EndBabelCommands
```

A real example is:

```
\StartBabelCommands{austrian}{date}
[unicode, fontenc=TU EU1 EU2, charset=utf8]
\SetString\monthiname{Jänner}

\StartBabelCommands{german,austrian}{date}
[unicode, fontenc=TU EU1 EU2, charset=utf8]
\SetString\monthiiname{März}

\StartBabelCommands{austrian}{date}
\SetString\monthiname{J\"a\"nner}

\StartBabelCommands{german}{date}
\SetString\monthiname{Januar}

\StartBabelCommands{german,austrian}{date}
\SetString\monthiiname{Februar}
\SetString\monthiiname{M\"a\"rz}
\SetString\monthivname{April}
\SetString\monthvname{Mai}
\SetString\monthviname{Juni}
\SetString\monthviiname{Juli}
\SetString\monthviiiname{August}
\SetString\monthixname{September}
\SetString\monthxname{Oktober}
\SetString\monthxiname{November}
\SetString\monthxiiname{Dezenber}
\SetString\today{\number\day.~%
\csname month\romannumeral\month name\endcsname\space
\number\year}

\StartBabelCommands{german,austrian}{captions}
\SetString\prefacename{Vorwort}
[etc.]

\EndBabelCommands
```

When used in ldf files, previous values of  $\langle category \rangle \langle language \rangle$  are overridden, which means the old way to define strings still works and used by default (to be precise, is first set to undefined and then strings are added). However, when used in the preamble or in a package, new settings are added to the previous ones, if the language exists (in the babel sense, ie, if  $\langle date \rangle \langle language \rangle$  exists).

**\StartBabelCommands** \*  $\{ \langle language-list \rangle \} \{ \langle category \rangle \} [ \langle selector \rangle ]$

The starred version just forces strings to take a value – if not set as package option, then the default for the engine is used. This is not done by default to prevent backward incompatibilities, but if you are creating a new language this version is better. It's up to the maintainers of the current languages to decide if using it is appropriate.<sup>29</sup>

**\EndBabelCommands** Marks the end of the series of blocks.

**\AfterBabelCommands**  $\{ \langle code \rangle \}$

The code is delayed and executed at the global scope just after `\EndBabelCommands`.

<sup>29</sup>This replaces in 3.9g a short-lived `\UseStrings` which has been removed because it did not work.

**\SetString** {*<macro-name>*}{*<string>*}

Adds *<macro-name>* to the current category, and defines globally *<lang-macro-name>* to *<code>* (after applying the transformation corresponding to the current charset or defined with the hook `stringprocess`).

Use this command to define strings, without including any “logic” if possible, which should be a separated macro. See the example above for the date.

**\SetStringLoop** {*<macro-name>*}{*<string-list>*}

A convenient way to define several ordered names at once. For example, to define `\abmoniname`, `\abmoniiname`, etc. (and similarly with `abday`):

```
\SetStringLoop{abmon#1name}{en,fb,mr,ab,my,jn,jl,ag,sp,oc,nv,dc}
\SetStringLoop{abday#1name}{lu,ma,mi,ju,vi,sa,do}
```

#1 is replaced by the roman numeral.

**\SetCase** [*<map-list>*]{*<toupper-code>*}{*<tolower-code>*}

Sets globally code to be executed at `\MakeUppercase` and `\MakeLowercase`. The code would typically be things like `\let\BB\bb` and `\uccode` or `\lccode` (although for the reasons explained above, changes in lc/uc codes may not work). A *<map-list>* is a series of macros using the internal format of `\@uc1clist` (eg, `\bb\BB\cc\CC`). The mandatory arguments take precedence over the optional one. This command, unlike `\SetString`, is executed always (even without strings), and it is intended for minor readjustments only. For example, as T1 is the default case mapping in  $\TeX$ , we can set for Turkish:

```
\StartBabelCommands{turkish}{}[ot1enc, fontenc=OT1]
\SetCase
  {\uccode"10=`I\relax}
  {\lccode`I="10\relax}

\StartBabelCommands{turkish}{}[unicode, fontenc=TU EU1 EU2, charset=utf8]
\SetCase
  {\uccode`i=`İ\relax
   \uccode`ı=`I\relax}
  {\lccode`İ=`i\relax
   \lccode`I=`ı\relax}

\StartBabelCommands{turkish}{}
\SetCase
  {\uccode`i="9D\relax
   \uccode"19=`I\relax}
  {\lccode"9D=`i\relax
   \lccode`I="19\relax}

\EndBabelCommands
```

(Note the mapping for OT1 is not complete.)

**\SetHyphenMap** {*<to-lower-macros>*}

**New 3.9g** Case mapping serves in  $\TeX$  for two unrelated purposes: case transforms (upper/lower) and hyphenation. `\SetCase` handles the former, while hyphenation is handled by `\SetHyphenMap` and controlled with the package option `hyphenmap`. So, even if internally they are based on the same  $\TeX$  primitive (`\lccode`), babel sets them separately. There are three helper macros to be used inside `\SetHyphenMap`:

- `\BabelLower{<uccode>}{<lccode>}` is similar to `\lccode` but it's ignored if the char has been set and saves the original `\lccode` to restore it when switching the language (except with `hyphenmap=first`).

- `\BabelLowerMM{⟨uccode-from⟩}{⟨uccode-to⟩}{⟨step⟩}{⟨lccode-from⟩}` loops through the given uppercase codes, using the step, and assigns them the lccode, which is also increased (MM stands for *many-to-many*).
- `\BabelLowerMO{⟨uccode-from⟩}{⟨uccode-to⟩}{⟨step⟩}{⟨lccode⟩}` loops through the given uppercase codes, using the step, and assigns them the lccode, which is fixed (MO stands for *many-to-one*).

An example is (which is redundant, because these assignments are done by both `luatex` and `xetex`):

```
\SetHyphenMap{\BabelLowerMM{"100"}{"11F"}{2}{"101"}}
```

This macro is not intended to fix wrong mappings done by Unicode (which are the default in both `xetex` and `luatex`) – if an assignment is wrong, fix it directly.

### 3.9 Executing code based on the selector

`\IfBabelSelectorTF {⟨selectors⟩}{⟨true⟩}{⟨false⟩}`

**New 3.67** Sometimes a different setup is desired depending on the selector used. Values allowed in `⟨selectors⟩` are `select`, `other`, `foreign`, `other*` (and also `foreign*` for the tentative starred version), and it can consist of a comma-separated list. For example:

```
\IfBabelSelectorTF{other, other*}{A}{B}
```

is true with these two environment selectors.  
Its natural place of use is in hooks or in `\extras{language}`.

## Part II

# Source code

`babel` is being developed incrementally, which means parts of the code are under development and therefore incomplete. Only documented features are considered complete. In other words, use `babel` only as documented (except, of course, if you want to explore and test them – you can post suggestions about multilingual issues to [kadingira@tug.org](mailto:kadingira@tug.org) on <http://tug.org/mailman/listinfo/kadingira>).

## 4 Identification and loading of required files

*Code documentation is still under revision.*

**The following description is no longer valid, because `switch` and `plain` have been merged into `babel.def`.**

The `babel` package after unpacking consists of the following files:

**`switch.def`** defines macros to set and switch languages.

**`babel.def`** defines the rest of macros. It has two parts: a generic one and a second one only for LaTeX.

**`babel.sty`** is the  $\TeX$  package, which sets options and loads language styles.

**`plain.def`** defines some  $\TeX$  macros required by `babel.def` and provides a few tools for Plain.

**`hyphen.cfg`** is the file to be used when generating the formats to load hyphenation patterns.

The `babel` installer extends `docstrip` with a few “pseudo-guards” to set “variables” used at installation time. They are used with `<@name@>` at the appropriated places in the source code and shown below with `⟨⟨name⟩⟩`. That brings a little bit of literate programming.

## 5 locale directory

A required component of babel is a set of ini files with basic definitions for about 200 languages. They are distributed as a separate zip file, not packed as dtx. With them, babel will fully support Unicode engines.

Most of them are essentially finished (except bugs and mistakes, of course). Some of them are still incomplete (but they will be usable), and there are some omissions (eg, Latin and polytonic Greek, and there are no geographic areas in Spanish). Hindi, French, Occitan and Breton will show a warning related to dates. Not all include LICR variants.

This is a preliminary documentation.

ini files contain the actual data; tex files are currently just proxies to the corresponding ini files.

Most keys are self-explanatory.

**charset** the encoding used in the ini file.

**version** of the ini file

**level** “version” of the ini specification . which keys are available (they may grow in a compatible way) and how they should be read.

**encodings** a descriptive list of font encodings.

**[captions]** section of captions in the file charset

**[captions.licr]** same, but in pure ASCII using the LICR

**date.long** fields are as in the CLDR, but the syntax is different. Anything inside brackets is a date field (eg, MMMM for the month name) and anything outside is text. In addition, [ ] is a non breakable space and [ . ] is an abbreviation dot.

Keys may be further qualified in a particular language with a suffix starting with a uppercase letter.

It can be just a letter (eg, babel.name.A, babel.name.B) or a name (eg, date.long.Nominative, date.long.Formal, but no language is currently using the latter). *Multi-letter* qualifiers are forward compatible in the sense they won’t conflict with new “global” keys (which start always with a lowercase case). There is an exception, however: the section counters has been devised to have arbitrary keys, so you can add lowercased keys if you want.

## 6 Tools

```
1 <<version=3.85.04072>>
2 <<date=2023/02/09>>
```

**Do not use the following macros in ldf files. They may change in the future.** This applies mainly to those recently added for replacing, trimming and looping. The older ones, like \bbl@afterfi, will not change.

We define some basic macros which just make the code cleaner. \bbl@add is now used internally instead of \addto because of the unpredictable behavior of the latter. Used in babel.def and in babel.sty, which means in L<sup>A</sup>T<sub>E</sub>X is executed twice, but we need them when defining options and babel.def cannot be load until options have been defined. This does not hurt, but should be fixed somehow.

```
3 <<(*Basic macros)>> ≡
4 \bbl@trace{Basic macros}
5 \def\bbl@stripslash{\expandafter\@gobble\string}
6 \def\bbl@add#1#2{%
7   \bbl@ifunset{\bbl@stripslash#1}%
8     {\def#1{#2}}%
9     {\expandafter\def\expandafter#1\expandafter{#1#2}}
10 \def\bbl@xin@{\@expandtwoargs\in@}
11 \def\bbl@carg#1#2{\expandafter#1\csname#2\endcsname}%
12 \def\bbl@ncarg#1#2#3{\expandafter#1\expandafter#2\csname#3\endcsname}%
13 \def\bbl@ccarg#1#2#3{%
14   \expandafter#1\csname#2\expandafter\endcsname\csname#3\endcsname}%
15 \def\bbl@csarg#1#2{\expandafter#1\csname bbl@#2\endcsname}%
16 \def\bbl@cs#1{\csname bbl@#1\endcsname}
17 \def\bbl@c1#1{\csname bbl@#1\language\endcsname}
18 \def\bbl@loop#1#2#3{\bbl@@loop#1{#3}#2,\@nnil,}
19 \def\bbl@loopx#1#2{\expandafter\bbl@loop\expandafter#1\expandafter{#2}}
20 \def\bbl@@loop#1#2#3,%
21   \ifx\@nnil#3\relax\else
22     \def#1{#3}#2\bbl@afterfi\bbl@@loop#1{#2}%
23   \fi
```

```

23 \fi}
24 \def\bbl@for#1#2#3{\bbl@loopx#1{#2}{\ifx#1\@empty\else#3\fi}}

\bbl@add@list This internal macro adds its second argument to a comma separated list in its first argument. When
the list is not defined yet (or empty), it will be initiated. It presumes expandable character strings.

25 \def\bbl@add@list#1#2{%
26   \edef#1{%
27     \bbl@ifunset{\bbl@stripslash#1}%
28     }%
29     {\ifx#1\@empty\else#1,\fi}%
30     #2}}

\bbl@afterelse Because the code that is used in the handling of active characters may need to look ahead, we take
\bbl@afterfi extra care to ‘throw’ it over the \else and \fi parts of an \if-statement30. These macros will break
if another \if... \fi statement appears in one of the arguments and it is not enclosed in braces.

31 \long\def\bbl@afterelse#1\else#2\fi{\fi#1}
32 \long\def\bbl@afterfi#1\fi{\fi#1}

\bbl@exp Now, just syntactical sugar, but it makes partial expansion of some code a lot more simple and
readable. Here \> stands for \noexpand, \<. > for \noexpand applied to a built macro name (which
does not define the macro if undefined to \relax, because it is created locally), and \[... ] for
one-level expansion (where ... is the macro name without the backslash). The result may be
followed by extra arguments, if necessary.

33 \def\bbl@exp#1{%
34   \begingroup
35     \let\>\noexpand
36     \let\<\bbl@exp@en
37     \let\[\bbl@exp@ue
38     \edef\bbl@exp@aux{\endgroup#1}%
39     \bbl@exp@aux}
40 \def\bbl@exp@en#1>{\expandafter\noexpand\csname#1\endcsname}%
41 \def\bbl@exp@ue#1][{%
42   \unexpanded\expandafter\expandafter\expandafter{\csname#1\endcsname}}%

\bbl@trim The following piece of code is stolen (with some changes) from keyval, by David Carlisle. It defines
two macros: \bbl@trim and \bbl@trim@def. The first one strips the leading and trailing spaces from
the second argument and then applies the first argument (a macro, \toks@ and the like). The second
one, as its name suggests, defines the first argument as the stripped second argument.

43 \def\bbl@tempa#1{%
44   \long\def\bbl@trim##1##2{%
45     \futurelet\bbl@trim@a\bbl@trim@c##2\@nil\@nil#1\@nil\relax{##1}}%
46   \def\bbl@trim@c{%
47     \ifx\bbl@trim@a\@sptoken
48       \expandafter\bbl@trim@b
49     \else
50       \expandafter\bbl@trim@b\expandafter#1%
51     \fi}%
52   \long\def\bbl@trim@b#1##1 \@nil{\bbl@trim@i##1}}
53 \bbl@tempa{ }
54 \long\def\bbl@trim@i#1\@nil#2\relax#3{#3{#1}}
55 \long\def\bbl@trim@def#1{\bbl@trim{\def#1}}

\bbl@ifunset To check if a macro is defined, we create a new macro, which does the same as \ifundefined.
However, in an  $\epsilon$ -tex engine, it is based on \ifcsname, which is more efficient, and does not waste
memory. Defined inside a group, to avoid \ifcsname being implicitly set to \relax by the \csname
test.

56 \begingroup
57   \gdef\bbl@ifunset#1{%
58     \expandafter\ifx\csname#1\endcsname\relax
59     \expandafter\@firstoftwo

```

<sup>30</sup>This code is based on code presented in TUGboat vol. 12, no2, June 1991 in “An expansion Power Lemma” by Sonja Maus.



```

60 \else
61 \expandafter\@secondoftwo
62 \fi}
63 \bbl@ifunset{ifcsname}%
64 {}%
65 {\gdef\bbl@ifunset#1{%
66 \ifcsname#1\endcsname
67 \expandafter\ifx\csname#1\endcsname\relax
68 \bbl@afterelse\expandafter\@firstoftwo
69 \else
70 \bbl@afterfi\expandafter\@secondoftwo
71 \fi
72 \else
73 \expandafter\@firstoftwo
74 \fi}}
75 \endgroup

```

**\bbl@ifblank** A tool from url, by Donald Arseneau, which tests if a string is empty or space. The companion macros tests if a macro is defined with some ‘real’ value, ie, not \relax and not empty,

```

76 \def\bbl@ifblank#1{%
77 \bbl@ifblank@i#1\@nil\@nil\@secondoftwo\@firstoftwo\@nil}
78 \long\def\bbl@ifblank@i#1#2\@nil#3#4#5\@nil{#4}
79 \def\bbl@ifset#1#2#3{%
80 \bbl@ifunset{#1}{#3}{\bbl@exp{\@nameuse{#1}}{#3}{#2}}}

```

For each element in the comma separated <key>=<value> list, execute <code> with #1 and #2 as the key and the value of current item (trimmed). In addition, the item is passed verbatim as #3. With the <key> alone, it passes \@empty (ie, the macro thus named, not an empty argument, which is what you get with <key>= and no value).

```

81 \def\bbl@forkv#1#2{%
82 \def\bbl@kvcmd##1##2##3{#2}%
83 \bbl@kvnext#1,\@nil,}
84 \def\bbl@kvnext#1,{%
85 \ifx\@nil#1\relax\else
86 \bbl@ifblank{#1}{\bbl@forkv@eq#1=\@empty=\@nil{#1}}%
87 \expandafter\bbl@kvnext
88 \fi}
89 \def\bbl@forkv@eq#1=#2=#3\@nil#4{%
90 \bbl@trim\def\bbl@forkv@a{#1}%
91 \bbl@trim{\expandafter\bbl@kvcmd\expandafter{\bbl@forkv@a}}{#2}{#4}}

```

A for loop. Each item (trimmed), is #1. It cannot be nested (it’s doable, but we don’t need it).

```

92 \def\bbl@vforeach#1#2{%
93 \def\bbl@forcmd##1{#2}%
94 \bbl@fornext#1,\@nil,}
95 \def\bbl@fornext#1,{%
96 \ifx\@nil#1\relax\else
97 \bbl@ifblank{#1}{\bbl@trim\bbl@forcmd{#1}}%
98 \expandafter\bbl@fornext
99 \fi}
100 \def\bbl@foreach#1{\expandafter\bbl@vforeach\expandafter{#1}}

```

**\bbl@replace** Returns implicitly \toks@ with the modified string.

```

101 \def\bbl@replace#1#2#3{% in #1 -> repl #2 by #3
102 \toks@{}}%
103 \def\bbl@replace@aux##1#2##2#2{%
104 \ifx\bbl@nil##2%
105 \toks@\expandafter{\the\toks@##1}%
106 \else
107 \toks@\expandafter{\the\toks@##1#3}%
108 \bbl@afterfi
109 \bbl@replace@aux##2#2%
110 \fi}%

```

```

111 \expandafter\bb1@replace@aux#1#2\bb1@nil#2%
112 \edef#1{\the\toks@}

```

An extension to the previous macro. It takes into account the parameters, and it is string based (ie, if you replace elax by ho, then \relax becomes \rho). No checking is done at all, because it is not a general purpose macro, and it is used by babel only when it works (an example where it does *not* work is in \bb1@TG@@date, and also fails if there are macros with spaces, because they are retokenized). It may change! (or even merged with \bb1@replace; I'm not sure ckecking the replacement is really necessary or just paranoia).

```

113 \ifx\detokenize\undefined\else % Unused macros if old Plain TeX
114 \bb1@exp{\def\\bb1@parsedef##1\detokenize{macro:}}#2->#3\relax{%
115   \def\bb1@tempa{#1}%
116   \def\bb1@tempb{#2}%
117   \def\bb1@tempe{#3}}
118 \def\bb1@sreplace#1#2#3{%
119   \begingroup
120     \expandafter\bb1@parsedef\meaning#1\relax
121     \def\bb1@tempc{#2}%
122     \edef\bb1@tempc{\expandafter\strip@prefix\meaning\bb1@tempc}%
123     \def\bb1@tempd{#3}%
124     \edef\bb1@tempd{\expandafter\strip@prefix\meaning\bb1@tempd}%
125     \bb1@xin@{\bb1@tempc}{\bb1@tempe}% If not in macro, do nothing
126     \ifin@
127       \bb1@exp{\\bb1@replace\\bb1@tempe{\bb1@tempc}{\bb1@tempd}}%
128       \def\bb1@tempc{% Expanded an executed below as 'uplevel'
129         \\makeatletter % "internal" macros with @ are assumed
130         \\scantokens{%
131           \bb1@tempa\\@namedef{\bb1@stripslash#1}\bb1@tempb{\bb1@tempe}}%
132         \catcode64=\the\catcode64\relax}% Restore @
133     \else
134       \let\bb1@tempc\@empty % Not \relax
135     \fi
136     \bb1@exp{% For the 'uplevel' assignments
137   \endgroup
138   \bb1@tempc}} % empty or expand to set #1 with changes
139 \fi

```

Two further tools. \bb1@ifsamestring first expand its arguments and then compare their expansion (sanitized, so that the catcodes do not matter). \bb1@engine takes the following values: 0 is pdf<sub>T</sub><sub>E</sub>X, 1 is luatex, and 2 is xetex. You may use the latter it in your language style if you want.

```

140 \def\bb1@ifsamestring#1#2{%
141   \begingroup
142     \protected@edef\bb1@tempb{#1}%
143     \edef\bb1@tempb{\expandafter\strip@prefix\meaning\bb1@tempb}%
144     \protected@edef\bb1@tempc{#2}%
145     \edef\bb1@tempc{\expandafter\strip@prefix\meaning\bb1@tempc}%
146     \ifx\bb1@tempb\bb1@tempc
147       \aftergroup\@firstoftwo
148     \else
149       \aftergroup\@secondoftwo
150     \fi
151   \endgroup}
152 \chardef\bb1@engine=%
153 \ifx\directlua\undefined
154   \ifx\XeTeXinputencoding\undefined
155     \z@
156   \else
157     \tw@
158   \fi
159 \else
160   \@ne
161 \fi

```

A somewhat hackish tool (hence its name) to avoid spurious spaces in some contexts.

```

162 \def\bbl@bsphack{%
163   \ifhmode
164     \hskip\z@skip
165     \def\bbl@esphack{\loop\ifdim\lastskip>\z@\unskip\repeat\unskip}%
166   \else
167     \let\bbl@esphack\@empty
168   \fi}

```

Another hackish tool, to apply case changes inside a protected macros. It's based on the internal `\let`'s made by `\MakeUppercase` and `\MakeLowercase` between things like `\oe` and `\OE`.

```

169 \def\bbl@cased{%
170   \ifx\oe\OE
171     \expandafter\in@\expandafter
172       {\expandafter\OE\expandafter}\expandafter{\oe}%
173   \ifin@
174     \bbl@afterelse\expandafter\MakeUppercase
175   \else
176     \bbl@afterfi\expandafter\MakeLowercase
177   \fi
178 \else
179   \expandafter\@firstofone
180 \fi}

```

The following adds some code to `\extras...` both before and after, while avoiding doing it twice. It's somewhat convoluted, to deal with `#`'s. Used to deal with `alph`, `Alph` and `frenchspacing` when there are already changes (with `\babel@save`).

```

181 \def\bbl@extras@wrap#1#2#3{% 1:in-test, 2:before, 3:after
182   \toks@\expandafter\expandafter\expandafter{%
183     \csname extras\language\endcsname}%
184   \bbl@exp{\in@{#1}}{\the\toks@}}%
185   \ifin@\else
186     \@temptokena{#2}%
187     \edef\bbl@tempc{\the\@temptokena\the\toks@}%
188     \toks@\expandafter{\bbl@tempc#3}%
189     \expandafter\edef\csname extras\language\endcsname{\the\toks@}%
190   \fi}
191 <</Basic macros>>

```

Some files identify themselves with a  $\TeX$  macro. The following code is placed before them to define (and then undefine) if not in  $\TeX$ .

```

192 <<{*Make sure ProvidesFile is defined}>> \equiv
193 \ifx\ProvidesFile\@undefined
194   \def\ProvidesFile#1[#2 #3 #4]{%
195     \wlog{File: #1 #4 #3 <#2>}%
196     \let\ProvidesFile\@undefined}
197 \fi
198 <</Make sure ProvidesFile is defined>>

```

## 6.1 Multiple languages

`\language` Plain  $\TeX$  version 3.0 provides the primitive `\language` that is used to store the current language. When used with a pre-3.0 version this function has to be implemented by allocating a counter. The following block is used in `switch.def` and `hyphen.cfg`; the latter may seem redundant, but remember `babel` doesn't require loading `switch.def` in the format.

```

199 <<{*Define core switching macros}>> \equiv
200 \ifx\language\@undefined
201   \csname newcount\endcsname\language
202 \fi
203 <</Define core switching macros>>

```

`\last@language` Another counter is used to keep track of the allocated languages.  $\TeX$  and  $\mathTeX$  reserves for this purpose the count 19.

`\addlanguage` This macro was introduced for  $\mathrm{T}_{\mathrm{E}}\mathrm{X} < 2$ . Preserved for compatibility.

```

204 <(*Define core switching macros)> ≡
205 \countdef\last@language=19
206 \def\addlanguage{\csname newlanguage\endcsname}
207 <(/Define core switching macros)>

```

Now we make sure all required files are loaded. When the command `\AtBeginDocument` doesn't exist we assume that we are dealing with a plain-based format. In that case the file `plain.def` is needed (which also defines `\AtBeginDocument`, and therefore it is not loaded twice). We need the first part when the format is created, and `\orig@dump` is used as a flag. Otherwise, we need to use the second part, so `\orig@dump` is not defined (`plain.def` undefines it).

Check if the current version of `switch.def` has been previously loaded (mainly, `hyphen.cfg`). If not, load it now. We cannot load `babel.def` here because we first need to declare and process the package options.

## 6.2 The Package File ( $\mathrm{L}^{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$ , `babel.sty`)

```

208 <*package>
209 \NeedsTeXFormat{LaTeX2e}[2005/12/01]
210 \ProvidesPackage{babel}[\<date>] \<version>] The Babel package]

```

Start with some “private” debugging tool, and then define macros for errors.

```

211 \@ifpackagewith{babel}{debug}
212   {\providecommand\bbbl@trace[1]{\message{^^J[ #1 ]}}%
213    \let\bbbl@debug\@firstofone
214    \ifx\directlua\@undefined\else
215      \directlua{ Babel = Babel or {}
216                Babel.debug = true }%
217      \input{babel-debug.tex}%
218    \fi}
219 {\providecommand\bbbl@trace[1]{}%
220  \let\bbbl@debug\@gobble
221  \ifx\directlua\@undefined\else
222    \directlua{ Babel = Babel or {}
223              Babel.debug = false }%
224  \fi}
225 \def\bbbl@error#1#2{%
226   \begingroup
227   \def\{\MessageBreak}%
228   \PackageError{babel}{#1}{#2}%
229   \endgroup}
230 \def\bbbl@warning#1{%
231   \begingroup
232   \def\{\MessageBreak}%
233   \PackageWarning{babel}{#1}%
234   \endgroup}
235 \def\bbbl@infowarn#1{%
236   \begingroup
237   \def\{\MessageBreak}%
238   \PackageNote{babel}{#1}%
239   \endgroup}
240 \def\bbbl@info#1{%
241   \begingroup
242   \def\{\MessageBreak}%
243   \PackageInfo{babel}{#1}%
244   \endgroup}

```

This file also takes care of a number of compatibility issues with other packages and defines a few additional package options. Apart from all the language options below we also have a few options that influence the behavior of language definition files.

Many of the following options don't do anything themselves, they are just defined in order to make it possible for `babel` and language definition files to check if one of them was specified by the user.

But first, include here the *Basic macros* defined above.

```

245 <(Basic macros)>

```

```

246 \@ifpackagewith{babel}{silent}
247   {\let\bbl@info\@gobble
248    \let\bbl@infowarn\@gobble
249    \let\bbl@warning\@gobble}
250   {}
251 %
252 \def\AfterBabelLanguage#1{%
253   \global\expandafter\bbl@add\csname#1.ldf-h@@k\endcsname}%

```

If the format created a list of loaded languages (in `\bbl@languages`), get the name of the 0-th to show the actual language used. Also available with base, because it just shows info.

```

254 \ifx\bbl@languages\undefined\else
255   \begingroup
256     \catcode\^^I=12
257     \@ifpackagewith{babel}{showlanguages}{%
258       \begingroup
259         \def\bbl@elt#1#2#3#4{\wlog{#2^^I#1^^I#3^^I#4}}%
260         \wlog{<*languages>}%
261         \bbl@languages
262         \wlog{</languages>}%
263       \endgroup}{%
264     \endgroup
265     \def\bbl@elt#1#2#3#4{%
266       \ifnum#2=\z@
267         \gdef\bbl@nulllanguage{#1}%
268         \def\bbl@elt##1##2##3##4{%
269           \fi}%
270     \bbl@languages
271 \fi%

```

### 6.3 base

The first ‘real’ option to be processed is base, which set the hyphenation patterns then resets `ver@babel.sty` so that  $\TeX$  forgets about the first loading. After a subset of `babel.def` has been loaded (the old `switch.def`) and `\AfterBabelLanguage` defined, it exits. Now the base option. With it we can define (and load, with `luatex`) hyphenation patterns, even if we are not interested in the rest of `babel`.

```

272 \bbl@trace{Defining option 'base'}
273 \@ifpackagewith{babel}{base}{%
274   \let\bbl@onlyswitch\@empty
275   \let\bbl@provide@locale\relax
276   \input babel.def
277   \let\bbl@onlyswitch\@undefined
278   \ifx\directlua\@undefined
279     \DeclareOption*{\bbl@patterns{\CurrentOption}}%
280   \else
281     \input luababel.def
282     \DeclareOption*{\bbl@patterns@lua{\CurrentOption}}%
283   \fi
284   \DeclareOption{base}{}%
285   \DeclareOption{showlanguages}{}%
286   \ProcessOptions
287   \global\expandafter\let\csname opt@babel.sty\endcsname\relax
288   \global\expandafter\let\csname ver@babel.sty\endcsname\relax
289   \global\let\@ifl@ter@\@ifl@ter
290   \def\@ifl@ter#1#2#3#4#5{\global\let\@ifl@ter\@ifl@ter@@}%
291   \endinput}{}%

```

### 6.4 key=value options and other general option

The following macros extract language modifiers, and only real package options are kept in the option list. Modifiers are saved and assigned to `\BabelModifiers` at `\bbl@load@language`; when no modifiers have been given, the former is `\relax`. How modifiers are handled are left to language styles; they can use `\in@`, loop them with `\@for` or load `keyval`, for example.

```

292 \bbl@trace{key=value and another general options}
293 \bbl@csarg\let{tempa\expandafter}\csname opt@babel.sty\endcsname
294 \def\bbl@tempb#1.#2{% Remove trailing dot
295   #1\ifx\@empty#2\else,\bbl@afterfi\bbl@tempb#2\fi}%
296 \def\bbl@tempd#1.#2\@nnil{% TODO. Refactor lists?
297   \ifx\@empty#2%
298     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
299   \else
300     \in@{,provide=}{, #1}%
301     \ifin@
302       \edef\bbl@tempc{%
303         \ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.\bbl@tempb#2}%
304     \else
305       \in@{=}{#1}%
306       \ifin@
307         \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.#2}%
308       \else
309         \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
310         \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}%
311       \fi
312     \fi
313   \fi}
314 \let\bbl@tempc\@empty
315 \bbl@foreach\bbl@tempa{\bbl@tempd#1.\@empty\@nnil}
316 \expandafter\let\csname opt@babel.sty\endcsname\bbl@tempc

```

The next option tells babel to leave shorthand characters active at the end of processing the package. This is *not* the default as it can cause problems with other packages, but for those who want to use the shorthand characters in the preamble of their documents this can help.

```

317 \DeclareOption{KeepShorthandsActive}{}
318 \DeclareOption{activeacute}{}
319 \DeclareOption{activegrave}{}
320 \DeclareOption{debug}{}
321 \DeclareOption{noconfigs}{}
322 \DeclareOption{showlanguages}{}
323 \DeclareOption{silent}{}
324 % \DeclareOption{mono}{}
325 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
326 \chardef\bbl@iniflag\z@
327 \DeclareOption{provide=*}{\chardef\bbl@iniflag\@ne} % main -> +1
328 \DeclareOption{provide+=*}{\chardef\bbl@iniflag\tw@} % add = 2
329 \DeclareOption{provide*=*}{\chardef\bbl@iniflag\thr@@} % add + main
330 % A separate option
331 \let\bbl@autoload@options\@empty
332 \DeclareOption{provide@=*}{\def\bbl@autoload@options{import}}
333 % Don't use. Experimental. TODO.
334 \newif\ifbbl@single
335 \DeclareOption{selectors=off}{\bbl@singletrue}
336 <More package options>

```

Handling of package options is done in three passes. (I [JBL] am not very happy with the idea, anyway.) The first one processes options which has been declared above or follow the syntax <key>=<value>, the second one loads the requested languages, except the main one if set with the key main, and the third one loads the latter. First, we “flag” valid keys with a nil value.

```

337 \let\bbl@opt@shorthands\@nnil
338 \let\bbl@opt@config\@nnil
339 \let\bbl@opt@main\@nnil
340 \let\bbl@opt@headfoot\@nnil
341 \let\bbl@opt@layout\@nnil
342 \let\bbl@opt@provide\@nnil

```

The following tool is defined temporarily to store the values of options.

```

343 \def\bbl@tempa#1=#2\bbl@tempa{%
344   \bbl@csarg\ifx{opt@#1}\@nnil

```

```

345 \bbl@csarg\edef{opt@#1}{#2}%
346 \else
347 \bbl@error
348 {Bad option '#1=#2'. Either you have misspelled the\\%
349 key or there is a previous setting of '#1'. Valid\\%
350 keys are, among others, 'shorthands', 'main', 'bidi',\\%
351 'strings', 'config', 'headfoot', 'safe', 'math'.}%
352 {See the manual for further details.}
353 \fi}

```

Now the option list is processed, taking into account only currently declared options (including those declared with a =), and <key>=<value> options (the former take precedence). Unrecognized options are saved in \bbl@language@opts, because they are language options.

```

354 \let\bbl@language@opts\@empty
355 \DeclareOption*{%
356 \bbl@xin@{\string=}{\CurrentOption}%
357 \ifin@
358 \expandafter\bbl@tempa\CurrentOption\bbl@tempa
359 \else
360 \bbl@add@list\bbl@language@opts{\CurrentOption}%
361 \fi}

```

Now we finish the first pass (and start over).

```

362 \ProcessOptions*
363 \ifx\bbl@opt@provide\@nnil
364 \let\bbl@opt@provide\@empty %%% MOVE above
365 \else
366 \chardef\bbl@iniflag\@ne
367 \bbl@exp{\bbl@forkv{\@nameuse{@raw@opt@babel.sty}}}{%
368 \in@{,provide,}{, #1,}%
369 \ifin@
370 \def\bbl@opt@provide{#2}%
371 \bbl@replace\bbl@opt@provide{;}{,}%
372 \fi}
373 \fi
374 %

```

## 6.5 Conditional loading of shorthands

If there is no shorthands=<chars>, the original babel macros are left untouched, but if there is, these macros are wrapped (in babel.def) to define only those given.

A bit of optimization: if there is no shorthands=, then \bbl@ifshorthand is always true, and it is always false if shorthands is empty. Also, some code makes sense only with shorthands=...

```

375 \bbl@trace{Conditional loading of shorthands}
376 \def\bbl@sh@string#1{%
377 \ifx#1\@empty\else
378 \ifx#1t\string~%
379 \else\ifx#1c\string,%
380 \else\string#1%
381 \fi\fi
382 \expandafter\bbl@sh@string
383 \fi}
384 \ifx\bbl@opt@shorthands\@nnil
385 \def\bbl@ifshorthand#1#2#3{#2}%
386 \else\ifx\bbl@opt@shorthands\@empty
387 \def\bbl@ifshorthand#1#2#3{#3}%
388 \else

```

The following macro tests if a shorthand is one of the allowed ones.

```

389 \def\bbl@ifshorthand#1{%
390 \bbl@xin@{\string#1}{\bbl@opt@shorthands}%
391 \ifin@
392 \expandafter\@firstoftwo

```

```

393 \else
394 \expandafter\@secondoftwo
395 \fi}

```

We make sure all chars in the string are ‘other’, with the help of an auxiliary macro defined above (which also zaps spaces).

```

396 \edef\bbl@opt@shorthands{%
397 \expandafter\bbl@sh@string\bbl@opt@shorthands\@empty}%

```

The following is ignored with shorthands=off, since it is intended to take some additional actions for certain chars.

```

398 \bbl@ifshorthand{'}%
399 {\PassOptionsToPackage{activeacute}{babel}}{}
400 \bbl@ifshorthand{'}%
401 {\PassOptionsToPackage{activegrave}{babel}}{}
402 \fi\fi

```

With headfoot=lang we can set the language used in heads/foots. For example, in babel/3796 just adds headfoot=english. It misuses \resetactivechars but seems to work.

```

403 \ifx\bbl@opt@headfoot\@nnil\else
404 \g@addto@macro\resetactivechars{%
405 \set@typeset@protect
406 \expandafter\select@language@x\expandafter{\bbl@opt@headfoot}%
407 \let\protect\noexpand}
408 \fi

```

For the option safe we use a different approach – \bbl@opt@safe says which macros are redefined (B for bibs and R for refs). By default, both are currently set, but in a future release it will be set to none.

```

409 \ifx\bbl@opt@safe\@undefined
410 \def\bbl@opt@safe{BR}
411 % \let\bbl@opt@safe\@empty % Pending of \cite
412 \fi

```

For layout an auxiliary macro is provided, available for packages and language styles. Optimization: if there is no layout, just do nothing.

```

413 \bbl@trace{Defining IfBabelLayout}
414 \ifx\bbl@opt@layout\@nnil
415 \newcommand\IfBabelLayout[3]{#3}%
416 \else
417 \bbl@exp{\bbl@forkv{\@nameuse{@raw@opt@babel.sty}}}{%
418 \in@{,layout,},{, #1,}%
419 \ifin@
420 \def\bbl@opt@layout{#2}%
421 \bbl@replace\bbl@opt@layout{ }{.}%
422 \fi}
423 \newcommand\IfBabelLayout[1]{%
424 \@expandtwoargs\in@{.#1.}{.\bbl@opt@layout.}%
425 \ifin@
426 \expandafter\@firstoftwo
427 \else
428 \expandafter\@secondoftwo
429 \fi}
430 \fi
431 </package>
432 <*core>

```

## 6.6 Interlude for Plain

Because of the way docstrip works, we need to insert some code for Plain here. However, the tools provided by the babel installer for literate programming makes this section a short interlude, because the actual code is below, tagged as *Emulate LaTeX*.

```

433 \ifx\ldf@quit\@undefined\else
434 \endinput\fi % Same line!

```



```

435 <<Make sure ProvidesFile is defined>>
436 \ProvidesFile{babel.def}[\<<date>>] <<version>> Babel common definitions]
437 \ifx\AtBeginDocument\@undefined % TODO. change test.
438 <<Emulate LaTeX>>
439 \fi

```

That is all for the moment. Now follows some common stuff, for both Plain and  $\text{\LaTeX}$ . After it, we will resume the  $\text{\LaTeX}$ -only stuff.

```

440 </core>
441 <*package | core>

```

## 7 Multiple languages

This is not a separate file (switch.def) anymore.

Plain  $\text{\TeX}$  version 3.0 provides the primitive `\language` that is used to store the current language.

When used with a pre-3.0 version this function has to be implemented by allocating a counter.

```

442 \def\bbl@version{\<<version>>}
443 \def\bbl@date{\<<date>>}
444 <<Define core switching macros>>

```

`\adddialect` The macro `\adddialect` can be used to add the name of a dialect or variant language, for which an already defined hyphenation table can be used.

```

445 \def\adddialect#1#2{%
446   \global\chardef#1#2\relax
447   \bbl@usehooks{adddialect}{\#1}{\#2}}%
448   \begingroup
449     \count@#1\relax
450     \def\bbl@elt##1##2##3##4{%
451       \ifnum\count@=##2\relax
452         \edef\bbl@tempa{\expandafter\@gobbletwo\string#1}%
453         \bbl@info{Hyphen rules for '\expandafter\@gobble\bbl@tempa'
454           set to \expandafter\string\csname l@##1\endcsname\%
455           (\string\language\the\count@). Reported}%
456         \def\bbl@elt####1####2####3####4{%
457           \fi}%
458         \bbl@cs{languages}%
459         \endgroup}

```

`\bbl@iflanguage` executes code only if the language `l@` exists. Otherwise raises an error.

The argument of `\bbl@fixname` has to be a macro name, as it may get “fixed” if casing (lc/uc) is wrong. It’s an attempt to fix a long-standing bug when `\foreignlanguage` and the like appear in a `\MakeXXXcase`. However, a lowercase form is not imposed to improve backward compatibility (perhaps you defined a language named MYLANG, but unfortunately mixed case names cannot be trapped). Note `l@` is encapsulated, so that its case does not change.

```

460 \def\bbl@fixname#1{%
461   \begingroup
462     \def\bbl@tempe{l@}%
463     \edef\bbl@tempd{\noexpand\@ifundefined{\noexpand\bbl@tempe#1}}%
464     \bbl@tempd
465     {\lowercase\expandafter{\bbl@tempd}%
466     {\uppercase\expandafter{\bbl@tempd}%
467     \@empty
468     {\edef\bbl@tempd{\def\noexpand#1{\#1}}%
469     {\uppercase\expandafter{\bbl@tempd}}}%
470     {\edef\bbl@tempd{\def\noexpand#1{\#1}}%
471     {\lowercase\expandafter{\bbl@tempd}}}%
472     \@empty
473     \edef\bbl@tempd{\endgroup\def\noexpand#1{\#1}}%
474     \bbl@tempd
475     \bbl@exp{\bbl@usehooks{language}\#1}}%
476 \def\bbl@iflanguage#1{%
477   \@ifundefined{l@#1}{\@nolanerr{#1}\@gobble}\@firstofone}

```

After a name has been ‘fixed’, the selectors will try to load the language. If even the fixed name is not defined, will load it on the fly, either based on its name, or if activated, its BCP47 code. We first need a couple of macros for a simple BCP 47 look up. It also makes sure, with `\bbl@bcpcase`, casing is the correct one, so that `sr-latn-ba` becomes `fr-Latn-BA`. Note #4 may contain some `\@empty`’s, but they are eventually removed. `\bbl@bcpllookup` either returns the found ini or it is `\relax`.

```

478 \def\bbl@bcpcase#1#2#3#4\@#5{%
479   \ifx\@empty#3%
480     \uppercase{\def#5{#1#2}}%
481   \else
482     \uppercase{\def#5{#1}}%
483     \lowercase{\edef#5{#5#2#3#4}}%
484   \fi}
485 \def\bbl@bcpllookup#1-#2-#3-#4\@{%
486   \let\bbl@bcp\relax
487   \lowercase{\def\bbl@tempa{#1}}%
488   \ifx\@empty#2%
489     \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
490   \else\ifx\@empty#3%
491     \bbl@bcpcase#2\@empty\@empty\@{\bbl@tempb
492     \IfFileExists{babel-\bbl@tempa-\bbl@tempb.ini}%
493     {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb}}%
494     }%
495     \ifx\bbl@bcp\relax
496       \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
497     \fi
498   \else
499     \bbl@bcpcase#2\@empty\@empty\@{\bbl@tempb
500     \bbl@bcpcase#3\@empty\@empty\@{\bbl@tempc
501     \IfFileExists{babel-\bbl@tempa-\bbl@tempb-\bbl@tempc.ini}%
502     {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb-\bbl@tempc}}%
503     }%
504     \ifx\bbl@bcp\relax
505       \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
506       {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}%
507       }%
508     \fi
509     \ifx\bbl@bcp\relax
510       \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
511       {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}%
512       }%
513     \fi
514     \ifx\bbl@bcp\relax
515       \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
516     \fi
517   \fi\fi}
518 \let\bbl@initoload\relax
519 \def\bbl@provide@locale{%
520   \ifx\babelprovide\@undefined
521     \bbl@error{For a language to be defined on the fly 'base'\\%
522               is not enough, and the whole package must be\\%
523               loaded. Either delete the 'base' option or\\%
524               request the languages explicitly}%
525     {See the manual for further details.}%
526   \fi
527   \let\bbl@auxname\language\name % Still necessary. TODO
528   \bbl@ifunset{bbl@bcp@map@\language\name}{}% Move uplevel??
529   {\edef\language\name{\@nameuse{bbl@bcp@map@\language\name}}}%
530   \ifbbl@bcppallowed
531     \expandafter\ifx\csname date\language\name\endcsname\relax
532     \expandafter
533     \bbl@bcpllookup\language\name-\@empty-\@empty-\@empty\@
534     \ifx\bbl@bcp\relax\else % Returned by \bbl@bcpllookup
535       \edef\language\name{\bbl@bcp@prefix\bbl@bcp}%

```

```

536 \edef\localename{\bbl@bcp@prefix\bbl@bcp}%
537 \expandafter\ifx\csname date\language\endcsname\relax
538 \let\bbl@initoload\bbl@bcp
539 \bbl@exp{\bbl@babelprovide[\bbl@autoload@bcptoptions]{\language}}%
540 \let\bbl@initoload\relax
541 \fi
542 \bbl@csarg\xdef{bcp@map@\bbl@bcp}{\localename}%
543 \fi
544 \fi
545 \fi
546 \expandafter\ifx\csname date\language\endcsname\relax
547 \IfFileExists{babel-\language.tex}%
548 {\bbl@exp{\bbl@babelprovide[\bbl@autoload@options]{\language}}}%
549 {}%
550 \fi}

```

`\iflanguage` Users might want to test (in a private package for instance) which language is currently active. For this we provide a test macro, `\iflanguage`, that has three arguments. It checks whether the first argument is a known language. If so, it compares the first argument with the value of `\language`. Then, depending on the result of the comparison, it executes either the second or the third argument.

```

551 \def\iflanguage#1{%
552 \bbl@iflanguage{#1}%
553 \ifnum\csname l@#1\endcsname=\language
554 \expandafter\@firstoftwo
555 \else
556 \expandafter\@secondoftwo
557 \fi}}

```

## 7.1 Selecting the language

`\selectlanguage` The macro `\selectlanguage` checks whether the language is already defined before it performs its actual task, which is to update `\language` and activate language-specific definitions.

```

558 \let\bbl@select@type\z@
559 \edef\selectlanguage{%
560 \noexpand\protect
561 \expandafter\noexpand\csname selectlanguage \endcsname}

```

Because the command `\selectlanguage` could be used in a moving argument it expands to `\protect\selectlanguageL`. Therefore, we have to make sure that a macro `\protect` exists. If it doesn't it is `\let` to `\relax`.

```
562 \ifx\@undefined\protect\let\protect\relax\fi
```

The following definition is preserved for backwards compatibility (eg, arabi, koma). It is related to a trick for 2.09, now discarded.

```
563 \let\xstring\string
```

Since version 3.5 babel writes entries to the auxiliary files in order to typeset table of contents etc. in the correct language environment.

`\bbl@pop@language` But when the language change happens *inside* a group the end of the group doesn't write anything to the auxiliary files. Therefore we need T<sub>E</sub>X's `aftergroup` mechanism to help us. The command `\aftergroup` stores the token immediately following it to be executed when the current group is closed. So we define a temporary control sequence `\bbl@pop@language` to be executed at the end of the group. It calls `\bbl@set@language` with the name of the current language as its argument.

`\bbl@language@stack` The previous solution works for one level of nesting groups, but as soon as more levels are used it is no longer adequate. For that case we need to keep track of the nested languages using a stack mechanism. This stack is called `\bbl@language@stack` and initially empty.

```
564 \def\bbl@language@stack{}
```

When using a stack we need a mechanism to push an element on the stack and to retrieve the information afterwards.

`\bbl@push@language` The stack is simply a list of languagenames, separated with a '+' sign; the push function can be simple:  
`\bbl@pop@language`

```

565 \def\bbl@push@language{%
566   \ifx\language\undefined\else
567     \ifx\currentgrouplevel\undefined
568       \xdef\bbl@language@stack{\language+\bbl@language@stack}%
569     \else
570       \ifnum\currentgrouplevel=\z@
571         \xdef\bbl@language@stack{\language+}%
572       \else
573         \xdef\bbl@language@stack{\language+\bbl@language@stack}%
574       \fi
575     \fi
576   \fi}

```

Retrieving information from the stack is a little bit less simple, as we need to remove the element from the stack while storing it in the macro `\language`. For this we first define a helper function.

`\bbl@pop@lang` This macro stores its first element (which is delimited by the '+'-sign) in `\language` and stores the rest of the string in `\bbl@language@stack`.

```

577 \def\bbl@pop@lang#1+#2\@@{%
578   \edef\language{#1}%
579   \xdef\bbl@language@stack{#2}}

```

The reason for the somewhat weird arrangement of arguments to the helper function is the fact it is called in the following way. This means that before `\bbl@pop@lang` is executed  $\TeX$  first *expands* the stack, stored in `\bbl@language@stack`. The result of that is that the argument string of `\bbl@pop@lang` contains one or more language names, each followed by a '+'-sign (zero language names won't occur as this macro will only be called after something has been pushed on the stack).

```

580 \let\bbl@ifrestoring\@secondoftwo
581 \def\bbl@pop@language{%
582   \expandafter\bbl@pop@lang\bbl@language@stack\@@
583   \let\bbl@ifrestoring\@firstoftwo
584   \expandafter\bbl@set@language\expandafter{\language}%
585   \let\bbl@ifrestoring\@secondoftwo}

```

Once the name of the previous language is retrieved from the stack, it is fed to `\bbl@set@language` to do the actual work of switching everything that needs switching.

An alternative way to identify languages (in the babel sense) with a numerical value is introduced in 3.30. This is one of the first steps for a new interface based on the concept of locale, which explains the name of `\localeid`. This means `\l@...` will be reserved for hyphenation patterns (so that two locales can share the same rules).

```

586 \chardef\localeid\z@
587 \def\bbl@id@last{0} % No real need for a new counter
588 \def\bbl@id@assign{%
589   \bbl@ifunset\bbl@id@\language}%
590   {\count@\bbl@id@last\relax
591    \advance\count@\@ne
592    \bbl@csarg\chardef{id@\language}\count@
593    \edef\bbl@id@last{\the\count@}%
594    \ifcase\bbl@engine\or
595      \directlua{
596        Babel = Babel or {}
597        Babel.locale_props = Babel.locale_props or {}
598        Babel.locale_props[\bbl@id@last] = {}
599        Babel.locale_props[\bbl@id@last].name = '\language'
600      }%
601    \fi}%
602  {}%
603  \chardef\localeid\bbl@cl{id@}}

```

The unprotected part of `\selectlanguage`.

```

604 \expandafter\def\csname selectlanguage \endcsname#1{%

```

```

605 \ifnum\bbl@hymapsel=\cclv\let\bbl@hymapsel\tw@\fi
606 \bbl@push@language
607 \aftergroup\bbl@pop@language
608 \bbl@set@language{#1}}

```

`\bbl@set@language` The macro `\bbl@set@language` takes care of switching the language environment *and* of writing entries on the auxiliary files. For historical reasons, language names can be either language of `\language`. To catch either form a trick is used, but unfortunately as a side effect the catcodes of letters in `\language` are messed up. This is a bug, but preserved for backwards compatibility. The list of auxiliary files can be extended by redefining `\BabelContentsFiles`, but make sure they are loaded inside a group (as `aux`, `toc`, `lof`, and `lot` do) or the last language of the document will remain active afterwards.

We also write a command to change the current language in the auxiliary files.

`\bbl@savelastskip` is used to deal with skips before the write whatsit (as suggested by U Fischer). Adapted from `hyperref`, but it might fail, so I'll consider it a temporary hack, while I study other options (the ideal, but very likely unfeasible except perhaps in `laTeX`, is to avoid the `\write` altogether when not needed).

```

609 \def\BabelContentsFiles{toc,lof,lot}
610 \def\bbl@set@language#1{% from selectlanguage, pop@
611 % The old buggy way. Preserved for compatibility.
612 \edef\language{%
613 \ifnum\escapechar=\expandafter`\string#1\@empty
614 \else\string#1\@empty\fi}%
615 \ifcat\relax\noexpand#1%
616 \expandafter\ifx\csname date\language\endcsname\relax
617 \edef\language{#1}%
618 \let\localname\language
619 \else
620 \bbl@info{Using '\string\language' instead of 'language' is\\%
621 deprecated. If what you want is to use a\\%
622 macro containing the actual locale, make\\%
623 sure it does not not match any language.\\%
624 Reported}%
625 \ifx\scantokens\@undefined
626 \def\localname{??}%
627 \else
628 \scantokens\expandafter{\expandafter
629 \def\expandafter\localname\expandafter{\language}}%
630 \fi
631 \fi
632 \else
633 \def\localname{#1}% This one has the correct catcodes
634 \fi
635 \select@language{\language}%
636 % write to auxs
637 \expandafter\ifx\csname date\language\endcsname\relax\else
638 \if@filesw
639 \ifx\babel@aux\@gobbletwo\else % Set if single in the first, redundant
640 \bbl@savelastskip
641 \protected@write\@auxout{}\string\babel@aux{\bbl@auxname}{}}%
642 \bbl@restorelastskip
643 \fi
644 \bbl@usehooks{write}{}}%
645 \fi
646 \fi}
647 %
648 \let\bbl@restorelastskip\relax
649 \let\bbl@savelastskip\relax
650 %
651 \newif\ifbbl@bcpallowed
652 \bbl@bcpallowedfalse
653 \def\select@language#1{% from set@, babel@aux
654 \ifx\bbl@selectorname\@empty

```

```

655 \def\bbl@selectorname{select}%
656 % set hmap
657 \fi
658 \ifnum\bbl@hmapsel=\@cclv\chardef\bbl@hmapsel4\relax\fi
659 % set name
660 \edef\language{#1}%
661 \bbl@fixname\language
662 % TODO. name@map must be here?
663 \bbl@provide@locale
664 \bbl@iflanguage\language{%
665 \let\bbl@select@type\z@
666 \expandafter\bbl@switch\expandafter{\language}}
667 \def\babel@aux#1#2{%
668 \select@language{#1}%
669 \bbl@foreach\BabelContentsFiles{% \relax -> don't assume vertical mode
670 \writefile{##1}{\babel@toc{#1}{#2}\relax}}}% TODO - plain?
671 \def\babel@toc#1#2{%
672 \select@language{#1}}

```

First, check if the user asks for a known language. If so, update the value of `\language` and call `\originalTeX` to bring  $\TeX$  in a certain pre-defined state.

The name of the language is stored in the control sequence `\language`.

Then we have to *redefine* `\originalTeX` to compensate for the things that have been activated. To save memory space for the macro definition of `\originalTeX`, we construct the control sequence name for the `\noextras<lang>` command at definition time by expanding the `\csname` primitive. Now activate the language-specific definitions. This is done by constructing the names of three macros by concatenating three words with the argument of `\selectlanguage`, and calling these macros.

The switching of the values of `\lefthyphenmin` and `\righthyphenmin` is somewhat different. First we save their current values, then we check if `\<lang>hyphenmins` is defined. If it is not, we set default values (2 and 3), otherwise the values in `\<lang>hyphenmins` will be used.

```

673 \newif\ifbbl@usedategroup
674 \let\bbl@savextras\@empty
675 \def\bbl@switch#1{% from select@, foreign@
676 % make sure there is info for the language if so requested
677 \bbl@ensureinfo{#1}%
678 % restore
679 \originalTeX
680 \expandafter\def\expandafter\originalTeX\expandafter{%
681 \csname noextras#1\endcsname
682 \let\originalTeX\@empty
683 \babel@beginsave}%
684 \bbl@usehooks{afterreset}}}%
685 \languageshorthands{none}%
686 % set the locale id
687 \bbl@id@assign
688 % switch captions, date
689 % No text is supposed to be added here, so we remove any
690 % spurious spaces.
691 \bbl@bsphack
692 \ifcase\bbl@select@type
693 \csname captions#1\endcsname\relax
694 \csname date#1\endcsname\relax
695 \else
696 \bbl@xin@{,captions,}{,\bbl@select@opts,}%
697 \ifin@
698 \csname captions#1\endcsname\relax
699 \fi
700 \bbl@xin@{,date,}{,\bbl@select@opts,}%
701 \ifin@ % if \foreign... within \<lang>date
702 \csname date#1\endcsname\relax
703 \fi
704 \fi

```

```

705 \bbl@esphack
706 % switch extras
707 \csname bbl@preextras@#1\endcsname
708 \bbl@usehooks{beforeextras}{}%
709 \csname extras#1\endcsname\relax
710 \bbl@usehooks{afterextras}{}%
711 % > babel-ensure
712 % > babel-sh-<short>
713 % > babel-bidi
714 % > babel-fontspec
715 \let\bbl@savextras\@empty
716 % hyphenation - case mapping
717 \ifcase\bbl@opt@hyphenmap\or
718   \def\BabelLower##1##2{\lccode##1=##2\relax}%
719   \ifnum\bbl@hymapsel>4\else
720     \csname\language\ @bbl@hyphenmap\endcsname
721     \fi
722   \chardef\bbl@opt@hyphenmap\z@
723 \else
724   \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
725     \csname\language\ @bbl@hyphenmap\endcsname
726     \fi
727 \fi
728 \let\bbl@hymapsel\@cclv
729 % hyphenation - select rules
730 \ifnum\csname l@\language\endcsname=\l@unhyphenated
731   \edef\bbl@tempa{u}%
732 \else
733   \edef\bbl@tempa{\bbl@cl{\lnbrk}}%
734 \fi
735 % linebreaking - handle u, e, k (v in the future)
736 \bbl@xin@{/u}{/\bbl@tempa}%
737 \ifin@ \else\bbl@xin@{/e}{/\bbl@tempa}\fi % elongated forms
738 \ifin@ \else\bbl@xin@{/k}{/\bbl@tempa}\fi % only kashida
739 \ifin@ \else\bbl@xin@{/p}{/\bbl@tempa}\fi % padding (eg, Tibetan)
740 \ifin@ \else\bbl@xin@{/v}{/\bbl@tempa}\fi % variable font
741 \ifin@
742   % unhyphenated/kashida/elongated/padding = allow stretching
743   \language\l@unhyphenated
744   \babel@savevariable\emergencystretch
745   \emergencystretch\maxdimen
746   \babel@savevariable\hbadness
747   \hbadness\@M
748 \else
749   % other = select patterns
750   \bbl@patterns{#1}%
751 \fi
752 % hyphenation - mins
753 \babel@savevariable\lefthyphenmin
754 \babel@savevariable\righthyphenmin
755 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
756   \set@hyphenmins\tw@\thr@@\relax
757 \else
758   \expandafter\expandafter\expandafter\set@hyphenmins
759     \csname #1hyphenmins\endcsname\relax
760 \fi
761 \let\bbl@selectorname\@empty}

```

`otherlanguage (env.)` The `otherlanguage` environment can be used as an alternative to using the `\selectlanguage` declarative command. When you are typesetting a document which mixes left-to-right and right-to-left typesetting you have to use this environment in order to let things work as you expect them to.

The `\ignorespaces` command is necessary to hide the environment when it is entered in horizontal

mode.

```
762 \long\def\otherlanguage#1{%
763   \def\bbl@selectorname{other}%
764   \ifnum\bbl@hymapset=\@cclv\let\bbl@hymapset\thr@@\fi
765   \csname selectlanguage \endcsname{#1}%
766   \ignorespaces}
```

The `\endotherlanguage` part of the environment tries to hide itself when it is called in horizontal mode.

```
767 \long\def\endotherlanguage{%
768   \global\@ignoretrue\ignorespaces}
```

`otherlanguage*` (*env*) The `otherlanguage` environment is meant to be used when a large part of text from a different language needs to be typeset, but without changing the translation of words such as ‘figure’. This environment makes use of `\foreign@language`.

```
769 \expandafter\def\csname otherlanguage*\endcsname{%
770   \ifnextchar[\bbl@otherlanguage@s{\bbl@otherlanguage@s[]}}
771 \def\bbl@otherlanguage@s[#1]#2{%
772   \def\bbl@selectorname{other*}%
773   \ifnum\bbl@hymapset=\@cclv\chardef\bbl@hymapset4\relax\fi
774   \def\bbl@select@opts{#1}%
775   \foreign@language{#2}}
```

At the end of the environment we need to switch off the extra definitions. The grouping mechanism of the environment will take care of resetting the correct hyphenation rules and “extras”.

```
776 \expandafter\let\csname endotherlanguage*\endcsname\relax
```

`\foreignlanguage` The `\foreignlanguage` command is another substitute for the `\selectlanguage` command. This command takes two arguments, the first argument is the name of the language to use for typesetting the text specified in the second argument.

Unlike `\selectlanguage` this command doesn’t switch *everything*, it only switches the hyphenation rules and the extra definitions for the language specified. It does this within a group and assumes the `\extras<lang>` command doesn’t make any `\global` changes. The coding is very similar to part of `\selectlanguage`.

`\bbl@beforeforeign` is a trick to fix a bug in bidi texts. `\foreignlanguage` is supposed to be a ‘text’ command, and therefore it must emit a `\leavevmode`, but it does not, and therefore the indent is placed on the opposite margin. For backward compatibility, however, it is done only if a right-to-left script is requested; otherwise, it is no-op.

(3.11) `\foreignlanguage*` is a temporary, experimental macro for a few lines with a different script direction, while preserving the paragraph format (thank the braces around `\par`, things like `\hangindent` are not reset). Do not use it in production, because its semantics and its syntax may change (and very likely will, or even it could be removed altogether). Currently it enters in `vmode` and then selects the language (which in turn sets the paragraph direction).

(3.11) Also experimental are the hook `foreign` and `foreign*`. With them you can redefine `\BabelText` which by default does nothing. Its behavior is not well defined yet. So, use it in horizontal mode only if you do not want surprises.

In other words, at the beginning of a paragraph `\foreignlanguage` enters into `hmode` with the surrounding `lang`, and with `\foreignlanguage*` with the new `lang`.

```
777 \providecommand\bbl@beforeforeign{}
778 \edef\foreignlanguage{%
779   \noexpand\protect
780   \expandafter\noexpand\csname foreignlanguage \endcsname}
781 \expandafter\def\csname foreignlanguage \endcsname{%
782   \@ifstar\bbl@foreign@s\bbl@foreign@x}
783 \providecommand\bbl@foreign@x[3][{}]{%
784   \begingroup
785     \def\bbl@selectorname{foreign}%
786     \def\bbl@select@opts{#1}%
787     \let\BabelText\@firstofone
788     \bbl@beforeforeign
789     \foreign@language{#2}%
790     \bbl@usehooks{foreign}{}%
791     \BabelText{#3}% Now in horizontal mode!
```



```

792 \endgroup}
793 \def\bbl@foreign@s#1#2{% TODO - \shapemode, \setpar, ?\@@par
794 \begin{group}
795   {\par}%
796   \def\bbl@selectorname{foreign*}%
797   \let\bbl@select@opts\empty
798   \let\BabelText\@firstofone
799   \foreign@language{#1}%
800   \bbl@usehooks{foreign*}{}%
801   \bbl@dirparastext
802   \BabelText{#2}% Still in vertical mode!
803   {\par}%
804 \end{group}}

```

`\foreign@language` This macro does the work for `\foreignlanguage` and the other `language*` environment. First we need to store the name of the language and check that it is a known language. Then it just calls `bbl@switch`.

```

805 \def\foreign@language#1{%
806   % set name
807   \edef\language#1%
808   \ifbbl@usedategroup
809     \bbl@add\bbl@select@opts{,date,}%
810     \bbl@usedategroupfalse
811   \fi
812   \bbl@fixname\language
813   % TODO. name@map here?
814   \bbl@provide@locale
815   \bbl@iflanguage\language%
816   \let\bbl@select@type\ne
817   \expandafter\bbl@switch\expandafter{\language}}

```

The following macro executes conditionally some code based on the selector being used.

```

818 \def\IfBabelSelectorTF#1{%
819   \bbl@xin@{,\bbl@selectorname,}{,\zap@space#1 \empty,}%
820   \ifin@
821     \expandafter\@firstoftwo
822   \else
823     \expandafter\@secondoftwo
824   \fi}

```

`\bbl@patterns` This macro selects the hyphenation patterns by changing the `\language` register. If special hyphenation patterns are available specifically for the current font encoding, use them instead of the default.

It also sets hyphenation exceptions, but only once, because they are global (here language `\lccode's` has been set, too). `\bbl@hyphenation@` is set to relax until the very first `\babelhyphenation`, so do nothing with this value. If the exceptions for a language (by its number, not its name, so that `:ENC` is taken into account) has been set, then use `\hyphenation` with both global and language exceptions and empty the latter to mark they must not be set again.

```

825 \let\bbl@hyphlist\empty
826 \let\bbl@hyphenation@\relax
827 \let\bbl@pttnlist\empty
828 \let\bbl@patterns@ \relax
829 \let\bbl@hymapsel=\ccclv
830 \def\bbl@patterns#1{%
831   \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
832     \csname l@#1\endcsname
833     \edef\bbl@tempa{#1}%
834   \else
835     \csname l@#1:\f@encoding\endcsname
836     \edef\bbl@tempa{#1:\f@encoding}%
837   \fi
838   \@expandtwoargs\bbl@usehooks{patterns}{#1}{\bbl@tempa}%
839   % > luatex

```

```

840 \@ifundefined{bbl@hyphenation@}{\relax!
841 \beginngroup
842 \bbl@xin@{\number\language,}{\bbl@hyphlist}%
843 \ifin@ \else
844 \@expandtwoargs\bbl@usehooks{hyphenation}{\#1}{\bbl@tempa}}%
845 \hyphenation{%
846 \bbl@hyphenation@
847 \@ifundefined{bbl@hyphenation@#1}%
848 \@empty
849 {\space\csname bbl@hyphenation@#1\endcsname}}%
850 \xdef\bbl@hyphlist{\bbl@hyphlist\number\language,}%
851 \fi
852 \endgroup}}

```

`hyphenrules` (*env.*) The environment `hyphenrules` can be used to select *just* the hyphenation rules. This environment does *not* change `\language` and when the hyphenation rules specified were not loaded it has no effect. Note however, `\lcode`'s and font encodings are not set at all, so in most cases you should use `otherlanguage*`.

```

853 \def\hyphenrules#1{%
854 \edef\bbl@tempf{\#1}%
855 \bbl@fixname\bbl@tempf
856 \bbl@iflanguage\bbl@tempf{%
857 \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
858 \ifx\languageshorthands\undefined\else
859 \languageshorthands{none}%
860 \fi
861 \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
862 \set@hyphenmins\tw@\thr@@\relax
863 \else
864 \expandafter\expandafter\expandafter\set@hyphenmins
865 \csname\bbl@tempf hyphenmins\endcsname\relax
866 \fi}}
867 \let\endhyphenrules\@empty

```

`\providehyphenmins` The macro `\providehyphenmins` should be used in the language definition files to provide a *default* setting for the hyphenation parameters `\lefthyphenmin` and `\righthyphenmin`. If the macro `\(lang)hyphenmins` is already defined this command has no effect.

```

868 \def\providehyphenmins#1#2{%
869 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
870 \@namedef{\#1hyphenmins}{\#2}%
871 \fi}

```

`\set@hyphenmins` This macro sets the values of `\lefthyphenmin` and `\righthyphenmin`. It expects two values as its argument.

```

872 \def\set@hyphenmins#1#2{%
873 \lefthyphenmin#1\relax
874 \righthyphenmin#2\relax}

```

`\ProvidesLanguage` The identification code for each file is something that was introduced in  $\TeX$  2 $\epsilon$ . When the command `\ProvidesFile` does not exist, a dummy definition is provided temporarily. For use in the language definition file the command `\ProvidesLanguage` is defined by `babel`. Depending on the format, ie, on if the former is defined, we use a similar definition or not.

```

875 \ifx\ProvidesFile\undefined
876 \def\ProvidesLanguage#1[#2 #3 #4]{%
877 \wlog{Language: #1 #4 #3 <#2>}%
878 }
879 \else
880 \def\ProvidesLanguage#1{%
881 \beginngroup
882 \catcode`\ 10 %
883 \@makeother\%
884 \@ifnextchar[%]

```

```

885      {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}}
886 \def\@provideslanguage#1[#2]{%
887   \wlog{Language: #1 #2}%
888   \expandafter\edef\csname ver@#1.1df\endcsname{#2}%
889   \endgroup}
890 \fi

```

`\originalTeX` The macro `\originalTeX` should be known to  $\TeX$  at this moment. As it has to be expandable we `\let` it to `\@empty` instead of `\relax`.

```
891 \ifx\originalTeX\undefined\let\originalTeX\@empty\fi
```

Because this part of the code can be included in a format, we make sure that the macro which initializes the save mechanism, `\babel@beginsave`, is not considered to be undefined.

```
892 \ifx\babel@beginsave\undefined\let\babel@beginsave\relax\fi
```

A few macro names are reserved for future releases of babel, which will use the concept of ‘locale’:

```

893 \providecommand\setlocale{%
894   \bbl@error
895   {Not yet available}%
896   {Find an armchair, sit down and wait}}
897 \let\uselocale\setlocale
898 \let\locale\setlocale
899 \let\selectlocale\setlocale
900 \let\textlocale\setlocale
901 \let\textlanguage\setlocale
902 \let\languagetext\setlocale

```

## 7.2 Errors

`\@nolanerr` The babel package will signal an error when a documents tries to select a language that hasn’t been defined earlier. When a user selects a language for which no hyphenation patterns were loaded into the format he will be given a warning about that fact. We revert to the patterns for `\language=0` in that case. In most formats that will be (US)english, but it might also be empty.

`\@noopterr` When the package was loaded without options not everything will work as expected. An error message is issued in that case.  
When the format knows about `\PackageError` it must be  $\LaTeX 2_{\epsilon}$ , so we can safely use its error handling interface. Otherwise we’ll have to ‘keep it simple’.  
Infos are not written to the console, but on the other hand many people think warnings are errors, so a further message type is defined: an important info which is sent to the console.

```

903 \edef\bbl@nulllanguage{\string\language=0}
904 \def\bbl@nocaption{\protect\bbl@nocaption@i}
905 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
906   \global\@namedef{#2}{\textbf{?#1?}}}%
907   \@nameuse{#2}%
908   \edef\bbl@tempa{#1}%
909   \bbl@sreplace\bbl@tempa{name}{}}%
910   \bbl@warning{%
911     \@backslashchar#1 not set for '\language'. Please,\\%
912     define it after the language has been loaded\\%
913     (typically in the preamble) with:\\%
914     \string\setlocalecaption{\language}{\bbl@tempa}{.}\\%
915     Feel free to contribute on github.com/latex3/babel.\\%
916     Reported}}
917 \def\bbl@tentative{\protect\bbl@tentative@i}
918 \def\bbl@tentative@i#1{%
919   \bbl@warning{%
920     Some functions for '#1' are tentative.\\%
921     They might not work as expected and their behavior\\%
922     could change in the future.\\%
923     Reported}}
924 \def\@nolanerr#1{%
925   \bbl@error

```

```

926 {You haven't defined the language '#1' yet.\\%
927 Perhaps you misspelled it or your installation\\%
928 is not complete}%
929 {Your command will be ignored, type <return> to proceed}}
930 \def\@nopatterns#1{%
931 \bbl@warning
932 {No hyphenation patterns were preloaded for\\%
933 the language '#1' into the format.\\%
934 Please, configure your TeX system to add them and\\%
935 rebuild the format. Now I will use the patterns\\%
936 preloaded for \bbl@nulllanguage\space instead}}
937 \let\bbl@usehooks\@gobbletwo
938 \ifx\bbl@onlyswitch\@empty\endinput\fi
939 % Here ended switch.def

```

Here ended the now discarded switch.def. Here also (currently) ends the base option.

```

940 \ifx\directlua\@undefined\else
941 \ifx\bbl@luapatterns\@undefined
942 \input luababel.def
943 \fi
944 \fi
945 <Basic macros>
946 \bbl@trace{Compatibility with language.def}
947 \ifx\bbl@languages\@undefined
948 \ifx\directlua\@undefined
949 \openin1 = language.def % TODO. Remove hardcoded number
950 \ifeof1
951 \closein1
952 \message{I couldn't find the file language.def}
953 \else
954 \closein1
955 \begingroup
956 \def\addlanguage#1#2#3#4#5{%
957 \expandafter\ifx\csname lang@#1\endcsname\relax\else
958 \global\expandafter\let\csname l@#1\endcsname
959 \csname lang@#1\endcsname
960 \fi}%
961 \def\uselanguage#1{%
962 \input language.def
963 \endgroup
964 \fi
965 \fi
966 \chardef\l@english\z@
967 \fi

```

\addto It takes two arguments, a *<control sequence>* and TeX-code to be added to the *<control sequence>*. If the *<control sequence>* has not been defined before it is defined now. The control sequence could also expand to \relax, in which case a circular definition results. The net result is a stack overflow. Note there is an inconsistency, because the assignment in the last branch is global.

```

968 \def\addto#1#2{%
969 \ifx#1\@undefined
970 \def#1{#2}%
971 \else
972 \ifx#1\relax
973 \def#1{#2}%
974 \else
975 {\toks@\expandafter{#1#2}%
976 \xdef#1{\the\toks@}}%
977 \fi
978 \fi}

```

The macro \initiate@active@char below takes all the necessary actions to make its argument a shorthand character. The real work is performed once for each character. But first we define a little tool.

```

979 \def\bbl@withactive#1#2{%
980   \begingroup
981     \lccode`~=`#2\relax
982     \lowercase{\endgroup#1~}}

```

`\bbl@redefine` To redefine a command, we save the old meaning of the macro. Then we redefine it to call the original macro with the ‘sanitized’ argument. The reason why we do it this way is that we don’t want to redefine the  $\TeX$  macros completely in case their definitions change (they have changed in the past). A macro named `\macro` will be saved new control sequences named `\org@macro`.

```

983 \def\bbl@redefine#1{%
984   \edef\bbl@tempa{\bbl@stripslash#1}%
985   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
986   \expandafter\def\csname\bbl@tempa\endcsname}
987 \@onlypreamble\bbl@redefine

```

`\bbl@redefine@long` This version of `\babel@redefine` can be used to redefine `\long` commands such as `\ifthenelse`.

```

988 \def\bbl@redefine@long#1{%
989   \edef\bbl@tempa{\bbl@stripslash#1}%
990   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
991   \long\expandafter\def\csname\bbl@tempa\endcsname}
992 \@onlypreamble\bbl@redefine@long

```

`\bbl@redefineroobust` For commands that are redefined, but which *might* be robust we need a slightly more intelligent macro. A robust command `foo` is defined to expand to `\protect\foo_`. So it is necessary to check whether `\foo_` exists. The result is that the command that is being redefined is always robust afterwards. Therefore all we need to do now is define `\foo_`.

```

993 \def\bbl@redefineroobust#1{%
994   \edef\bbl@tempa{\bbl@stripslash#1}%
995   \bbl@ifunset{\bbl@tempa\space}%
996   {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
997     \bbl@exp{\def\#1{\protect\<\bbl@tempa\space>}}}%
998   {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}}%
999   \@namedef{\bbl@tempa\space}}
1000 \@onlypreamble\bbl@redefineroobust

```

### 7.3 Hooks

Admittedly, the current implementation is a somewhat simplistic and does very little to catch errors, but it is meant for developers, after all. `\bbl@usehooks` is the commands used by `babel` to execute hooks defined for an event.

```

1001 \bbl@trace{Hooks}
1002 \newcommand\AddBabelHook[3][]{%
1003   \bbl@ifunset{\bbl@hk@#2}{\EnableBabelHook{#2}}}%
1004   \def\bbl@tempa##1,#3=##2,##3@empty{\def\bbl@tempb{##2}}%
1005   \expandafter\bbl@tempa\bbl@evargs,#3=,\@empty
1006   \bbl@ifunset{\bbl@ev@#2@#3@#1}%
1007   {\bbl@csarg\bbl@add{ev@#3@#1}{\bbl@elth{#2}}}%
1008   {\bbl@csarg\let{ev@#2@#3@#1}\relax}%
1009   \bbl@csarg\newcommand{ev@#2@#3@#1}{\bbl@tempb}}
1010 \newcommand\EnableBabelHook[1]{\bbl@csarg\let{hk@#1}\@firstofone}
1011 \newcommand\DisableBabelHook[1]{\bbl@csarg\let{hk@#1}\@gobble}
1012 \def\bbl@usehooks#1#2{%
1013   \ifx\UseHook\@undefined\else\UseHook{babel/*/#1}\fi
1014   \def\bbl@elth##1{%
1015     \bbl@cs{hk@##1}{\bbl@cs{ev@##1@#1@#2}}%
1016     \bbl@cs{ev@#1@}%
1017     \ifx\language\@undefined\else % Test required for Plain (?)
1018       \ifx\UseHook\@undefined\else\UseHook{babel/\language/#1}\fi
1019       \def\bbl@elth##1{%
1020         \bbl@cs{hk@##1}{\bbl@cl{ev@##1@#1@#2}}%
1021         \bbl@cl{ev@#1}%
1022       \fi}

```

To ensure forward compatibility, arguments in hooks are set implicitly. So, if a further argument is added in the future, there is no need to change the existing code. Note events intended for `hyphen.cfg` are also loaded (just in case you need them for some reason).

```

1023 \def\bbl@evargs{,% <- don't delete this comma
1024   everylanguage=1,loadkernel=1,loadpatterns=1,loadexceptions=1,%
1025   adddialect=2,patterns=2,defaultcommands=0,encodedcommands=2,write=0,%
1026   beforeextras=0,afterextras=0,stopcommands=0,stringprocess=0,%
1027   hyphenation=2,initiateactive=3,afterreset=0,foreign=0,foreign*=0,%
1028   beforestart=0,language=2}
1029 \ifx\NewHook\undefined\else
1030   \def\bbl@tempa#1=#2\@{\NewHook{babel/#1}}
1031   \bbl@foreach\bbl@evargs{\bbl@tempa#1\@}
1032 \fi

```

`\babelensure` The user command just parses the optional argument and creates a new macro named `\bbl@e@<language>`. We register a hook at the `afterextras` event which just executes this macro in a “complete” selection (which, if undefined, is `\relax` and does nothing). This part is somewhat involved because we have to make sure things are expanded the correct number of times. The macro `\bbl@e@<language>` contains `\bbl@ensure{<include>}{<exclude>}{<fontenc>}`, which in turn loops over the macros names in `\bbl@captionslist`, excluding (with the help of `\in@`) those in the exclude list. If the fontenc is given (and not `\relax`), the `\fontencoding` is also added. Then we loop over the include list, but if the macro already contains `\foreignlanguage`, nothing is done. Note this macro (1) is not restricted to the preamble, and (2) changes are local.

```

1033 \bbl@trace{Defining babelensure}
1034 \newcommand\babelensure[2][{}]{%
1035   \AddBabelHook{babel-ensure}{afterextras}{%
1036     \ifcase\bbl@select@type
1037       \bbl@c1{e}%
1038     \fi}%
1039   \begingroup
1040     \let\bbl@ens@include\empty
1041     \let\bbl@ens@exclude\empty
1042     \def\bbl@ens@fontenc{\relax}%
1043     \def\bbl@tempb##1{%
1044       \ifx\empty##1\else\noexpand##1\expandafter\bbl@tempb\fi}%
1045     \edef\bbl@tempa{\bbl@tempb#1\empty}%
1046     \def\bbl@tempb##1=#2\@{\@namedef{\bbl@ens@##1}{##2}}%
1047     \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
1048     \def\bbl@tempc{\bbl@ensure}%
1049     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1050       \expandafter{\bbl@ens@include}}%
1051     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1052       \expandafter{\bbl@ens@exclude}}%
1053     \toks@{\expandafter{\bbl@tempc}}%
1054     \bbl@exp{%
1055       \endgroup
1056       \def\<bbl@e@#2>{\the\toks@{\bbl@ens@fontenc}}}%
1057 \def\bbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
1058   \def\bbl@tempb##1{% elt for (excluding) \bbl@captionslist list
1059     \if##1\undefined % 3.32 - Don't assume the macro exists
1060       \edef##1{\noexpand\bbl@nocaption
1061         {\bbl@stripslash##1}{\language\bbl@stripslash##1}}%
1062     \fi
1063     \if##1\empty\else
1064       \in@{##1}{#2}%
1065       \ifin\else
1066         \bbl@ifunset{\bbl@ensure@\language}%
1067         {\bbl@exp{%
1068           \\DeclareRobustCommand\<bbl@ensure@\language>[1]{%
1069             \\foreignlanguage{\language}%
1070             {\ifx\relax#3\else
1071               \\fontencoding{#3}\\selectfont
1072             \fi

```

```

1073         #####1}}}%
1074     }%
1075     \toks@\expandafter{##1}%
1076     \edef##1{%
1077         \bbl@csarg\noexpand{ensure@\language}%
1078         {\the\toks@}}%
1079     \fi
1080     \expandafter\bbl@tempb
1081 \fi}%
1082 \expandafter\bbl@tempb\bbl@captionslist\today\@empty
1083 \def\bbl@tempa##1{% elt for include list
1084     \ifx##1\@empty\else
1085         \bbl@csarg\in@{ensure@\language\expandafter}\expandafter{##1}%
1086         \ifin@\else
1087             \bbl@tempb##1\@empty
1088         \fi
1089         \expandafter\bbl@tempa
1090     \fi}%
1091 \bbl@tempa#1\@empty}
1092 \def\bbl@captionslist{%
1093     \prefacename\refname\abstractname\bibname\chaptername\appendixname
1094     \contentsname\listfigurename\listtablename\indexname\figurename
1095     \tablename\partname\enclname\ccname\headtoname\pagename\seename
1096     \alsoname\proofname\glossaryname}

```

## 7.4 Setting up language files

`\LdfInit` `\LdfInit` macro takes two arguments. The first argument is the name of the language that will be defined in the language definition file; the second argument is either a control sequence or a string from which a control sequence should be constructed. The existence of the control sequence indicates that the file has been processed before.

At the start of processing a language definition file we always check the category code of the `@`-sign. We make sure that it is a ‘letter’ during the processing of the file. We also save its name as the last called option, even if not loaded.

Another character that needs to have the correct category code during processing of language definition files is the equals sign, ‘=’, because it is sometimes used in constructions with the `\let` primitive. Therefore we store its current catcode and restore it later on.

Now we check whether we should perhaps stop the processing of this file. To do this we first need to check whether the second argument that is passed to `\LdfInit` is a control sequence. We do that by looking at the first token after passing #2 through string. When it is equal to `\@backslashchar` we are dealing with a control sequence which we can compare with `\@undefined`.

If so, we call `\ldf@quit` to set the main language, restore the category code of the `@`-sign and call `\endinput`

When #2 was *not* a control sequence we construct one and compare it with `\relax`.

Finally we check `\originalTeX`.

```

1097 \bbl@trace{Macros for setting language files up}
1098 \def\bbl@ldfinit{%
1099     \let\bbl@screset\@empty
1100     \let\BabelStrings\bbl@opt@string
1101     \let\BabelOptions\@empty
1102     \let\BabelLanguages\relax
1103     \ifx\originalTeX\@undefined
1104         \let\originalTeX\@empty
1105     \else
1106         \originalTeX
1107     \fi}
1108 \def\LdfInit#1#2{%
1109     \chardef\atcatcode=\catcode`\@
1110     \catcode`\@=11\relax
1111     \chardef\eqcatcode=\catcode`\=
1112     \catcode`\==12\relax
1113     \expandafter\if\expandafter\@backslashchar
1114         \expandafter\@car\string#2\@nil

```

```

1115 \ifx#2\@undefined\else
1116 \ldf@quit{#1}%
1117 \fi
1118 \else
1119 \expandafter\ifx\csname#2\endcsname\relax\else
1120 \ldf@quit{#1}%
1121 \fi
1122 \fi
1123 \bbl@ldfinit}

```

`\ldf@quit` This macro interrupts the processing of a language definition file.

```

1124 \def\ldf@quit#1{%
1125 \expandafter\main@language\expandafter{#1}%
1126 \catcode`\@=\atcatcode \let\atcatcode\relax
1127 \catcode`\==\eqcatcode \let\eqcatcode\relax
1128 \endinput}

```

`\ldf@finish` This macro takes one argument. It is the name of the language that was defined in the language definition file.

We load the local configuration file if one is present, we set the main language (taking into account that the argument might be a control sequence that needs to be expanded) and reset the category code of the `@`-sign.

```

1129 \def\bbl@afterldf#1{% TODO. Merge into the next macro? Unused elsewhere
1130 \bbl@afterlang
1131 \let\bbl@afterlang\relax
1132 \let\BabelModifiers\relax
1133 \let\bbl@screset\relax}%
1134 \def\ldf@finish#1{%
1135 \loadlocalcfg{#1}%
1136 \bbl@afterldf{#1}%
1137 \expandafter\main@language\expandafter{#1}%
1138 \catcode`\@=\atcatcode \let\atcatcode\relax
1139 \catcode`\==\eqcatcode \let\eqcatcode\relax}

```

After the preamble of the document the commands `\LdfInit`, `\ldf@quit` and `\ldf@finish` are no longer needed. Therefore they are turned into warning messages in `LTEX`.

```

1140 \@onlypreamble\LdfInit
1141 \@onlypreamble\ldf@quit
1142 \@onlypreamble\ldf@finish

```

`\main@language` This command should be used in the various language definition files. It stores its argument in `\bbl@main@language` to be used to switch to the correct language at the beginning of the document.

```

1143 \def\main@language#1{%
1144 \def\bbl@main@language{#1}%
1145 \let\language\bbl@main@language % TODO. Set locale name
1146 \bbl@id@assign
1147 \bbl@patterns{\language}%

```

We also have to make sure that some code gets executed at the beginning of the document, either when the aux file is read or, if it does not exist, when the `\AtBeginDocument` is executed. Languages do not set `\pagedir`, so we set here for the whole document to the main `\bodydir`.

```

1148 \def\bbl@beforestart{%
1149 \def\@nolanerr##1{%
1150 \bbl@warning{Undefined language '##1' in aux.\\Reported}}%
1151 \bbl@usehooks{beforestart}}}%
1152 \global\let\bbl@beforestart\relax}
1153 \AtBeginDocument{%
1154 {\@nameuse{bbl@beforestart}}% Group!
1155 \if@filesw
1156 \providecommand\babel@aux[2]{}%
1157 \immediate\write\@mainaux{%
1158 \string\providecommand\string\babel@aux[2]{}%

```



```

1159 \immediate\write\@mainaux{\string\@nameuse{bbl@beforestart}}%
1160 \fi
1161 \expandafter\selectlanguage\expandafter{\bbl@main@language}%
1162 \ifbbl@single % must go after the line above.
1163 \renewcommand\selectlanguage[1]{}%
1164 \renewcommand\foreignlanguage[2]{#2}%
1165 \global\let\babel@aux\@gobbletwo % Also as flag
1166 \fi
1167 \ifcase\bbl@engine\or\pagedir\bodydir\fi} % TODO - a better place

```

A bit of optimization. Select in heads/foots the language only if necessary.

```

1168 \def\select@language@x#1{%
1169 \ifcase\bbl@select@type
1170 \bbl@ifsamestring\language\name{#1}{\select@language{#1}}%
1171 \else
1172 \select@language{#1}%
1173 \fi}

```

## 7.5 Shorthands

`\bbl@add@special` The macro `\bbl@add@special` is used to add a new character (or single character control sequence) to the macro `\dospecials` (and `\@sanitize` if  $\text{\LaTeX}$  is used). It is used only at one place, namely when `\initiate@active@char` is called (which is ignored if the char has been made active before). Because `\@sanitize` can be undefined, we put the definition inside a conditional. Items are added to the lists without checking its existence or the original catcode. It does not hurt, but should be fixed. It's already done with `\nfss@catcodes`, added in 3.10.

```

1174 \bbl@trace{Shorhands}
1175 \def\bbl@add@special#1{% 1:a macro like \", \?, etc.
1176 \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
1177 \bbl@ifunset{@sanitize}{\bbl@add@sanitize{\@makeother#1}}%
1178 \ifx\nfss@catcodes\undefined\else % TODO - same for above
1179 \begingroup
1180 \catcode`#1\active
1181 \nfss@catcodes
1182 \ifnum\catcode`#1=\active
1183 \endgroup
1184 \bbl@add\nfss@catcodes{\@makeother#1}%
1185 \else
1186 \endgroup
1187 \fi
1188 \fi}

```

`\bbl@remove@special` The companion of the former macro is `\bbl@remove@special`. It removes a character from the set macros `\dospecials` and `\@sanitize`, but it is not used at all in the babel core.

```

1189 \def\bbl@remove@special#1{%
1190 \begingroup
1191 \def\x##1##2{\ifnum`#1=`##2\noexpand\@empty
1192 \else\noexpand##1\noexpand##2\fi}%
1193 \def\do{\x\do}%
1194 \def\@makeother{\x\@makeother}%
1195 \edef\x{\endgroup
1196 \def\noexpand\dospecials{\dospecials}%
1197 \expandafter\ifx\csname @sanitize\endcsname\relax\else
1198 \def\noexpand\@sanitize{\@sanitize}%
1199 \fi}%
1200 \x}

```

`\initiate@active@char` A language definition file can call this macro to make a character active. This macro takes one argument, the character that is to be made active. When the character was already active this macro does nothing. Otherwise, this macro defines the control sequence `\normal@char<char>` to expand to the character in its 'normal state' and it defines the active character to expand to `\normal@char<char>` by default (`<char>` being the character to be made active). Later its definition can be changed to expand to `\active@char<char>` by calling `\bbl@activate{<char>}`.

For example, to make the double quote character active one could have `\initiate@active@char{}` in a language definition file. This defines " as `\active@prefix " \active@char` (where the first " is the character with its original catcode, when the shorthand is created, and `\active@char` is a single token). In protected contexts, it expands to `\protect " or \noexpand "` (ie, with the original "); otherwise `\active@char` is executed. This macro in turn expands to `\normal@char` in "safe" contexts (eg, `\label`), but `\user@active` in normal "unsafe" ones. The latter search a definition in the user, language and system levels, in this order, but if none is found, `\normal@char` is used. However, a deactivated shorthand (with `\bbl@deactivate` is defined as `\active@prefix "\normal@char`.

The following macro is used to define shorthands in the three levels. It takes 4 arguments: the (string'ed) character, `\<level>@group`, `<level>@active` and `<next-level>@active` (except in system).

```
1201 \def\bbl@active@def#1#2#3#4{%
1202   \@namedef{#3#1}{%
1203     \expandafter\ifx\csname#2@sh@#1@endcsname\relax
1204       \bbl@afterelse\bbl@sh@select#2#1{#3@arg#1}{#4#1}%
1205     \else
1206       \bbl@afterfi\csname#2@sh@#1@endcsname
1207     \fi}%

```

When there is also no current-level shorthand with an argument we will check whether there is a next-level defined shorthand for this active character.

```
1208   \long\@namedef{#3@arg#1}##1{%
1209     \expandafter\ifx\csname#2@sh@#1@string##1@endcsname\relax
1210       \bbl@afterelse\csname#4#1@endcsname##1%
1211     \else
1212       \bbl@afterfi\csname#2@sh@#1@string##1@endcsname
1213     \fi}}%

```

`\initiate@active@char` calls `\@initiate@active@char` with 3 arguments. All of them are the same character with different catcodes: active, other (`\string'ed`) and the original one. This trick simplifies the code a lot.

```
1214 \def\initiate@active@char#1{%
1215   \bbl@ifunset{active@char\string#1}%
1216   {\bbl@withactive
1217     {\expandafter\@initiate@active@char\expandafter}#1\string#1#1}%
1218   {}}

```

The very first thing to do is saving the original catcode and the original definition, even if not active, which is possible (undefined characters require a special treatment to avoid making them `\relax` and preserving some degree of protection).

```
1219 \def\@initiate@active@char#1#2#3{%
1220   \bbl@csarg\edef{oricat@#2}{\catcode`#2=\the\catcode`#2\relax}%
1221   \ifx#1\undefined
1222     \bbl@csarg\def{oridef@#2}{\def#1{\active@prefix#1\undefined}}%
1223   \else
1224     \bbl@csarg\let{oridef@#2}#1%
1225     \bbl@csarg\edef{oridef@#2}{%
1226       \let\noexpand#1%
1227       \expandafter\noexpand\csname bbl@oridef@#2@endcsname}%
1228   \fi

```

If the character is already active we provide the default expansion under this shorthand mechanism. Otherwise we write a message in the transcript file, and define `\normal@char` (*char*) to expand to the character in its default state. If the character is mathematically active when babel is loaded (for example ') the normal expansion is somewhat different to avoid an infinite loop (but it does not prevent the loop if the mathcode is set to "8000 *a posteriori*").

```
1229   \ifx#1#3\relax
1230     \expandafter\let\csname normal@char#2@endcsname#3%
1231   \else
1232     \bbl@info{Making #2 an active character}%
1233     \ifnum\mathcode`#2=\ifodd\bbl@engine"1000000 \else"8000 \fi
1234     \@namedef{normal@char#2}{%

```

```

1235      \textormath{#3}{\csname bbl@oridef@@#2\endcsname}}%
1236      \else
1237      \namedef{normal@char#2}{#3}%
1238      \fi

```

To prevent problems with the loading of other packages after babel we reset the catcode of the character to the original one at the end of the package and of each language file (except with KeepShorthandsActive). It is re-activate again at `\begin{document}`. We also need to make sure that the shorthands are active during the processing of the .aux file. Otherwise some citations may give unexpected results in the printout when a shorthand was used in the optional argument of `\bibitem` for example. Then we make it active (not strictly necessary, but done for backward compatibility).

```

1239      \bbl@restoreactive{#2}%
1240      \AtBeginDocument{%
1241      \catcode`#2\active
1242      \if@filesw
1243      \immediate\write\mainaux{\catcode`\string#2\active}%
1244      \fi}%
1245      \expandafter\bbl@add@special\csname#2\endcsname
1246      \catcode`#2\active
1247      \fi

```

Now we have set `\normal@char{char}`, we must define `\active@char{char}`, to be executed when the character is activated. We define the first level expansion of `\active@char{char}` to check the status of the `@safe@actives` flag. If it is set to true we expand to the 'normal' version of this character; otherwise we call `\user@active{char}` to start the search of a definition in the user, language and system levels (or eventually `\normal@char{char}`).

```

1248      \let\bbl@tempa\@firstoftwo
1249      \if\string^#2%
1250      \def\bbl@tempa{\noexpand\textormath}%
1251      \else
1252      \ifx\bbl@mathnormal\@undefined\else
1253      \let\bbl@tempa\bbl@mathnormal
1254      \fi
1255      \fi
1256      \expandafter\edef\csname active@char#2\endcsname{%
1257      \bbl@tempa
1258      {\noexpand\if@safe@actives
1259      \noexpand\expandafter
1260      \expandafter\noexpand\csname normal@char#2\endcsname
1261      \noexpand\else
1262      \noexpand\expandafter
1263      \expandafter\noexpand\csname bbl@doactive#2\endcsname
1264      \noexpand\fi}%
1265      {\expandafter\noexpand\csname normal@char#2\endcsname}}}%
1266      \bbl@csarg\edef{doactive#2}{%
1267      \expandafter\noexpand\csname user@active#2\endcsname}%

```

We now define the default values which the shorthand is set to when activated or deactivated. It is set to the deactivated form (globally), so that the character expands to

`\active@prefix{char} \normal@char{char}`

(where `\active@char{char}` is one control sequence!).

```

1268      \bbl@csarg\edef{active#2}{%
1269      \noexpand\active@prefix\noexpand#1%
1270      \expandafter\noexpand\csname active@char#2\endcsname}%
1271      \bbl@csarg\edef{normal#2}{%
1272      \noexpand\active@prefix\noexpand#1%
1273      \expandafter\noexpand\csname normal@char#2\endcsname}%
1274      \bbl@ncarg\let#1\bbl@normal@#2}%

```

The next level of the code checks whether a user has defined a shorthand for himself with this character. First we check for a single character shorthand. If that doesn't exist we check for a shorthand with an argument.

```

1275 \bbl@active@def#2\user@group{user@active}{language@active}%
1276 \bbl@active@def#2\language@group{language@active}{system@active}%
1277 \bbl@active@def#2\system@group{system@active}{normal@char}%

```

In order to do the right thing when a shorthand with an argument is used by itself at the end of the line we provide a definition for the case of an empty argument. For that case we let the shorthand character expand to its non-active self. Also, When a shorthand combination such as ' ' ends up in a heading T<sub>E</sub>X would see \protect'\protect'. To prevent this from happening a couple of shorthand needs to be defined at user level.

```

1278 \expandafter\edef\csname\user@group @sh#2@@\endcsname
1279 {\expandafter\noexpand\csname normal@char#2\endcsname}%
1280 \expandafter\edef\csname\user@group @sh#2@\string\protect@\endcsname
1281 {\expandafter\noexpand\csname user@active#2\endcsname}%

```

Finally, a couple of special cases are taken care of. (1) If we are making the right quote (') active we need to change \pr@m@s as well. Also, make sure that a single ' in math mode 'does the right thing'. (2) If we are using the caret (^) as a shorthand character special care should be taken to make sure math still works. Therefore an extra level of expansion is introduced with a check for math mode on the upper level.

```

1282 \if\string'#2%
1283 \let\prim@s\bbl@prim@s
1284 \let\active@math@prime#1%
1285 \fi
1286 \bbl@usehooks{initiateactive}{{#1}{#2}{#3}}

```

The following package options control the behavior of shorthands in math mode.

```

1287 <<{*More package options}>> ≡
1288 \DeclareOption{math=active}{}
1289 \DeclareOption{math=normal}{{\def\bbl@mathnormal{\noexpand\textormath}}}
1290 <</More package options>>

```

Initiating a shorthand makes active the char. That is not strictly necessary but it is still done for backward compatibility. So we need to restore the original catcode at the end of package *and* the end of the ldf.

```

1291 \@ifpackagewith{babel}{KeepShorthandsActive}%
1292 {\let\bbl@restoreactive\@gobble}%
1293 {\def\bbl@restoreactive#1{%
1294   \bbl@exp{%
1295     \\\AfterBabelLanguage\\CurrentOption
1296     {\catcode`#1=\the\catcode`#1\relax}%
1297     \\\AtEndOfPackage
1298     {\catcode`#1=\the\catcode`#1\relax}}}%
1299   \AtEndOfPackage{\let\bbl@restoreactive\@gobble}}

```

**\bbl@sh@select** This command helps the shorthand supporting macros to select how to proceed. Note that this macro needs to be expandable as do all the shorthand macros in order for them to work in expansion-only environments such as the argument of \hyphenation.

This macro expects the name of a group of shorthands in its first argument and a shorthand character in its second argument. It will expand to either \bbl@firstcs or \bbl@scndcs. Hence two more arguments need to follow it.

```

1300 \def\bbl@sh@select#1#2{%
1301   \expandafter\ifx\csname#1@sh#2@sel\endcsname\relax
1302     \bbl@afterelse\bbl@scndcs
1303   \else
1304     \bbl@afterfi\csname#1@sh#2@sel\endcsname
1305   \fi}

```

**\active@prefix** The command \active@prefix which is used in the expansion of active characters has a function similar to \OT1-cmd in that it \protects the active character whenever \protect is *not* \@typeset@protect. The \@gobble is needed to remove a token such as \activechar: (when the double colon was the active character to be dealt with). There are two definitions, depending of \ifincsname is available. If there is, the expansion will be more robust.

```

1306 \begingroup

```

```

1307 \bbl@ifunset{ifincsname}% TODO. Ugly. Correct? Only Plain?
1308 {\gdef\active@prefix#1{%
1309   \ifx\protect\@typeset@protect
1310   \else
1311     \ifx\protect\@unexpandable@protect
1312       \noexpand#1%
1313     \else
1314       \protect#1%
1315     \fi
1316     \expandafter\@gobble
1317   \fi}}
1318 {\gdef\active@prefix#1{%
1319   \ifincsname
1320     \string#1%
1321     \expandafter\@gobble
1322   \else
1323     \ifx\protect\@typeset@protect
1324     \else
1325       \ifx\protect\@unexpandable@protect
1326         \noexpand#1%
1327       \else
1328         \protect#1%
1329       \fi
1330       \expandafter\expandafter\expandafter\@gobble
1331     \fi
1332   \fi}}
1333 \endgroup

```

**\if@safe@actives** In some circumstances it is necessary to be able to reset the shorthand to its ‘normal’ value (usually the character with catcode ‘other’) on the fly. For this purpose the switch `@safe@actives` is available. The setting of this switch should be checked in the first level expansion of `\active@char⟨char⟩`. When this expansion mode is active (with `\@safe@activetrue`), something like `"13"13` becomes `"12"12` in an `\edef` (in other words, shorthands are `\string`’ed). This contrasts with `\protected@edef`, where catcodes are always left unchanged. Once converted, they can be used safely even after this expansion mode is deactivated (with `\@safe@activefalse`).

```

1334 \newif\if@safe@actives
1335 \@safe@activefalse

```

**\bbl@restore@actives** When the output routine kicks in while the active characters were made “safe” this must be undone in the headers to prevent unexpected typeset results. For this situation we define a command to make them “unsafe” again.

```

1336 \def\bbl@restore@actives{\if@safe@actives\@safe@activefalse\fi}

```

**\bbl@activate** Both macros take one argument, like `\initiate@active@char`. The macro is used to change the definition of an active character to expand to `\active@char⟨char⟩` in the case of `\bbl@activate`, or `\normal@char⟨char⟩` in the case of `\bbl@deactivate`.

```

1337 \chardef\bbl@activated\z@
1338 \def\bbl@activate#1{%
1339   \chardef\bbl@activated\@ne
1340   \bbl@withactive{\expandafter\let\expandafter}#1%
1341   \csname bbl@active@\string#1\endcsname}
1342 \def\bbl@deactivate#1{%
1343   \chardef\bbl@activated\tw@
1344   \bbl@withactive{\expandafter\let\expandafter}#1%
1345   \csname bbl@normal@\string#1\endcsname}

```

**\bbl@firstcs** These macros are used only as a trick when declaring shorthands.

```

\bbl@scndcs
1346 \def\bbl@firstcs#1#2{\csname#1\endcsname}
1347 \def\bbl@scndcs#1#2{\csname#2\endcsname}

```

**\declare@shorthand** The command `\declare@shorthand` is used to declare a shorthand on a certain level. It takes three arguments:

1. a name for the collection of shorthands, i.e. ‘system’, or ‘dutch’;
2. the character (sequence) that makes up the shorthand, i.e. ~ or "a;
3. the code to be executed when the shorthand is encountered.

The auxiliary macro `\babel@texpdf` improves the interoperativity with `hyperref` and takes 4 arguments: (1) The  $\TeX$  code in text mode, (2) the string for `hyperref`, (3) the  $\TeX$  code in math mode, and (4), which is currently ignored, but it's meant for a string in math mode, like a minus sign instead of an hyphen (currently `hyperref` doesn't discriminate the mode). This macro may be used in `ldf` files.

```

1348 \def\babel@texpdf#1#2#3#4{%
1349   \ifx\texorpdfstring\undefined
1350     \textormath{#1}{#3}%
1351   \else
1352     \texorpdfstring{\textormath{#1}{#3}}{#2}%
1353     % \texorpdfstring{\textormath{#1}{#3}}{\textormath{#2}{#4}}%
1354   \fi}
1355 %
1356 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
1357 \def\@decl@short#1#2#3\@nil#4{%
1358   \def\bbl@tempa{#3}%
1359   \ifx\bbl@tempa\empty
1360     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
1361     \bbl@ifunset{#1@sh@\string#2@}{}%
1362     {\def\bbl@tempa{#4}%
1363       \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbl@tempa
1364       \else
1365         \bbl@info
1366           {Redefining #1 shorthand \string#2\}%
1367           in language \CurrentOption}%
1368       \fi}%
1369   \@namedef{#1@sh@\string#2@}{#4}%
1370 \else
1371   \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@firstcs
1372   \bbl@ifunset{#1@sh@\string#2@\string#3@}{}%
1373   {\def\bbl@tempa{#4}%
1374     \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bbl@tempa
1375     \else
1376       \bbl@info
1377         {Redefining #1 shorthand \string#2\string#3\}%
1378         in language \CurrentOption}%
1379     \fi}%
1380   \@namedef{#1@sh@\string#2@\string#3@}{#4}%
1381 \fi}

```

`\textormath` Some of the shorthands that will be declared by the language definition files have to be usable in both text and mathmode. To achieve this the helper macro `\textormath` is provided.

```

1382 \def\textormath{%
1383   \ifmmode
1384     \expandafter\@secondoftwo
1385   \else
1386     \expandafter\@firstoftwo
1387   \fi}

```

`\user@group` The current concept of ‘shorthands’ supports three levels or groups of shorthands. For each level the name of the level or group is stored in a macro. The default is to have a user group; use language

`\language@group` group ‘english’ and have a system group called ‘system’.

`\system@group`

```

1388 \def\user@group{user}
1389 \def\language@group{english} % TODO. I don't like defaults
1390 \def\system@group{system}

```

`\usesshorthands` This is the user level macro. It initializes and activates the character for use as a shorthand character (ie, it's active in the preamble). Languages can deactivate shorthands, so a starred version is also provided which activates them always after the language has been switched.

```

1391 \def\useshorthands{%
1392   \@ifstar\bb1@usesesh@s{\bb1@usesesh@x{}}
1393 \def\bb1@usesesh@s#1{%
1394   \bb1@usesesh@x
1395   {\AddBabelHook{babel-sh-\string#1}{afterextras}{\bb1@activate{#1}}}%
1396   {#1}}
1397 \def\bb1@usesesh@x#1#2{%
1398   \bb1@ifshorthand{#2}%
1399   {\def\user@group{user}%
1400    \initiate@active@char{#2}%
1401    #1%
1402    \bb1@activate{#2}}%
1403   {\bb1@error
1404    {I can't declare a shorthand turned off (\string#2)}
1405    {Sorry, but you can't use shorthands which have been\\
1406     turned off in the package options}}}

```

`\defineshorthand` Currently we only support two groups of user level shorthands, named internally `user` and `user@<lang>` (language-dependent user shorthands). By default, only the first one is taken into account, but if the former is also used (in the optional argument of `\defineshorthand`) a new level is inserted for it (`user@generic`, done by `\bb1@set@user@generic`); we make also sure `{}` and `\protect` are taken into account in this new top level.

```

1407 \def\user@language@group{user@\language@group}
1408 \def\bb1@set@user@generic#1#2{%
1409   \bb1@ifunset{user@generic@active#1}%
1410   {\bb1@active@def#1\user@language@group{user@active}{user@generic@active}%
1411    \bb1@active@def#1\user@group{user@generic@active}{language@active}%
1412    \expandafter\edef\csname#2@sh@#1@\endcsname{%
1413      \expandafter\noexpand\csname normal@char#1\endcsname}%
1414    \expandafter\edef\csname#2@sh@#1@\string\protect\endcsname{%
1415      \expandafter\noexpand\csname user@active#1\endcsname}}%
1416   \@empty}
1417 \newcommand\defineshorthand[3][user]{%
1418   \edef\bb1@tempa{\zap@space#1 \@empty}%
1419   \bb1@for\bb1@tempb\bb1@tempa{%
1420     \if*\expandafter\@car\bb1@tempb\@nil
1421       \edef\bb1@tempb{user\expandafter\@gobble\bb1@tempb}%
1422       \@expandtwoargs
1423       \bb1@set@user@generic{\expandafter\string\@car#2\@nil}\bb1@tempb
1424     \fi
1425     \declare@shorthand{\bb1@tempb}{#2}{#3}}}

```

`\languageshortands` A user level command to change the language from which shorthands are used. Unfortunately, `babel` currently does not keep track of defined groups, and therefore there is no way to catch a possible change in casing to fix it in the same way languages names are fixed. [TODO].

```

1426 \def\languageshortands#1{\def\language@group{#1}}

```

`\aliasshorthand` First the new shorthand needs to be initialized. Then, we define the new shorthand in terms of the original one, but note with `\aliasshorthands{"}{/}` is `\active@prefix /active@char/`, so we still need to let the latest to `\active@char`.

```

1427 \def\aliasshorthand#1#2{%
1428   \bb1@ifshorthand{#2}%
1429   {\expandafter\ifx\csname active@char\string#2\endcsname\relax
1430    \ifx\document\@notprerr
1431      \@notshorthand{#2}%
1432    \else
1433      \initiate@active@char{#2}%
1434      \bb1@ccarg\let{active@char\string#2}{active@char\string#1}%
1435      \bb1@ccarg\let{normal@char\string#2}{normal@char\string#1}%
1436      \bb1@activate{#2}%
1437    \fi
1438    \fi}%
1439   {\bb1@error

```

```
1440 {Cannot declare a shorthand turned off (\string#2)}
1441 {Sorry, but you cannot use shorthands which have been\\%
1442   turned off in the package options}}}
```

```

1443 \def\@notshorthand#1{%
1444   \bbl@error{%
1445     The character '\string #1' should be made a shorthand character;\%
1446     add the command \string\usesshorthands\string{#1\string} to
1447     the preamble.\%
1448     I will ignore your instruction}%
1449   {You may proceed, but expect unexpected results}}

```

```
1450 \newcommand*\shorthandon[1]{\bbl@switch@sh\@ne#1\@nnil}
1451 \DeclareRobustCommand*\shorthandoff{%
1452   \ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
1453 \def\bbl@shorthandoff#1#2{\bbl@switch@sh#1#2\@nnil}
```

```

1454 \def\bbl@switch@sh#1#2{%
1455   \ifx#2@\nnil\else
1456     \bbl@ifunset{\bbl@active@\string#2}%
1457     {\bbl@error
1458       {I can't switch '\string#2' on or off--not a shorthand}%
1459       {This character is not a shorthand. Maybe you made\\%
1460         a typing mistake? I will ignore your instruction.}}%
1461   {\ifcase#1%   off, on, off*
1462     \catcode`#212\relax
1463   \or
1464     \catcode`#2\active
1465     \bbl@ifunset{\bbl@shdef@\string#2}%
1466     {}%
1467     {\bbl@withactive{\expandafter\let\expandafter}%#2%
1468       \csname bbl@shdef@\string#2\endcsname
1469       \bbl@csarg\let{shdef@\string#2}\relax}%
1470   \ifcase\bbl@activated\or
1471     \bbl@activate{#2}%
1472   \else
1473     \bbl@deactivate{#2}%
1474   \fi
1475 \or
1476   \bbl@ifunset{\bbl@shdef@\string#2}%
1477   {\bbl@withactive{\bbl@csarg\let{shdef@\string#2}}#2}%
1478   {}%
1479   \csname bbl@oricat@\string#2\endcsname
1480   \csname bbl@oridef@\string#2\endcsname
1481   \fi}%
1482   \bbl@afterfi\bbl@switch@sh#1%
1483 \fi}

```

```

1484 \def\babelshorthand{\active@prefix\babelshorthand\bbl@putsh}
1485 \def\bbl@putsh#1{%
1486   \bbl@ifunset{\bbl@active@{string#1}%
1487     {\bbl@putsh@i#1\@empty\@nnil}%

```



```

1488     {\csname bbl@active@\string#1\endcsname}}
1489 \def\bbl@putsh@i#1#2\@nnil{%
1490   \csname\language@group @sh@\string#1@%
1491     \ifx\@empty#2\else\string#2@\fi\endcsname}
1492 %
1493 \ifx\bbl@opt@shorthands\@nnil\else
1494   \let\bbl@s@initiate@active@char\initiate@active@char
1495   \def\initiate@active@char#1{%
1496     \bbl@ifshorthand{#1}{\bbl@s@initiate@active@char{#1}}{}}
1497   \let\bbl@s@switch@sh\bbl@switch@sh
1498   \def\bbl@switch@sh#1#2{%
1499     \ifx#2\@nnil\else
1500       \bbl@afterfi
1501       \bbl@ifshorthand{#2}{\bbl@s@switch@sh#1{#2}}{\bbl@switch@sh#1}%
1502     \fi}
1503   \let\bbl@s@activate\bbl@activate
1504   \def\bbl@activate#1{%
1505     \bbl@ifshorthand{#1}{\bbl@s@activate{#1}}{}}
1506   \let\bbl@s@deactivate\bbl@deactivate
1507   \def\bbl@deactivate#1{%
1508     \bbl@ifshorthand{#1}{\bbl@s@deactivate{#1}}{}}
1509 \fi

```

You may want to test if a character is a shorthand. Note it does not test whether the shorthand is on or off.

```

1510 \newcommand\ifbabelshorthand[3]{\bbl@ifunset{\bbl@active@\string#1}{#3}{#2}}

```

**\bbl@prim@s** One of the internal macros that are involved in substituting `\prime` for each right quote in  
**\bbl@pr@m@s** mathmode is `\prim@s`. This checks if the next character is a right quote. When the right quote is active, the definition of this macro needs to be adapted to look also for an active right quote; the hat could be active, too.

```

1511 \def\bbl@prim@s{%
1512   \prime\futurelet\@let@token\bbl@pr@m@s}
1513 \def\bbl@if@primes#1#2{%
1514   \ifx#1\@let@token
1515     \expandafter\@firstoftwo
1516   \else\ifx#2\@let@token
1517     \bbl@afterelse\expandafter\@firstoftwo
1518   \else
1519     \bbl@afterfi\expandafter\@secondoftwo
1520   \fi\fi}
1521 \begingroup
1522   \catcode`\^=7 \catcode`\*=\active \lccode`\*=\^
1523   \catcode`\'=12 \catcode`\"=\active \lccode`\"=\'
1524   \lowercase{%
1525     \gdef\bbl@pr@m@s{%
1526       \bbl@if@primes"%"
1527       \pr@@@s
1528       {\bbl@if@primes*\^pr@@@t\egroup}}}
1529 \endgroup

```

Usually the `~` is active and expands to `\penalty\@M\.`. When it is written to the `.aux` file it is written expanded. To prevent that and to be able to use the character `~` as a start character for a shorthand, it is redefined here as a one character shorthand on system level. The system declaration is in most cases redundant (when `~` is still a non-break space), and in some cases is inconvenient (if `~` has been redefined); however, for backward compatibility it is maintained (some existing documents may rely on the babel value).

```

1530 \initiate@active@char{~}
1531 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }
1532 \bbl@activate{~}

```

**\OT1dqpos** The position of the double quote character is different for the OT1 and T1 encodings. It will later be  
**\T1dqpos** selected using the `\f@encoding` macro. Therefore we define two macros here to store the position of the character in these encodings.

```

1533 \expandafter\def\csname OT1dqpos\endcsname{127}
1534 \expandafter\def\csname T1dqpos\endcsname{4}

```

When the macro `\f@encoding` is undefined (as it is in plain  $\TeX$ ) we define it here to expand to `OT1`

```

1535 \ifx\f@encoding\undefined
1536   \def\f@encoding{OT1}
1537 \fi

```

## 7.6 Language attributes

Language attributes provide a means to give the user control over which features of the language definition files he wants to enable.

`\languageattribute` The macro `\languageattribute` checks whether its arguments are valid and then activates the selected language attribute. First check whether the language is known, and then process each attribute in the list.

```

1538 \bbl@trace{Language attributes}
1539 \newcommand\languageattribute[2]{%
1540   \def\bbl@tempc{#1}%
1541   \bbl@fixname\bbl@tempc
1542   \bbl@iflanguage\bbl@tempc{%
1543     \bbl@vforeach{#2}{%

```

We want to make sure that each attribute is selected only once; therefore we store the already selected attributes in `\bbl@known@attribs`. When that control sequence is not yet defined this attribute is certainly not selected before.

```

1544     \ifx\bbl@known@attribs\undefined
1545       \in@false
1546     \else
1547       \bbl@xin@{,\bbl@tempc-##1,}{,\bbl@known@attribs,}%
1548     \fi
1549     \ifin@
1550       \bbl@warning{%
1551         You have more than once selected the attribute '##1'\%
1552         for language #1. Reported}%
1553     \else

```

When we end up here the attribute is not selected before. So, we add it to the list of selected attributes and execute the associated  $\TeX$ -code.

```

1554       \bbl@exp{%
1555         \\bbl@add@list\\bbl@known@attribs{\bbl@tempc-##1}}%
1556       \edef\bbl@tempa{\bbl@tempc-##1}%
1557       \expandafter\bbl@ifknown@trib\expandafter{\bbl@tempa}\bbl@attributes%
1558       {\csname\bbl@tempc @attr##1\endcsname}%
1559       {\@attrerr{\bbl@tempc}{##1}}%
1560     \fi}}
1561 \@onlypreamble\languageattribute

```

The error text to be issued when an unknown attribute is selected.

```

1562 \newcommand*\@attrerr[2]{%
1563   \bbl@error
1564   {The attribute #2 is unknown for language #1.}%
1565   {Your command will be ignored, type <return> to proceed}}

```

`\bbl@declare@ttribute` This command adds the new language/attribute combination to the list of known attributes. Then it defines a control sequence to be executed when the attribute is used in a document. The result of this should be that the macro `\extras...` for the current language is extended, otherwise the attribute will not work as its code is removed from memory at `\begin{document}`.

```

1566 \def\bbl@declare@ttribute#1#2#3{%
1567   \bbl@xin@{,#2,}{,\BabelModifiers,}%
1568   \ifin@
1569     \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
1570   \fi
1571   \bbl@add@list\bbl@attributes{#1-#2}%
1572   \expandafter\def\csname#1@attr@#2\endcsname{#3}}

```

`\bbl@ifattributeset` This internal macro has 4 arguments. It can be used to interpret  $\TeX$  code based on whether a certain attribute was set. This command should appear inside the argument to `\AtBeginDocument` because the attributes are set in the document preamble, *after* `babel` is loaded.

The first argument is the language, the second argument the attribute being checked, and the third and fourth arguments are the true and false clauses.

```

1573 \def\bbl@ifattributeset#1#2#3#4{%
1574   \ifx\bbl@known@attribs\undefined
1575     \in@false
1576   \else
1577     \bbl@xin@{,#1-#2,}{,\bbl@known@attribs,}%
1578   \fi
1579   \ifin@
1580     \bbl@afterelse#3%
1581   \else
1582     \bbl@afterfi#4%
1583   \fi}

```

`\bbl@ifknown@ttrib` An internal macro to check whether a given language/attribute is known. The macro takes 4 arguments, the language/attribute, the attribute list, the  $\TeX$ -code to be executed when the attribute is known and the  $\TeX$ -code to be executed otherwise.

We first assume the attribute is unknown. Then we loop over the list of known attributes, trying to find a match.

```

1584 \def\bbl@ifknown@ttrib#1#2{%
1585   \let\bbl@tempa\@secondoftwo
1586   \bbl@loopx\bbl@tempb{#2}{%
1587     \expandafter\in@\expandafter{\expandafter,\bbl@tempb,}{,#1,}%
1588     \ifin@
1589       \let\bbl@tempa\@firstoftwo
1590     \else
1591       \fi}%
1592   \bbl@tempa}

```

`\bbl@clear@ttribs` This macro removes all the attribute code from  $\TeX$ 's memory at `\begin{document}` time (if any is present).

```

1593 \def\bbl@clear@ttribs{%
1594   \ifx\bbl@attributes\undefined\else
1595     \bbl@loopx\bbl@tempa{\bbl@attributes}{%
1596       \expandafter\bbl@clear@ttrib\bbl@tempa.
1597     }%
1598     \let\bbl@attributes\undefined
1599   \fi}
1600 \def\bbl@clear@ttrib#1-#2.{%
1601   \expandafter\let\csname#1@attr#2\endcsname\undefined}
1602 \AtBeginDocument{\bbl@clear@ttribs}

```

## 7.7 Support for saving macro definitions

To save the meaning of control sequences using `\babel@save`, we use temporary control sequences. To save hash table entries for these control sequences, we don't use the name of the control sequence to be saved to construct the temporary name. Instead we simply use the value of a counter, which is reset to zero each time we begin to save new values. This works well because we release the saved meanings before we begin to save a new set of control sequence meanings (see `\selectlanguage` and `\originalTeX`). Note undefined macros are not undefined any more when saved – they are `\relax`'ed.

`\babel@savecnt` The initialization of a new save cycle: reset the counter to zero.  
`\babel@beginsave`

```

1603 \bbl@trace{Macros for saving definitions}
1604 \def\babel@beginsave{\babel@savecnt\z@}

```

Before it's forgotten, allocate the counter and initialize all.

```

1605 \newcount\babel@savecnt
1606 \babel@beginsave

```

`\babel@save` The macro `\babel@save<csname>` saves the current meaning of the control sequence `<csname>` to `\originalTeX`<sup>31</sup>. To do this, we let the current meaning to a temporary control sequence, the restore commands are appended to `\originalTeX` and the counter is incremented. The macro `\babel@savevariable<variable>` saves the value of the variable. `<variable>` can be anything allowed after the `\the` primitive. To avoid messing saved definitions up, they are saved only the very first time.

```

1607 \def\babel@save#1{%
1608   \def\bb@tempa{, #1,}% Clumsy, for Plain
1609   \expandafter\bb@add\expandafter\bb@tempa\expandafter{%
1610     \expandafter\expandafter,\bb@savedextras,}%
1611   \expandafter\in@\bb@tempa
1612   \ifin@ \else
1613     \bb@add\bb@savedextras{, #1,}%
1614     \bb@carg\let\babel@number\babel@savecnt}#1\relax
1615     \toks@\expandafter{\originalTeX\let#1=}
1616     \bb@exp{%
1617       \def\originalTeX{\the\toks@<\babel@number\babel@savecnt>\relax}}%
1618     \advance\babel@savecnt@ne
1619   \fi}
1620 \def\babel@savevariable#1{%
1621   \toks@\expandafter{\originalTeX #1=}
1622   \bb@exp{\def\originalTeX{\the\toks@<\the#1>\relax}}

```

`\bb@frenchspacing` Some languages need to have `\frenchspacing` in effect. Others don't want that. The command `\bb@frenchspacing` switches it on when it isn't already in effect and `\bb@nonfrenchspacing` switches it off if necessary. A more refined way to switch the catcodes is done with ini files. Here an auxiliary macro is defined, but the main part is in `\babelprovide`. This new method should be ideally the default one.

```

1623 \def\bb@frenchspacing{%
1624   \ifnum\the\scode`\.=\@m
1625     \let\bb@nonfrenchspacing\relax
1626   \else
1627     \frenchspacing
1628     \let\bb@nonfrenchspacing\nonfrenchspacing
1629   \fi}
1630 \let\bb@nonfrenchspacing\nonfrenchspacing
1631 \let\bb@elt\relax
1632 \edef\bb@fs@chars{%
1633   \bb@elt{\string.}\@m{3000}\bb@elt{\string?}\@m{3000}%
1634   \bb@elt{\string!}\@m{3000}\bb@elt{\string:}\@m{2000}%
1635   \bb@elt{\string;}\@m{1500}\bb@elt{\string,}\@m{1250}}
1636 \def\bb@pre@fs{%
1637   \def\bb@elt##1##2##3{\scode`##1=\the\scode`##1\relax}%
1638   \edef\bb@save@sfcodes{\bb@fs@chars}%
1639 \def\bb@post@fs{%
1640   \bb@save@sfcodes
1641   \edef\bb@tempa{\bb@cl{frspc}}%
1642   \edef\bb@tempa{\expandafter\car\bb@tempa\@nil}%
1643   \if u\bb@tempa % do nothing
1644   \else\if n\bb@tempa % non french
1645     \def\bb@elt##1##2##3{%
1646       \ifnum\scode`##1=##2\relax
1647         \babel@savevariable{\scode`##1}%
1648         \scode`##1=##3\relax
1649       \fi}%
1650     \bb@fs@chars
1651   \else\if y\bb@tempa % french
1652     \def\bb@elt##1##2##3{%
1653       \ifnum\scode`##1=##3\relax
1654         \babel@savevariable{\scode`##1}%
1655         \scode`##1=##2\relax

```

<sup>31</sup>`\originalTeX` has to be expandable, i.e. you shouldn't let it to `\relax`.

```

1656     \fi}%
1657     \bbl@fs@chars
1658     \fi\fi\fi}

```

## 7.8 Short tags

`\babeltags` This macro is straightforward. After zapping spaces, we loop over the list and define the macros `\text{<tag>}` and `\<tag>`. Definitions are first expanded so that they don't contain `\csname` but the actual macro.

```

1659 \bbl@trace{Short tags}
1660 \def\babeltags#1{%
1661     \edef\bbl@tempa{\zap@space#1 \@empty}%
1662     \def\bbl@tempb##1=##2\@{%
1663         \edef\bbl@tempc{%
1664             \noexpand\newcommand
1665             \expandafter\noexpand\csname ##1\endcsname{%
1666                 \noexpand\protect
1667                 \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
1668             \noexpand\newcommand
1669             \expandafter\noexpand\csname text##1\endcsname{%
1670                 \noexpand\foreignlanguage{##2}}
1671         \bbl@tempc}%
1672     \bbl@for\bbl@tempa\bbl@tempa{%
1673         \expandafter\bbl@tempb\bbl@tempa\@}%

```

## 7.9 Hyphens

`\babelhyphenation` This macro saves hyphenation exceptions. Two macros are used to store them: `\bbl@hyphenation@` for the global ones and `\bbl@hyphenation<lang>` for language ones. See `\bbl@patterns` above for further details. We make sure there is a space between words when multiple commands are used.

```

1674 \bbl@trace{Hyphens}
1675 \@onlypreamble\babelhyphenation
1676 \AtEndOfPackage{%
1677     \newcommand\babelhyphenation[2][\@empty]{%
1678         \ifx\bbl@hyphenation@ \relax
1679             \let\bbl@hyphenation@ \@empty
1680         \fi
1681         \ifx\bbl@hyphlist \@empty \else
1682             \bbl@warning{%
1683                 You must not intermingle \string\selectlanguage\space and\%
1684                 \string\babelhyphenation\space or some exceptions will not\%
1685                 be taken into account. Reported}%
1686         \fi
1687         \ifx\@empty#1%
1688             \protected@edef\bbl@hyphenation@{\bbl@hyphenation@\space#2}%
1689         \else
1690             \bbl@vforeach{#1}{%
1691                 \def\bbl@tempa{##1}%
1692                 \bbl@fixname\bbl@tempa
1693                 \bbl@iflanguage\bbl@tempa{%
1694                     \bbl@csarg\protected@edef{hyphenation@\bbl@tempa}{%
1695                         \bbl@ifunset{bbl@hyphenation@\bbl@tempa}%
1696                         {}%
1697                         {\csname bbl@hyphenation@\bbl@tempa\endcsname\space}%
1698                         #2}}}%
1699             \fi}}

```

`\bbl@allowhyphens` This macro makes hyphenation possible. Basically its definition is nothing more than `\nobreak \hskip Opt plus Opt`<sup>32</sup>.

```

1700 \def\bbl@allowhyphens{\ifvmode\else\nobreak\hskip\z@skip\fi}

```

<sup>32</sup>TeX begins and ends a word for hyphenation at a glue node. The penalty prevents a linebreak at this glue node.

```

1701 \def\bbl@t@one{T1}
1702 \def\allowhyphens{\ifx\cf@encoding\bbl@t@one\else\bbl@allowhyphens\fi}

```

`\babelhyphen` Macros to insert common hyphens. Note the space before @ in `\babelhyphen`. Instead of protecting it with `\DeclareRobustCommand`, which could insert a `\relax`, we use the same procedure as shorthands, with `\active@prefix`.

```

1703 \newcommand\babellnullhyphen{\char\hyphenchar\font}
1704 \def\babelhyphen{\active@prefix\babelhyphen\bbl@hyphen}
1705 \def\bbl@hyphen{%
1706   \ifstar{\bbl@hyphen@i @}{\bbl@hyphen@i\@empty}}
1707 \def\bbl@hyphen@i#1#2{%
1708   \bbl@ifunset{\bbl@hy#1#2\@empty}%
1709   {\csname bbl@#1usehyphen\endcsname{\discretionary{#2}{}{#2}}}%
1710   {\csname bbl@hy#1#2\@empty\endcsname}}

```

The following two commands are used to wrap the “hyphen” and set the behavior of the rest of the word – the version with a single @ is used when further hyphenation is allowed, while that with @@ if no more hyphens are allowed. In both cases, if the hyphen is preceded by a positive space, breaking after the hyphen is disallowed.

There should not be a discretionary after a hyphen at the beginning of a word, so it is prevented if preceded by a skip. Unfortunately, this does handle cases like “(-suffix)”. `\nobreak` is always preceded by `\leavevmode`, in case the shorthand starts a paragraph.

```

1711 \def\bbl@usehyphen#1{%
1712   \leavevmode
1713   \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
1714   \nobreak\hskip\z@skip}
1715 \def\bbl@@usehyphen#1{%
1716   \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}

```

The following macro inserts the hyphen char.

```

1717 \def\bbl@hyphenchar{%
1718   \ifnum\hyphenchar\font=\m@ne
1719     \babellnullhyphen
1720   \else
1721     \char\hyphenchar\font
1722   \fi}

```

Finally, we define the hyphen “types”. Their names will not change, so you may use them in `ldf`’s. After a space, the `\mbox` in `\bbl@hy@nobreak` is redundant.

```

1723 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
1724 \def\bbl@hy@@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
1725 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
1726 \def\bbl@hy@@hard{\bbl@usehyphen\bbl@hyphenchar}
1727 \def\bbl@hy@nobreak{\bbl@usehyphen{\mbox{\bbl@hyphenchar}}{}}
1728 \def\bbl@hy@@nobreak{\mbox{\bbl@hyphenchar}}
1729 \def\bbl@hy@repeat{%
1730   \bbl@usehyphen{%
1731     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
1732 \def\bbl@hy@@repeat{%
1733   \bbl@usehyphen{%
1734     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
1735 \def\bbl@hy@empty{\hskip\z@skip}
1736 \def\bbl@hy@@empty{\discretionary{}{}{}}

```

`\bbl@disc` For some languages the macro `\bbl@disc` is used to ease the insertion of discretionaries for letters that behave ‘abnormally’ at a breakpoint.

```

1737 \def\bbl@disc#1#2{\nobreak\discretionary{#2-}{}{#1}\bbl@allowhyphens}

```

## 7.10 Multiencoding strings

The aim following commands is to provide a common interface for strings in several encodings. They also contains several hooks which can be used by `luatex` and `xetex`. The code is organized here with pseudo-guards, so we start with the basic commands.

**Tools** But first, a tool. It makes global a local variable. This is not the best solution, but it works.

```
1738 \bbl@trace{Multiencoding strings}
1739 \def\bbl@tglobal#1{\global\let#1#1}
```

The second one. We need to patch `\@uclclist`, but it is done once and only if `\SetCase` is used or if strings are encoded. The code is far from satisfactory for several reasons, including the fact `\@uclclist` is not a list any more. Therefore a package option is added to ignore it. Instead of gobbling the macro getting the next two elements (usually `\reserved@a`), we pass it as argument to `\bbl@uclc`. The parser is restarted inside `\lang@bbl@uclc` because we do not know how many expansions are necessary (depends on whether strings are encoded). The last part is tricky – when uppercasing, we have:

```
\let\bbl@tolower\@empty\bbl@toupper\@empty
```

and starts over (and similarly when lowercasing).

```
1740 \@ifpackagewith{babel}{nocase}%
1741   {\let\bbl@patchuclc\relax}%
1742   {\def\bbl@patchuclc{%
1743     \global\let\bbl@patchuclc\relax
1744     \g@addto@macro\@uclclist{\reserved@b{\reserved@b\bbl@uclc}}%
1745     \gdef\bbl@uclc##1{%
1746       \let\bbl@encoded\bbl@encoded@uclc
1747       \bbl@ifunset{\language @bbl@uclc}% and resumes it
1748       {##1}%
1749       {\let\bbl@tempa##1\relax % Used by LANG@bbl@uclc
1750        \csname\language @bbl@uclc\endcsname}%
1751        {\bbl@tolower\@empty}{\bbl@toupper\@empty}}}%
1752     \gdef\bbl@tolower{\csname\language @bbl@lc\endcsname}%
1753     \gdef\bbl@toupper{\csname\language @bbl@uc\endcsname}}%
1754 \langle *More package options \rangle \equiv
1755 \DeclareOption{nocase}{}
1756 \langle /More package options \rangle
```

The following package options control the behavior of `\SetString`.

```
1757 \langle *More package options \rangle \equiv
1758 \let\bbl@opt@strings\@nnil % accept strings=value
1759 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
1760 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
1761 \def\BabelStringsDefault{generic}
1762 \langle /More package options \rangle
```

**Main command** This is the main command. With the first use it is redefined to omit the basic setup in subsequent blocks. We make sure strings contain actual letters in the range 128-255, not active characters.

```
1763 \@onlypreamble\StartBabelCommands
1764 \def\StartBabelCommands{%
1765   \begin@group
1766   \@tempcnta="7F
1767   \def\bbl@tempa{%
1768     \ifnum\@tempcnta>"FF\else
1769       \catcode\@tempcnta=11
1770       \advance\@tempcnta\@ne
1771       \expandafter\bbl@tempa
1772     \fi}%
1773   \bbl@tempa
1774   \langle Macros local to BabelCommands \rangle
1775   \def\bbl@provstring##1##2{%
1776     \providecommand##1{##2}%
1777     \bbl@tglobal##1}%
1778   \global\let\bbl@scafter\@empty
1779   \let\StartBabelCommands\bbl@startcmds
```

```

1780 \ifx\BabelLanguages\relax
1781   \let\BabelLanguages\CurrentOption
1782 \fi
1783 \begingroup
1784 \let\bbbl@screset\@nnil % local flag - disable 1st stopcommands
1785 \StartBabelCommands}
1786 \def\bbbl@startcmds{%
1787   \ifx\bbbl@screset\@nnil\else
1788     \bbbl@usehooks{stopcommands}{}%
1789   \fi
1790 \endgroup
1791 \begingroup
1792 \@ifstar
1793   {\ifx\bbbl@opt@strings\@nnil
1794     \let\bbbl@opt@strings\BabelStringsDefault
1795   \fi
1796   \bbbl@startcmds@i}%
1797 \bbbl@startcmds@i}
1798 \def\bbbl@startcmds@i#1#2{%
1799   \edef\bbbl@L{\zap@space#1 \@empty}%
1800   \edef\bbbl@G{\zap@space#2 \@empty}%
1801   \bbbl@startcmds@ii}
1802 \let\bbbl@startcommands\StartBabelCommands

```

Parse the encoding info to get the label, input, and font parts.

Select the behavior of \SetString. There are two main cases, depending of if there is an optional argument: without it and strings=encoded, strings are defined always; otherwise, they are set only if they are still undefined (ie, fallback values). With labelled blocks and strings=encoded, define the strings, but with another value, define strings only if the current label or font encoding is the value of strings; otherwise (ie, no strings or a block whose label is not in strings=) do nothing.

We presume the current block is not loaded, and therefore set (above) a couple of default values to gobble the arguments. Then, these macros are redefined if necessary according to several parameters.

```

1803 \newcommand\bbbl@startcmds@ii[1][\@empty]{%
1804   \let\SetString\@gobbletwo
1805   \let\bbbl@stringdef\@gobbletwo
1806   \let\AfterBabelCommands\@gobble
1807   \ifx\@empty#1%
1808     \def\bbbl@sc@label{generic}%
1809     \def\bbbl@encstring##1##2{%
1810       \ProvideTextCommandDefault##1{##2}%
1811       \bbbl@tglobal##1%
1812       \expandafter\bbbl@tglobal\csname\string?\string##1\endcsname}%
1813     \let\bbbl@sctest\in@true
1814   \else
1815     \let\bbbl@sc@charset\space % <- zapped below
1816     \let\bbbl@sc@fontenc\space % <- " "
1817     \def\bbbl@tempa##1=##2\@nil{%
1818       \bbbl@csarg\edef{sc@\zap@space##1 \@empty}{##2 }}%
1819     \bbbl@vforeach{label=#1}{\bbbl@tempa##1\@nil}%
1820     \def\bbbl@tempa##1 ##2{% space -> comma
1821       ##1%
1822       \ifx\@empty##2\else\ifx,##1,\else,\fi\bbbl@afterfi\bbbl@tempa##2\fi}%
1823     \edef\bbbl@sc@fontenc{\expandafter\bbbl@tempa\bbbl@sc@fontenc\@empty}%
1824     \edef\bbbl@sc@label{\expandafter\zap@space\bbbl@sc@label\@empty}%
1825     \edef\bbbl@sc@charset{\expandafter\zap@space\bbbl@sc@charset\@empty}%
1826     \def\bbbl@encstring##1##2{%
1827       \bbbl@foreach\bbbl@sc@fontenc{%
1828         \bbbl@ifunset{T@####1}%
1829         }%
1830       {\ProvideTextCommand##1{####1}{##2}%
1831        \bbbl@tglobal##1%
1832        \expandafter

```



```

1833         \bbl@toglobal\csname####1\string##1\endcsname}}}%
1834     \def\bbl@sctest{%
1835         \bbl@xin@{,\bbl@opt@strings,},{,\bbl@sc@label,\bbl@sc@fontenc,}}}%
1836     \fi
1837     \ifx\bbl@opt@strings\@nnil           % ie, no strings key -> defaults
1838     \else\ifx\bbl@opt@strings\relax      % ie, strings=encoded
1839         \let\AfterBabelCommands\bbl@aftercmds
1840         \let\SetString\bbl@setstring
1841         \let\bbl@stringdef\bbl@encstring
1842     \else                                % ie, strings=value
1843     \bbl@sctest
1844     \ifin@
1845         \let\AfterBabelCommands\bbl@aftercmds
1846         \let\SetString\bbl@setstring
1847         \let\bbl@stringdef\bbl@provstring
1848     \fi\fi\fi
1849     \bbl@scswitch
1850     \ifx\bbl@G\@empty
1851         \def\SetString##1##2{%
1852             \bbl@error{Missing group for string \string##1}%
1853             {You must assign strings to some category, typically\%
1854             captions or extras, but you set none}}}%
1855     \fi
1856     \ifx\@empty#1%
1857         \bbl@usehooks{defaultcommands}{}%
1858     \else
1859         \@expandtwoargs
1860         \bbl@usehooks{encodedcommands}{\bbl@sc@charset}\bbl@sc@fontenc}}}%
1861     \fi}

```

There are two versions of `\bbl@scswitch`. The first version is used when `ldfs` are read, and it makes sure `\langle group \rangle \langle language \rangle` is reset, but only once (`\bbl@screset` is used to keep track of this). The second version is used in the preamble and packages loaded after `babel` and does nothing. The macro `\bbl@forlang` loops `\bbl@L` but its body is executed only if the value is in `\BabelLanguages` (inside `babel`) or `\date \langle language \rangle` is defined (after `babel` has been loaded). There are also two versions of `\bbl@forlang`. The first one skips the current iteration if the language is not in `\BabelLanguages` (used in `ldfs`), and the second one skips undefined languages (after `babel` has been loaded).

```

1862 \def\bbl@forlang#1#2{%
1863     \bbl@for#1\bbl@L{%
1864         \bbl@xin@{,#1,},{,\BabelLanguages,}%
1865         \ifin#2\relax\fi}}
1866 \def\bbl@scswitch{%
1867     \bbl@forlang\bbl@tempa{%
1868         \ifx\bbl@G\@empty\else
1869             \ifx\SetString\@gobbletwo\else
1870                 \edef\bbl@GL{\bbl@G\bbl@tempa}%
1871                 \bbl@xin@{,\bbl@GL,},{,\bbl@screset,}%
1872             \ifin@else
1873                 \global\expandafter\let\csname\bbl@GL\endcsname\@undefined
1874                 \xdef\bbl@screset{\bbl@screset,\bbl@GL}%
1875             \fi
1876         \fi
1877     \fi}}
1878 \AtEndOfPackage{%
1879     \def\bbl@forlang#1#2{\bbl@for#1\bbl@L{\bbl@ifunset{date#1}{\#2}}}%
1880     \let\bbl@scswitch\relax}
1881 \@onlypreamble\EndBabelCommands
1882 \def\EndBabelCommands{%
1883     \bbl@usehooks{stopcommands}{}%
1884     \endgroup
1885     \endgroup
1886     \bbl@scafter}

```

```
1887 \let\bbl@endcommands\EndBabelCommands
```

Now we define commands to be used inside \StartBabelCommands.

**Strings** The following macro is the actual definition of \SetString when it is “active” First save the “switcher”. Create it if undefined. Strings are defined only if undefined (ie, like \providescommand). With the event stringprocess you can preprocess the string by manipulating the value of \BabelString. If there are several hooks assigned to this event, preprocessing is done in the same order as defined. Finally, the string is set.

```
1888 \def\bbl@setstring#1#2{% eg, \prefacename{<string>}
1889   \bbl@forlang\bbl@tempa{%
1890     \edef\bbl@LC{\bbl@tempa\bbl@stripslash#1}%
1891     \bbl@ifunset{\bbl@LC}% eg, \germanchaptername
1892       {\bbl@exp{%
1893         \global\bbl@add\<\bbl@G\bbl@tempa>{\bbl@scset\#1\<\bbl@LC>}}}%
1894       }%
1895     \def\BabelString{#2}%
1896     \bbl@usehooks{stringprocess}{}%
1897     \expandafter\bbl@stringdef
1898     \csname\bbl@LC\expandafter\endcsname\expandafter{\BabelString}}}
```

Now, some additional stuff to be used when encoded strings are used. Captions then include \bbl@encoded for string to be expanded in case transformations. It is \relax by default, but in \MakeUppercase and \MakeLowercase its value is a modified expandable \@changed@cmd.

```
1899 \ifx\bbl@opt@strings\relax
1900   \def\bbl@scset#1#2{\def#1{\bbl@encoded#2}}
1901   \bbl@patchuclc
1902   \let\bbl@encoded\relax
1903   \def\bbl@encoded@uclc#1{%
1904     \@inmathwarn#1%
1905     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
1906       \expandafter\ifx\csname ?\string#1\endcsname\relax
1907         \TextSymbolUnavailable#1%
1908       \else
1909         \csname ?\string#1\endcsname
1910       \fi
1911     \else
1912       \csname\cf@encoding\string#1\endcsname
1913     \fi}
1914 \else
1915   \def\bbl@scset#1#2{\def#1{#2}}
1916 \fi
```

Define \SetStringLoop, which is actually set inside \StartBabelCommands. The current definition is somewhat complicated because we need a count, but \count@ is not under our control (remember \SetString may call hooks). Instead of defining a dedicated count, we just “pre-expand” its value.

```
1917 <<{*Macros local to BabelCommands}>> ≡
1918 \def\SetStringLoop##1##2{%
1919   \def\bbl@templ####1{\expandafter\noexpand\csname##1\endcsname}%
1920   \count@ \z@
1921   \bbl@loop\bbl@tempa{##2}{% empty items and spaces are ok
1922     \advance\count@\@ne
1923     \toks@\expandafter{\bbl@tempa}%
1924     \bbl@exp{%
1925       \SetString\bbl@templ{\romannumeral\count@}{\the\toks@}%
1926       \count@=\the\count@\relax}}}%
1927 <</Macros local to BabelCommands>>
```

**Delaying code** Now the definition of \AfterBabelCommands when it is activated.

```
1928 \def\bbl@aftercmds#1{%
1929   \toks@\expandafter{\bbl@scafter#1}%
1930   \xdef\bbl@scafter{\the\toks@}}
```

**Case mapping** The command `\SetCase` provides a way to change the behavior of `\MakeUppercase` and `\MakeLowercase`. `\bbl@tempa` is set by the patched `\@uclclist` to the parsing command.

```

1931 <<{*Macros local to BabelCommands}>> ≡
1932   \newcommand\SetCase[3][]{%
1933     \bbl@patchuclc
1934     \bbl@forlang\bbl@tempa{%
1935       \bbl@carg\bbl@encstring{\bbl@tempa @bbl@uclc}{\bbl@tempa##1}%
1936       \bbl@carg\bbl@encstring{\bbl@tempa @bbl@uc}{##2}%
1937       \bbl@carg\bbl@encstring{\bbl@tempa @bbl@lc}{##3}}}%
1938 <</Macros local to BabelCommands>>

```

Macros to deal with case mapping for hyphenation. To decide if the document is monolingual or multilingual, we make a rough guess – just see if there is a comma in the languages list, built in the first pass of the package options.

```

1939 <<{*Macros local to BabelCommands}>> ≡
1940   \newcommand\SetHyphenMap[1]{%
1941     \bbl@forlang\bbl@tempa{%
1942       \expandafter\bbl@stringdef
1943       \csname\bbl@tempa @bbl@hyphenmap\endcsname{##1}}}%
1944 <</Macros local to BabelCommands>>

```

There are 3 helper macros which do most of the work for you.

```

1945 \newcommand\BabelLower[2]{% one to one.
1946   \ifnum\lccode#1=#2\else
1947     \babel@savevariable{\lccode#1}%
1948     \lccode#1=#2\relax
1949   \fi}
1950 \newcommand\BabelLowerMM[4]{% many-to-many
1951   \@tempcnta=#1\relax
1952   \@tempcntb=#4\relax
1953   \def\bbl@tempa{%
1954     \ifnum\@tempcnta>#2\else
1955       \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
1956       \advance\@tempcnta#3\relax
1957       \advance\@tempcntb#3\relax
1958       \expandafter\bbl@tempa
1959     \fi}%
1960   \bbl@tempa}
1961 \newcommand\BabelLowerMO[4]{% many-to-one
1962   \@tempcnta=#1\relax
1963   \def\bbl@tempa{%
1964     \ifnum\@tempcnta>#2\else
1965       \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
1966       \advance\@tempcnta#3
1967       \expandafter\bbl@tempa
1968     \fi}%
1969   \bbl@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

1970 <<{*More package options}>> ≡
1971 \DeclareOption{hyphenmap=off}{\chardef\bbl@opt@hyphenmap\z@}
1972 \DeclareOption{hyphenmap=first}{\chardef\bbl@opt@hyphenmap\@ne}
1973 \DeclareOption{hyphenmap=select}{\chardef\bbl@opt@hyphenmap\tw@}
1974 \DeclareOption{hyphenmap=other}{\chardef\bbl@opt@hyphenmap\thr@@}
1975 \DeclareOption{hyphenmap=other*}{\chardef\bbl@opt@hyphenmap4\relax}
1976 <</More package options>>

```

Initial setup to provide a default behavior if hyphenmap is not set.

```

1977 \AtEndOfPackage{%
1978   \ifx\bbl@opt@hyphenmap\undefined
1979     \bbl@xin@{,}{\bbl@language@opts}%
1980     \chardef\bbl@opt@hyphenmap\ifin@4\else\@ne\fi
1981   \fi}

```

This sections ends with a general tool for resetting the caption names with a unique interface. With the old way, which mixes the switcher and the string, we convert it to the new one, which separates these two steps.

```

1982 \newcommand\setlocalecaption{% TODO. Catch typos.
1983   \@ifstar\bbbl@setcaption@s\bbbl@setcaption@x}
1984 \def\bbbl@setcaption@x#1#2#3{% language caption-name string
1985   \bbbl@trim@def\bbbl@tempa{#2}%
1986   \bbbl@xin@{.template}{\bbbl@tempa}%
1987   \ifin@
1988     \bbbl@ini@captions@template{#3}{#1}%
1989   \else
1990     \edef\bbbl@tempd{%
1991       \expandafter\expandafter\expandafter
1992       \strip@prefix\expandafter\meaning\csname captions#1\endcsname}%
1993     \bbbl@xin@
1994       {\expandafter\string\csname #2name\endcsname}%
1995     {\bbbl@tempd}%
1996     \ifin@ % Renew caption
1997       \bbbl@xin@{\string\bbbl@scset}{\bbbl@tempd}%
1998     \ifin@
1999       \bbbl@exp{%
2000         \\bbbl@ifsamestring{\bbbl@tempa}{\language}%
2001         {\bbbl@scset\<#2name>\<#1#2name>}%
2002         {}}%
2003       \else % Old way converts to new way
2004         \bbbl@ifunset{#1#2name}%
2005         {\bbbl@exp{%
2006           \\bbbl@add\<captions#1>{\def\<#2name>{\<#1#2name>}}%
2007           \\bbbl@ifsamestring{\bbbl@tempa}{\language}%
2008           {\def\<#2name>{\<#1#2name>}}%
2009           {}}}%
2010         {}}%
2011       \fi
2012     \else
2013       \bbbl@xin@{\string\bbbl@scset}{\bbbl@tempd}% New
2014       \ifin@ % New way
2015         \bbbl@exp{%
2016           \\bbbl@add\<captions#1>{\bbbl@scset\<#2name>\<#1#2name>}%
2017           \\bbbl@ifsamestring{\bbbl@tempa}{\language}%
2018           {\bbbl@scset\<#2name>\<#1#2name>}%
2019           {}}%
2020         \else % Old way, but defined in the new way
2021           \bbbl@exp{%
2022             \\bbbl@add\<captions#1>{\def\<#2name>{\<#1#2name>}}%
2023             \\bbbl@ifsamestring{\bbbl@tempa}{\language}%
2024             {\def\<#2name>{\<#1#2name>}}%
2025             {}}%
2026           \fi%
2027         \fi
2028         \@namedef{#1#2name}{#3}%
2029         \toks@\expandafter{\bbbl@captionslist}%
2030         \bbbl@exp{\\in@{\<#2name>}{\the\toks@}}%
2031         \ifin@ \else
2032           \bbbl@exp{\\bbbl@add\\bbbl@captionslist{\<#2name>}}%
2033           \bbbl@tglobal\bbbl@captionslist
2034         \fi
2035       \fi}
2036 % \def\bbbl@setcaption@s#1#2#3{} % TODO. Not yet implemented (w/o 'name')

```

## 7.11 Macros common to a number of languages

`\set@low@box` The following macro is used to lower quotes to the same level as the comma. It prepares its argument in box register 0.

```
2037 \bbl@trace{Macros related to glyphs}
2038 \def\set@low@box#1{\setbox\tw\hbox{,}\setbox\z@\hbox{#1}%
2039   \dimen\z@\ht\z@ \advance\dimen\z@ -\ht\tw@%
2040   \setbox\z@\hbox{\lower\dimen\z@ \box\z@}\ht\z@\ht\tw@ \dp\z@\dp\tw@}
```

`\save@sf@q` The macro `\save@sf@q` is used to save and reset the current space factor.

```
2041 \def\save@sf@q#1{\leavevmode
2042   \begingroup
2043   \edef\@SF{\spacefactor\the\spacefactor}\#1\@SF
2044   \endgroup}
```

## 7.12 Making glyphs available

This section makes a number of glyphs available that either do not exist in the OT1 encoding and have to be ‘faked’, or that are not accessible through T1enc.def.

### 7.12.1 Quotation marks

`\quotedblbase` In the T1 encoding the opening double quote at the baseline is available as a separate character, accessible via `\quotedblbase`. In the OT1 encoding it is not available, therefore we make it available by lowering the normal open quote character to the baseline.

```
2045 \ProvideTextCommand{\quotedblbase}{OT1}{%
2046   \save@sf@q{\set@low@box{\textquotedblright\}%
2047   \box\z@\kern-.04em\bbl@allowhyphens}}
```

Make sure that when an encoding other than OT1 or T1 is used this glyph can still be typeset.

```
2048 \ProvideTextCommandDefault{\quotedblbase}{%
2049   \UseTextSymbol{OT1}{\quotedblbase}}
```

`\quotesinglbase` We also need the single quote character at the baseline.

```
2050 \ProvideTextCommand{\quotesinglbase}{OT1}{%
2051   \save@sf@q{\set@low@box{\textquoteright\}%
2052   \box\z@\kern-.04em\bbl@allowhyphens}}
```

Make sure that when an encoding other than OT1 or T1 is used this glyph can still be typeset.

```
2053 \ProvideTextCommandDefault{\quotesinglbase}{%
2054   \UseTextSymbol{OT1}{\quotesinglbase}}
```

`\guillemetleft` The guillemet characters are not available in OT1 encoding. They are faked. (Wrong names with o preserved for compatibility.)

```
2055 \ProvideTextCommand{\guillemetleft}{OT1}{%
2056   \ifmmode
2057     \ll
2058   \else
2059     \save@sf@q{\nobreak
2060       \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bbl@allowhyphens}%
2061     \fi}
2062 \ProvideTextCommand{\guillemetright}{OT1}{%
2063   \ifmmode
2064     \gg
2065   \else
2066     \save@sf@q{\nobreak
2067       \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bbl@allowhyphens}%
2068     \fi}
2069 \ProvideTextCommand{\guillemotleft}{OT1}{%
2070   \ifmmode
2071     \ll
2072   \else
```

```

2073 \save@sf@q{\nobreak
2074 \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bbl@allowhyphens}%
2075 \fi}
2076 \ProvideTextCommand{\guillemotright}{OT1}{%
2077 \ifmmode
2078 \gg
2079 \else
2080 \save@sf@q{\nobreak
2081 \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bbl@allowhyphens}%
2082 \fi}

```

Make sure that when an encoding other than OT1 or T1 is used these glyphs can still be typeset.

```

2083 \ProvideTextCommandDefault{\guillemetleft}{%
2084 \UseTextSymbol{OT1}{\guillemetleft}}
2085 \ProvideTextCommandDefault{\guillemetright}{%
2086 \UseTextSymbol{OT1}{\guillemetright}}
2087 \ProvideTextCommandDefault{\guillemotleft}{%
2088 \UseTextSymbol{OT1}{\guillemotleft}}
2089 \ProvideTextCommandDefault{\guillemotright}{%
2090 \UseTextSymbol{OT1}{\guillemotright}}

```

`\guilsinglleft` The single guillemets are not available in OT1 encoding. They are faked.

```

\guilsinglright 2091 \ProvideTextCommand{\guilsinglleft}{OT1}{%
2092 \ifmmode
2093 <%
2094 \else
2095 \save@sf@q{\nobreak
2096 \raise.2ex\hbox{$\scriptscriptstyle<$}\bbl@allowhyphens}%
2097 \fi}
2098 \ProvideTextCommand{\guilsinglright}{OT1}{%
2099 \ifmmode
2100 >%
2101 \else
2102 \save@sf@q{\nobreak
2103 \raise.2ex\hbox{$\scriptscriptstyle>$}\bbl@allowhyphens}%
2104 \fi}

```

Make sure that when an encoding other than OT1 or T1 is used these glyphs can still be typeset.

```

2105 \ProvideTextCommandDefault{\guilsinglleft}{%
2106 \UseTextSymbol{OT1}{\guilsinglleft}}
2107 \ProvideTextCommandDefault{\guilsinglright}{%
2108 \UseTextSymbol{OT1}{\guilsinglright}}

```

### 7.12.2 Letters

`\ij` The dutch language uses the letter ‘ij’. It is available in T1 encoded fonts, but not in the OT1 encoded `\IJ` fonts. Therefore we fake it for the OT1 encoding.

```

2109 \DeclareTextCommand{\ij}{OT1}{%
2110 i\kern-0.02em\bbl@allowhyphens j}
2111 \DeclareTextCommand{\IJ}{OT1}{%
2112 I\kern-0.02em\bbl@allowhyphens J}
2113 \DeclareTextCommand{\ij}{T1}{\char188}
2114 \DeclareTextCommand{\IJ}{T1}{\char156}

```

Make sure that when an encoding other than OT1 or T1 is used these glyphs can still be typeset.

```

2115 \ProvideTextCommandDefault{\ij}{%
2116 \UseTextSymbol{OT1}{\ij}}
2117 \ProvideTextCommandDefault{\IJ}{%
2118 \UseTextSymbol{OT1}{\IJ}}

```

`\dj` The croatian language needs the letters `\dj` and `\DJ`; they are available in the T1 encoding, but not in `\DJ` the OT1 encoding by default.

Some code to construct these glyphs for the OT1 encoding was made available to me by Stipčević Mario, (stipcevic@olimp.irb.hr).

```

2119 \def\crrtic@{\hrule height0.1ex width0.3em}
2120 \def\crttic@{\hrule height0.1ex width0.33em}
2121 \def\ddj@{%
2122   \setbox0\hbox{d}\dimen@=\ht0
2123   \advance\dimen@1ex
2124   \dimen@.45\dimen@
2125   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2126   \advance\dimen@ii.5ex
2127   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
2128 \def\DDJ@{%
2129   \setbox0\hbox{D}\dimen@=.55\ht0
2130   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2131   \advance\dimen@ii.15ex %      correction for the dash position
2132   \advance\dimen@ii-.15\fontdimen7\font %      correction for cmtt font
2133   \dimen\thr@@\expandafter\rem@pt\the\fontdimen7\font\dimen@
2134   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crttic@}}}}
2135 %
2136 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
2137 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}

```

Make sure that when an encoding other than OT1 or T1 is used these glyphs can still be typeset.

```

2138 \ProvideTextCommandDefault{\dj}{%
2139   \UseTextSymbol{OT1}{\dj}}
2140 \ProvideTextCommandDefault{\DJ}{%
2141   \UseTextSymbol{OT1}{\DJ}}

```

\SS For the T1 encoding \SS is defined and selects a specific glyph from the font, but for other encodings it is not available. Therefore we make it available here.

```

2142 \DeclareTextCommand{\SS}{OT1}{SS}
2143 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}

```

### 7.12.3 Shorthands for quotation marks

Shorthands are provided for a number of different quotation marks, which make them usable both outside and inside mathmode. They are defined with \ProvideTextCommandDefault, but this is very likely not required because their definitions are based on encoding-dependent macros.

\glq The ‘german’ single quotes.

```

\grq 2144 \ProvideTextCommandDefault{\glq}{%
2145   \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}

```

The definition of \grq depends on the fontencoding. With T1 encoding no extra kerning is needed.

```

2146 \ProvideTextCommand{\grq}{T1}{%
2147   \textormath{\kern\z@\textquoteleft}{\mbox{\textquoteleft}}}
2148 \ProvideTextCommand{\grq}{TU}{%
2149   \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
2150 \ProvideTextCommand{\grq}{OT1}{%
2151   \save@sf@q{\kern-.0125em
2152     \textormath{\textquoteleft}{\mbox{\textquoteleft}}}%
2153     \kern.07em\relax}}
2154 \ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}

```

\glqq The ‘german’ double quotes.

```

\grqq 2155 \ProvideTextCommandDefault{\glqq}{%
2156   \textormath{\quotedblbase}{\mbox{\quotedblbase}}}

```

The definition of \grqq depends on the fontencoding. With T1 encoding no extra kerning is needed.

```

2157 \ProvideTextCommand{\grqq}{T1}{%
2158   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
2159 \ProvideTextCommand{\grqq}{TU}{%
2160   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}

```

```

2161 \ProvideTextCommand{\grqq}{OT1}{%
2162   \save@sf@q{\kern-.07em
2163     \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}%
2164     \kern.07em\relax}}
2165 \ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}

```

\flq The ‘french’ single guillemets.

```

\frq
2166 \ProvideTextCommandDefault{\flq}{%
2167   \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}
2168 \ProvideTextCommandDefault{\frq}{%
2169   \textormath{\guilsinglright}{\mbox{\guilsinglright}}}

```

\flqq The ‘french’ double guillemets.

```

\frqq
2170 \ProvideTextCommandDefault{\flqq}{%
2171   \textormath{\guillemetleft}{\mbox{\guillemetleft}}}
2172 \ProvideTextCommandDefault{\frqq}{%
2173   \textormath{\guillemetright}{\mbox{\guillemetright}}}

```

### 7.12.4 Umlauts and tremas

The command `\` needs to have a different effect for different languages. For German for instance, the ‘umlaut’ should be positioned lower than the default position for placing it over the letters a, o, u, A, O and U. When placed over an e, i, E or I it can retain its normal position. For Dutch the same glyph is always placed in the lower position.

\umlauthigh To be able to provide both positions of `\` we provide two commands to switch the positioning, the default will be `\umlauthigh` (the normal positioning).

```

2174 \def\umlauthigh{%
2175   \def\bbl@umlauta##1{\leavevmode\bgroup%
2176     \accent\csname\fontencoding dqpos\endcsname
2177     ##1\bbl@allowhyphens\egroup}%
2178   \let\bbl@umlaute\bbl@umlauta}
2179 \def\umlautlow{%
2180   \def\bbl@umlauta{\protect\lower@umlaut}}
2181 \def\umlautelow{%
2182   \def\bbl@umlaute{\protect\lower@umlaut}}
2183 \umlauthigh

```

\lower@umlaut The command `\lower@umlaut` is used to position the `\` closer to the letter.

We want the umlaut character lowered, nearer to the letter. To do this we need an extra *⟨dimen⟩* register.

```

2184 \expandafter\ifx\csname U@D\endcsname\relax
2185   \csname newdimen\endcsname\U@D
2186 \fi

```

The following code fools  $\TeX$ ’s `make_accent` procedure about the current x-height of the font to force another placement of the umlaut character. First we have to save the current x-height of the font, because we’ll change this font dimension and this is always done globally.

Then we compute the new x-height in such a way that the umlaut character is lowered to the base character. The value of `.45ex` depends on the METAFONT parameters with which the fonts were built. (Just try out, which value will look best.) If the new x-height is too low, it is not changed. Finally we call the `\accent` primitive, reset the old x-height and insert the base character in the argument.

```

2187 \def\lower@umlaut#1{%
2188   \leavevmode\bgroup
2189   \U@D 1ex%
2190   {\setbox\z@\hbox{%
2191     \char\csname\fontencoding dqpos\endcsname}%
2192     \dimen@ -.45ex\advance\dimen@ \ht\z@
2193     \ifdim 1ex<\dimen@ \fontdimen5\font\dimen@ \fi}%
2194     \accent\csname\fontencoding dqpos\endcsname
2195     \fontdimen5\font\U@D #1%
2196   \egroup}

```



For all vowels we declare `\` to be a composite command which uses `\bbl@umlauta` or `\bbl@umlaute` to position the umlaut character. We need to be sure that these definitions override the ones that are provided when the package `fontenc` with option `OT1` is used. Therefore these declarations are postponed until the beginning of the document. Note these definitions only apply to some languages, but `babel` sets them for *all* languages – you may want to redefine `\bbl@umlauta` and/or `\bbl@umlaute` for a language in the corresponding `ldf` (using the `babel` switching mechanism, of course).

```

2197 \AtBeginDocument{%
2198   \DeclareTextCompositeCommand{"}{OT1}{a}{\bbl@umlauta{a}}%
2199   \DeclareTextCompositeCommand{"}{OT1}{e}{\bbl@umlaute{e}}%
2200   \DeclareTextCompositeCommand{"}{OT1}{i}{\bbl@umlaute{i}}%
2201   \DeclareTextCompositeCommand{"}{OT1}{\i}{\bbl@umlaute{\i}}%
2202   \DeclareTextCompositeCommand{"}{OT1}{o}{\bbl@umlauta{o}}%
2203   \DeclareTextCompositeCommand{"}{OT1}{u}{\bbl@umlauta{u}}%
2204   \DeclareTextCompositeCommand{"}{OT1}{A}{\bbl@umlauta{A}}%
2205   \DeclareTextCompositeCommand{"}{OT1}{E}{\bbl@umlaute{E}}%
2206   \DeclareTextCompositeCommand{"}{OT1}{I}{\bbl@umlaute{I}}%
2207   \DeclareTextCompositeCommand{"}{OT1}{O}{\bbl@umlauta{O}}%
2208   \DeclareTextCompositeCommand{"}{OT1}{U}{\bbl@umlauta{U}}%

```

Finally, make sure the default hyphenrules are defined (even if empty). For internal use, another empty `\language` is defined. Currently used in Amharic.

```

2209 \ifx\l@english\@undefined
2210   \chardef\l@english\z@
2211 \fi
2212 % The following is used to cancel rules in ini files (see Amharic).
2213 \ifx\l@unhyphenated\@undefined
2214   \newlanguage\l@unhyphenated
2215 \fi

```

## 7.13 Layout

Layout is mainly intended to set bidi documents, but there is at least a tool useful in general.

```

2216 \bbl@trace{Bidi layout}
2217 \providecommand\IfBabelLayout[3]{#3}%
2218 \newcommand\BabelPatchSection[1]{%
2219   \@ifundefined{#1}{}{%
2220     \bbl@exp{\let<bbl@ss@#1>\<#1>}%
2221     \@namedef{#1}{%
2222       \@ifstar{\bbl@presec@#1}{%
2223         {\@dblarg{\bbl@presec@x{#1}}}}%
2224 \def\bbl@presec@x#1[#2]#3{%
2225   \bbl@exp{%
2226     \\\select@language@x{\bbl@main@language}%
2227     \\\bbl@cs{sspre@#1}%
2228     \\\bbl@cs{ss@#1}%
2229     [\\foreignlanguage{\language}{\unexpanded{#2}}}%
2230     {\\foreignlanguage{\language}{\unexpanded{#3}}}%
2231     \\\select@language@x{\language}}%
2232 \def\bbl@presec@s#1#2{%
2233   \bbl@exp{%
2234     \\\select@language@x{\bbl@main@language}%
2235     \\\bbl@cs{sspre@#1}%
2236     \\\bbl@cs{ss@#1}*%
2237     {\\foreignlanguage{\language}{\unexpanded{#2}}}%
2238     \\\select@language@x{\language}}%
2239 \IfBabelLayout{sectioning}%
2240   {\BabelPatchSection{part}%
2241     \BabelPatchSection{chapter}%
2242     \BabelPatchSection{section}%
2243     \BabelPatchSection{subsection}%
2244     \BabelPatchSection{subsubsection}%
2245     \BabelPatchSection{paragraph}%

```

```

2246 \BabelPatchSection{subparagraph}%
2247 \def\babel@toc#1{%
2248 \select@language{x{\bbl@main@language}}{}
2249 \IfBabelLayout{captions}%
2250 {\BabelPatchSection{caption}}{}

```

## 7.14 Load engine specific macros

Some macros are not defined in all engines, so, after loading the files define them if necessary to raise an error.

```

2251 \bbl@trace{Input engine specific macros}
2252 \ifcase\bbl@engine
2253 \input txtbabel.def
2254 \or
2255 \input luababel.def
2256 \or
2257 \input xebabel.def
2258 \fi
2259 \providecommand\babelfont{%
2260 \bbl@error
2261 {This macro is available only in LuaLaTeX and XeLaTeX.}%
2262 {Consider switching to these engines.}}
2263 \providecommand\babelprehyphenation{%
2264 \bbl@error
2265 {This macro is available only in LuaLaTeX.}%
2266 {Consider switching to that engine.}}
2267 \ifx\babelposthyphenation\@undefined
2268 \let\babelposthyphenation\babelprehyphenation
2269 \let\babelpatterns\babelprehyphenation
2270 \let\babelcharproperty\babelprehyphenation
2271 \fi

```

## 7.15 Creating and modifying languages

`\babelprovide` is a general purpose tool for creating and modifying languages. It creates the language infrastructure, and loads, if requested, an ini file. It may be used in conjunction to previously loaded ldf files.

```

2272 \bbl@trace{Creating languages and reading ini files}
2273 \let\bbl@extend@ini\@gobble
2274 \newcommand\babelprovide[2][]{%
2275 \let\bbl@savelangname\language
2276 \edef\bbl@savelocaleid{\the\localeid}%
2277 % Set name and locale id
2278 \edef\language{#2}%
2279 \bbl@id@assign
2280 % Initialize keys
2281 \bbl@vforeach{captions,date,import,main,script,language,%
2282 hyphenrules,linebreaking,justification,mapfont,maparabic,%
2283 mapdigits,intraspaces,intrapenalty,onchar,transforms,alph,%
2284 Alph,labels,labels*,calendar,date}%
2285 {\bbl@csarg\let{KVP@##1}\@nnil}%
2286 \global\let\bbl@release@transforms\@empty
2287 \let\bbl@calendars\@empty
2288 \global\let\bbl@inidata\@empty
2289 \global\let\bbl@extend@ini\@gobble
2290 \gdef\bbl@key@list{;}%
2291 \bbl@forkv{#1}{%
2292 \in@{/}{##1}%
2293 \ifin@
2294 \global\let\bbl@extend@ini\bbl@extend@ini@aux
2295 \bbl@renewinikey##1\@{##2}%
2296 \else

```

```

2297 \bbl@csarg\ifx{KVP@##1}\@nnil\else
2298 \bbl@error
2299 {Unknown key '##1' in \string\babelprovide}%
2300 {See the manual for valid keys}%
2301 \fi
2302 \bbl@csarg\def{KVP@##1}{##2}%
2303 \fi}%
2304 \chardef\bbl@howloaded=% 0:none; 1:ldf without ini; 2:ini
2305 \bbl@ifunset{date#2}\z@{\bbl@ifunset{bbl@llevel@#2}\@ne\tw@}%
2306 % == init ==
2307 \ifx\bbl@screset\@undefined
2308 \bbl@ldfinit
2309 \fi
2310 % == date (as option) ==
2311 % \ifx\bbl@KVP@date\@nnil\else
2312 % \fi
2313 % ==
2314 \let\bbl@lbkflag\relax % \@empty = do setup linebreak, only in 3 cases:
2315 \ifcase\bbl@howloaded
2316 \let\bbl@lbkflag\@empty % new
2317 \else
2318 \ifx\bbl@KVP@hyphenrules\@nnil\else
2319 \let\bbl@lbkflag\@empty
2320 \fi
2321 \ifx\bbl@KVP@import\@nnil\else
2322 \let\bbl@lbkflag\@empty
2323 \fi
2324 \fi
2325 % == import, captions ==
2326 \ifx\bbl@KVP@import\@nnil\else
2327 \bbl@exp{\bbl@ifblank{\bbl@KVP@import}}%
2328 {\ifx\bbl@initoload\relax
2329 \begingroup
2330 \def\BabelBeforeIni##1##2{\gdef\bbl@KVP@import{##1}\endinput}%
2331 \bbl@input@texini{##2}%
2332 \endgroup
2333 \else
2334 \xdef\bbl@KVP@import{\bbl@initoload}%
2335 \fi}%
2336 {}%
2337 \let\bbl@KVP@date\@empty
2338 \fi
2339 \let\bbl@KVP@captions@\bbl@KVP@captions % TODO. A dirty hack
2340 \ifx\bbl@KVP@captions\@nnil
2341 \let\bbl@KVP@captions\bbl@KVP@import
2342 \fi
2343 % ==
2344 \ifx\bbl@KVP@transforms\@nnil\else
2345 \bbl@replace\bbl@KVP@transforms{ }{,}%
2346 \fi
2347 % == Load ini ==
2348 \ifcase\bbl@howloaded
2349 \bbl@provide@new{##2}%
2350 \else
2351 \bbl@ifblank{##1}%
2352 {}% With \bbl@load@basic below
2353 {\bbl@provide@renew{##2}}%
2354 \fi
2355 % Post tasks
2356 % -----
2357 % == subsequent calls after the first provide for a locale ==
2358 \ifx\bbl@inidata\@empty\else
2359 \bbl@extend@ini{##2}%

```

```

2360 \fi
2361 % == ensure captions ==
2362 \ifx\bbl@KVP@captions\@nnil\else
2363   \bbl@ifunset{bbl@extracaps@#2}%
2364     {\bbl@exp{\bbl@babelensure[exclude=\today]{#2}}}%
2365     {\bbl@exp{\bbl@babelensure[exclude=\today,
2366       include=\[bbl@extracaps@#2]]{#2}}}%
2367   \bbl@ifunset{bbl@ensure@\language\name}%
2368     {\bbl@exp{%
2369       \\DeclareRobustCommand\<bbl@ensure@\language\name>[1]{%
2370         \\foreignlanguage{\language\name}%
2371         {###1}}}%
2372     }%
2373   \bbl@exp{%
2374     \\bbl@tglobal\<bbl@ensure@\language\name>%
2375     \\bbl@tglobal\<bbl@ensure@\language\name\space>%
2376   \fi
2377   % ==
2378   % At this point all parameters are defined if 'import'. Now we
2379   % execute some code depending on them. But what about if nothing was
2380   % imported? We just set the basic parameters, but still loading the
2381   % whole ini file.
2382   \bbl@load@basic{#2}%
2383   % == script, language ==
2384   % Override the values from ini or defines them
2385   \ifx\bbl@KVP@script\@nnil\else
2386     \bbl@csarg\edef{sname@#2}{\bbl@KVP@script}%
2387   \fi
2388   \ifx\bbl@KVP@language\@nnil\else
2389     \bbl@csarg\edef{lname@#2}{\bbl@KVP@language}%
2390   \fi
2391   \ifcase\bbl@engine\or
2392     \bbl@ifunset{bbl@chrng@\language\name}{}%
2393     {\directlua{
2394       Babel.set_chranges_b('\bbl@cl{sbc}', '\bbl@cl{chrng}') }}%
2395   \fi
2396   % == onchar ==
2397   \ifx\bbl@KVP@onchar\@nnil\else
2398     \bbl@luahyphenate
2399     \bbl@exp{%
2400       \\AddToHook{env/document/before}{\select@language{#2}}}%
2401     \directlua{
2402       if Babel.locale_mapped == nil then
2403         Babel.locale_mapped = true
2404         Babel.linebreaking.add_before(Babel.locale_map, 1)
2405         Babel.loc_to_scr = {}
2406         Babel.chr_to_loc = Babel.chr_to_loc or {}
2407       end
2408       Babel.locale_props[\the\localeid].letters = false
2409     }%
2410     \bbl@xin@{ letters }{ \bbl@KVP@onchar\space}%
2411     \ifin@
2412       \directlua{
2413         Babel.locale_props[\the\localeid].letters = true
2414       }%
2415     \fi
2416     \bbl@xin@{ ids }{ \bbl@KVP@onchar\space}%
2417     \ifin@
2418       \ifx\bbl@starthyphens\@undefined % Needed if no explicit selection
2419         \AddBabelHook{babel-onchar}{beforestart}{\bbl@starthyphens}%
2420       \fi
2421       \bbl@exp{\bbl@add\bbl@starthyphens
2422         {\bbl@patterns@lua{\language\name}}}%

```

```

2423 % TODO - error/warning if no script
2424 \directlua{
2425   if Babel.script_blocks['\bbl@cl{sbc}'] then
2426     Babel.loc_to_scr[\the\localeid] =
2427       Babel.script_blocks['\bbl@cl{sbc}']
2428     Babel.locale_props[\the\localeid].lc = \the\localeid\space
2429     Babel.locale_props[\the\localeid].lg = \the\nameuse{1@\language}\space
2430   end
2431 }%
2432 \fi
2433 \bbl@xin@{ fonts }{ \bbl@KVP@onchar\space}%
2434 \ifin@
2435   \bbl@ifunset{bbl@lsys@\language}{\bbl@provide@lsys@\language}}{}%
2436   \bbl@ifunset{bbl@wdir@\language}{\bbl@provide@dirs@\language}}{}%
2437   \directlua{
2438     if Babel.script_blocks['\bbl@cl{sbc}'] then
2439       Babel.loc_to_scr[\the\localeid] =
2440         Babel.script_blocks['\bbl@cl{sbc}']
2441     end}%
2442   \ifx\bbl@mapselect\undefined % TODO. almost the same as mapfont
2443     \AtBeginDocument{%
2444       \bbl@patchfont{\bbl@mapselect}}%
2445       {\selectfont}}%
2446     \def\bbl@mapselect{%
2447       \let\bbl@mapselect\relax
2448       \edef\bbl@prefontid{\fontid\font}}%
2449     \def\bbl@mapdir##1{%
2450       {\def\language{##1}%
2451        \let\bbl@ifrestoring\@firstoftwo % To avoid font warning
2452        \bbl@switchfont
2453        \ifnum\fontid\font>\z@ % A hack, for the pgf nullfont hack
2454          \directlua{
2455            Babel.locale_props[\the\csname bbl@id@##1\endcsname]%
2456              [\bbl@prefontid] = \fontid\font\space}%
2457          \fi}}%
2458     \fi
2459     \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language}}}%
2460   \fi
2461 % TODO - catch non-valid values
2462 \fi
2463 % == mapfont ==
2464 % For bidi texts, to switch the font based on direction
2465 \ifx\bbl@KVP@mapfont\@nnil\else
2466   \bbl@ifsamestring{\bbl@KVP@mapfont}{direction}}{}%
2467   {\bbl@error{Option '\bbl@KVP@mapfont' unknown for\
2468     mapfont. Use 'direction'.%
2469     {See the manual for details.}}}%
2470   \bbl@ifunset{bbl@lsys@\language}{\bbl@provide@lsys@\language}}{}%
2471   \bbl@ifunset{bbl@wdir@\language}{\bbl@provide@dirs@\language}}{}%
2472   \ifx\bbl@mapselect\undefined % TODO. See onchar.
2473     \AtBeginDocument{%
2474       \bbl@patchfont{\bbl@mapselect}}%
2475       {\selectfont}}%
2476     \def\bbl@mapselect{%
2477       \let\bbl@mapselect\relax
2478       \edef\bbl@prefontid{\fontid\font}}%
2479     \def\bbl@mapdir##1{%
2480       {\def\language{##1}%
2481        \let\bbl@ifrestoring\@firstoftwo % avoid font warning
2482        \bbl@switchfont
2483        \directlua{Babel.fontmap
2484          [\the\csname bbl@wdir@##1\endcsname]%
2485          [\bbl@prefontid]=\fontid\font}}}%

```

```

2486 \fi
2487 \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language\language}}}%
2488 \fi
2489 % == Line breaking: intraspace, intrapenalty ==
2490 % For CJK, East Asian, Southeast Asian, if interspace in ini
2491 \ifx\bbl@KVP@intraspace\@nnil\else % We can override the ini or set
2492 \bbl@csarg\edef{intsp@#2}{\bbl@KVP@intraspace}%
2493 \fi
2494 \bbl@provide@intraspace
2495 % == Line breaking: CJK quotes ==
2496 \ifcase\bbl@engine\or
2497 \bbl@xin@{/c}{/\bbl@cl{lnbrk}}%
2498 \ifin@
2499 \bbl@ifunset{\bbl@quote@\language\language}{}%
2500 {directlua{
2501 Babel.locale_props[\the\localeid].cjk_quotes = {}
2502 local cs = 'op'
2503 for c in string.utfvalues(
2504 [[\csname bbl@quote@\language\language\endcsname]]) do
2505 if Babel.cjk_characters[c].c == 'qu' then
2506 Babel.locale_props[\the\localeid].cjk_quotes[c] = cs
2507 end
2508 cs = ( cs == 'op') and 'cl' or 'op'
2509 end
2510 }}%
2511 \fi
2512 \fi
2513 % == Line breaking: justification ==
2514 \ifx\bbl@KVP@justification\@nnil\else
2515 \let\bbl@KVP@linebreaking\bbl@KVP@justification
2516 \fi
2517 \ifx\bbl@KVP@linebreaking\@nnil\else
2518 \bbl@xin@{,\bbl@KVP@linebreaking,}%
2519 {,elongated,kashida,cjk,padding,unhyphenated,}%
2520 \ifin@
2521 \bbl@csarg\xdef
2522 {lnbrk@\language\language}{\expandafter\@car\bbl@KVP@linebreaking\@nil}%
2523 \fi
2524 \fi
2525 \bbl@xin@{/e}{/\bbl@cl{lnbrk}}%
2526 \ifin@\else\bbl@xin@{/k}{/\bbl@cl{lnbrk}}\fi
2527 \ifin@\bbl@arabicjust\fi
2528 \bbl@xin@{/p}{/\bbl@cl{lnbrk}}%
2529 \ifin@\AtBeginDocument{\@nameuse{\bbl@tibetanjust}}\fi
2530 % == Line breaking: hyphenate.other.(locale|script) ==
2531 \ifx\bbl@lbkflag\@empty
2532 \bbl@ifunset{\bbl@hyotl@\language\language}{}%
2533 {\bbl@csarg\bbl@replace{\hyotl@\language\language}{ }{,}%
2534 \bbl@startcommands*\language\language}%
2535 \bbl@csarg\bbl@foreach{\hyotl@\language\language}{%
2536 \ifcase\bbl@engine
2537 \ifnum##1<257
2538 \SetHyphenMap{\BabelLower{##1}{##1}}%
2539 \fi
2540 \else
2541 \SetHyphenMap{\BabelLower{##1}{##1}}%
2542 \fi}%
2543 \bbl@endcommands}%
2544 \bbl@ifunset{\bbl@hyots@\language\language}{}%
2545 {\bbl@csarg\bbl@replace{\hyots@\language\language}{ }{,}%
2546 \bbl@csarg\bbl@foreach{\hyots@\language\language}{%
2547 \ifcase\bbl@engine
2548 \ifnum##1<257

```

```

2549         \global\lccode##1=##1\relax
2550     \fi
2551 \else
2552     \global\lccode##1=##1\relax
2553 \fi}}%
2554 \fi
2555 % == Counters: maparabic ==
2556 % Native digits, if provided in ini (TeX level, xe and lua)
2557 \ifcase\bbbl@engine\else
2558     \bbbl@ifunset{\bbbl@dgnat@\language\name}{}%
2559     {\expandafter\ifx\csname \bbbl@dgnat@\language\name\endcsname\@empty\else
2560         \expandafter\expandafter\expandafter
2561         \bbbl@setdigits\csname \bbbl@dgnat@\language\name\endcsname
2562         \ifx\bbbl@KVP@maparabic\@nnil\else
2563             \ifx\bbbl@latinarabic\@undefined
2564                 \expandafter\let\expandafter\@arabic
2565                     \csname \bbbl@counter@\language\name\endcsname
2566             \else % ie, if layout=counters, which redefines \@arabic
2567                 \expandafter\let\expandafter\bbbl@latinarabic
2568                     \csname \bbbl@counter@\language\name\endcsname
2569             \fi
2570         \fi
2571     \fi}%
2572 \fi
2573 % == Counters: mapdigits ==
2574 % > luababel.def
2575 % == Counters: alph, Alph ==
2576 \ifx\bbbl@KVP@alph\@nnil\else
2577     \bbbl@exp{%
2578         \\\bbbl@add\<\bbbl@preextras@\language\name>{%
2579             \\\babel@save\\\@alph
2580             \let\\\@alph\<\bbbl@cntr@\bbbl@KVP@alph @\language\name>}}%
2581 \fi
2582 \ifx\bbbl@KVP@Alph\@nnil\else
2583     \bbbl@exp{%
2584         \\\bbbl@add\<\bbbl@preextras@\language\name>{%
2585             \\\babel@save\\\@Alph
2586             \let\\\@Alph\<\bbbl@cntr@\bbbl@KVP@Alph @\language\name>}}%
2587 \fi
2588 % == Calendars ==
2589 \ifx\bbbl@KVP@calendar\@nnil
2590     \edef\bbbl@KVP@calendar{\bbbl@cl{calpr}}%
2591 \fi
2592 \def\bbbl@tempe##1 ##2\@{% % Get first calendar
2593     \def\bbbl@tempa{##1}}%
2594     \bbbl@exp{\\\bbbl@tempe\bbbl@KVP@calendar\space\\\@}%
2595 \def\bbbl@tempe##1.##2.##3\@{%
2596     \def\bbbl@tempc{##1}%
2597     \def\bbbl@tempb{##2}}%
2598 \expandafter\bbbl@tempe\bbbl@tempa..\@
2599 \bbbl@csarg\edef{calpr@\language\name}{%
2600     \ifx\bbbl@tempc\@empty\else
2601         calendar=\bbbl@tempc
2602     \fi
2603     \ifx\bbbl@tempb\@empty\else
2604         ,variant=\bbbl@tempb
2605     \fi}%
2606 % == engine specific extensions ==
2607 % Defined in XXXbabel.def
2608 \bbbl@provide@extra{#2}%
2609 % == require.babel in ini ==
2610 % To load or reload the babel-*.tex, if require.babel in ini
2611 \ifx\bbbl@beforestart\relax\else % But not in doc aux or body

```

```

2612 \bbl@ifunset{\bbl@rqtex@\languagename}{}%
2613 {\expandafter\ifx\csname bbl@rqtex@\languagename\endcsname\@empty\else
2614 \let\BabelBeforeIni\@gobbles
2615 \chardef\atcatcode=\catcode`\@
2616 \catcode`\@=11\relax
2617 \bbl@input@texini{\bbl@cs{rqtex@\languagename}}%
2618 \catcode`\@=\atcatcode
2619 \let\atcatcode\relax
2620 \global\bbl@csarg\let{rqtex@\languagename}\relax
2621 \fi}%
2622 \bbl@foreach\bbl@calendars{%
2623 \bbl@ifunset{\bbl@ca##1}{%
2624 \chardef\atcatcode=\catcode`\@
2625 \catcode`\@=11\relax
2626 \InputIfFileExists{babel-ca-##1.tex}{}}%
2627 \catcode`\@=\atcatcode
2628 \let\atcatcode\relax}%
2629 }%
2630 \fi
2631 % == frenchspacing ==
2632 \ifcase\bbl@howloaded\in@true\else\in@false\fi
2633 \ifin@else\bbl@xin@{typography/frenchspacing}{\bbl@key@list}\fi
2634 \ifin@
2635 \bbl@extras@wrap{\bbl@pre@fs}%
2636 {\bbl@pre@fs}%
2637 {\bbl@post@fs}%
2638 \fi
2639 % == transforms ==
2640 % > luababel.def
2641 % == main ==
2642 \ifx\bbl@KVP@main\@nnil % Restore only if not 'main'
2643 \let\languagename\bbl@savelangname
2644 \chardef\localeid\bbl@savelocaleid\relax
2645 \fi}

```

Depending on whether or not the language exists (based on \date<language>), we define two macros. Remember \bbl@startcommands opens a group.

```

2646 \def\bbl@provide@new#1{%
2647 \namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
2648 \namedef{extras#1}{}%
2649 \namedef{noextras#1}{}%
2650 \bbl@startcommands*{#1}{captions}%
2651 \ifx\bbl@KVP@captions\@nnil % and also if import, implicit
2652 \def\bbl@tempb##1{% elt for \bbl@captionslist
2653 \ifx##1\@empty\else
2654 \bbl@exp{%
2655 \\\SetString\\##1{%
2656 \\\bbl@nocaption{\bbl@stripslash##1}{#1\bbl@stripslash##1}}}%
2657 \expandafter\bbl@tempb
2658 \fi}%
2659 \expandafter\bbl@tempb\bbl@captionslist\@empty
2660 \else
2661 \ifx\bbl@initoload\relax
2662 \bbl@read@ini{\bbl@KVP@captions}2% % Here letters cat = 11
2663 \else
2664 \bbl@read@ini{\bbl@initoload}2% % Same
2665 \fi
2666 \fi
2667 \StartBabelCommands*{#1}{date}%
2668 \ifx\bbl@KVP@date\@nnil
2669 \bbl@exp{%
2670 \\\SetString\\today{\bbl@nocaption{today}{#1today}}}%
2671 \else

```



```

2672 \bbl@savetoday
2673 \bbl@savedate
2674 \fi
2675 \bbl@endcommands
2676 \bbl@load@basic{#1}%
2677 % == hyphenmins == (only if new)
2678 \bbl@exp{%
2679 \gdef\<#1hyphenmins>{%
2680 {\bbl@ifunset\bbl@ifthm@#1}{2}{\bbl@cs{lftthm@#1}}}%
2681 {\bbl@ifunset\bbl@rgthm@#1}{3}{\bbl@cs{rgthm@#1}}}%
2682 % == hyphenrules (also in renew) ==
2683 \bbl@provide@hyphens{#1}%
2684 \ifx\bbl@KVP@main\@nnil\else
2685 \expandafter\main@language\expandafter{#1}%
2686 \fi}
2687 %
2688 \def\bbl@provide@renew#1{%
2689 \ifx\bbl@KVP@captions\@nnil\else
2690 \StartBabelCommands*{#1}{captions}%
2691 \bbl@read@ini{\bbl@KVP@captions}2% % Here all letters cat = 11
2692 \EndBabelCommands
2693 \fi
2694 \ifx\bbl@KVP@date\@nnil\else
2695 \StartBabelCommands*{#1}{date}%
2696 \bbl@savetoday
2697 \bbl@savedate
2698 \EndBabelCommands
2699 \fi
2700 % == hyphenrules (also in new) ==
2701 \ifx\bbl@lbkflag\@empty
2702 \bbl@provide@hyphens{#1}%
2703 \fi}

```

Load the basic parameters (ids, typography, counters, and a few more), while captions and dates are left out. But it may happen some data has been loaded before automatically, so we first discard the saved values. (TODO. But preserving previous values would be useful.)

```

2704 \def\bbl@load@basic#1{%
2705 \ifcase\bbl@howloaded\or\or
2706 \ifcase\csname bbl@llevel@\languagename\endcsname
2707 \bbl@csarg\let{lname@\languagename}\relax
2708 \fi
2709 \fi
2710 \bbl@ifunset\bbl@lname@#1}%
2711 {\def\BabelBeforeIni##1##2{%
2712 \begingroup
2713 \let\bbl@ini@captions@aux\@gobbletwo
2714 \def\bbl@inidate ####1.####2.####3.####4\relax ####5####6}%
2715 \bbl@read@ini{##1}%
2716 \ifx\bbl@initoload\relax\endinput\fi
2717 \endgroup}%
2718 \begingroup % boxed, to avoid extra spaces:
2719 \ifx\bbl@initoload\relax
2720 \bbl@input@texini{#1}%
2721 \else
2722 \setbox\z@\hbox{\BabelBeforeIni{\bbl@initoload}}}%
2723 \fi
2724 \endgroup}%
2725 {}%

```

The hyphenrules option is handled with an auxiliary macro. This macro is called in three cases: when a language is first declared with `\babelprovide`, with `hyphenrules` and with `import`.

```

2726 \def\bbl@provide@hyphens#1{%
2727 \@tempcnta\m@ne % a flag
2728 \ifx\bbl@KVP@hyphenrules\@nnil\else

```

```

2729 \bbl@replace\bbl@KVP@hyphenrules{ }{,}%
2730 \bbl@foreach\bbl@KVP@hyphenrules{%
2731   \ifnum\@tempcnta=\m@ne % if not yet found
2732     \bbl@ifsamestring{##1}{+}%
2733     {\bbl@carg\addlanguage{l@##1}}%
2734     {}%
2735     \bbl@ifunset{l@##1}% After a possible +
2736     {}%
2737     {\@tempcnta\@nameuse{l@##1}}%
2738   \fi}%
2739 \ifnum\@tempcnta=\m@ne
2740   \bbl@warning{%
2741     Requested 'hyphenrules=' for '\language' not found.\\%
2742     Using the default value. Reported}%
2743   \fi
2744 \fi
2745 \ifnum\@tempcnta=\m@ne % if no opt or no language in opt found
2746   \ifx\bbl@KVP@captions@\@nnil % TODO. Hackish. See above.
2747     \bbl@ifunset{\bbl@hyphr@#1}{}% use value in ini, if exists
2748     {\bbl@exp{\bbl@ifblank{\bbl@cs{hyphr@#1}}}%
2749      {}}%
2750     {\bbl@ifunset{l@\bbl@cl{hyphr}}}%
2751     {}% if hyphenrules found:
2752     {\@tempcnta\@nameuse{l@\bbl@cl{hyphr}}}%
2753   \fi
2754 \fi
2755 \bbl@ifunset{l@#1}%
2756   {\ifnum\@tempcnta=\m@ne
2757     \bbl@carg\adddialect{l@#1}\language
2758     \else
2759     \bbl@carg\adddialect{l@#1}\@tempcnta
2760     \fi}%
2761   {\ifnum\@tempcnta=\m@ne\else
2762     \global\bbl@carg\chardef{l@#1}\@tempcnta
2763     \fi}}

```

The reader of babel-...tex files. We reset temporarily some catcodes.

```

2764 \def\bbl@input@texini#1{%
2765   \bbl@bsphack
2766   \bbl@exp{%
2767     \catcode`\%%=14 \catcode`\%%=0
2768     \catcode`\%{1} \catcode`\%{2}
2769     \lowercase{\InputIfFileExists{babel-#1.tex}{}}%
2770     \catcode`\%%=\the\catcode`\%relax
2771     \catcode`\%%=\the\catcode`\%relax
2772     \catcode`\%{=\the\catcode`\%relax
2773     \catcode`\%{=\the\catcode`\%relax}%
2774   \bbl@esphack}

```

The following macros read and store ini files (but don't process them). For each line, there are 3 possible actions: ignore if starts with ;, switch section if starts with [, and store otherwise. There are used in the first step of \bbl@read@ini.

```

2775 \def\bbl@inline#1\bbl@inline{%
2776   \@ifnextchar[\bbl@inisect{\@ifnextchar\bbl@iniskip\bbl@inistore}#1\@}% ]
2777 \def\bbl@inisect[#1]#2\@{\def\bbl@section{#1}}
2778 \def\bbl@iniskip#1\@{ } if starts with ;
2779 \def\bbl@inistore#1=#2\@{ } full (default)
2780 \bbl@trim@def\bbl@tempa{#1}%
2781 \bbl@trim\toks@{#2}%
2782 \bbl@xin@{;\bbl@section/\bbl@tempa;}{\bbl@key@list}%
2783 \ifin@ \else
2784   \bbl@xin@{,identification/include.}%
2785   {\bbl@section/\bbl@tempa}%
2786 \ifin@ \edef\bbl@required@inis{\the\toks@}\fi

```

```

2787 \bbl@exp{%
2788     \\g@addto@macro\\bbl@inidata{%
2789         \\bbl@elt{\bbl@section}{\bbl@tempa}{\the\toks@}}}%
2790 \fi}
2791 \def\bbl@inistore@min#1=#2\@@{% minimal (maybe set in \bbl@read@ini)
2792 \bbl@trim@def\bbl@tempa{#1}%
2793 \bbl@trim\toks@{#2}%
2794 \bbl@xin@{.identification.}{.\bbl@section.}%
2795 \ifin@
2796     \bbl@exp{\\g@addto@macro\\bbl@inidata{%
2797         \\bbl@elt{identification}{\bbl@tempa}{\the\toks@}}}%
2798 \fi}

```

Now, the ‘main loop’, which **must be executed inside a group**. At this point, \bbl@inidata may contain data declared in \babelprovide, with ‘slashed’ keys. There are 3 steps: first read the ini file and store it; then traverse the stored values, and process some groups if required (date, captions, labels, counters); finally, ‘export’ some values by defining global macros (identification, typography, characters, numbers). The second argument is 0 when called to read the minimal data for fonts; with \babelprovide it’s either 1 or 2.

```

2799 \def\bbl@loop@ini{%
2800     \loop
2801     \if T\ifeof\bbl@readstream F\fi T\relax % Trick, because inside \loop
2802     \endlinechar\m@ne
2803     \read\bbl@readstream to \bbl@line
2804     \endlinechar``^^M
2805     \ifx\bbl@line\@empty\else
2806         \expandafter\bbl@iniline\bbl@line\bbl@iniline
2807     \fi
2808     \repeat}
2809 \ifx\bbl@readstream\@undefined
2810     \csname newread\endcsname\bbl@readstream
2811 \fi
2812 \def\bbl@read@ini#1#2{%
2813     \global\let\bbl@extend@ini\@gobble
2814     \openin\bbl@readstream=babel-#1.ini
2815     \ifeof\bbl@readstream
2816         \bbl@error
2817         {There is no ini file for the requested language\\%
2818         (#1: \language\name). Perhaps you misspelled it or your\\%
2819         installation is not complete.}%
2820         {Fix the name or reinstall babel.}%
2821     \else
2822         % == Store ini data in \bbl@inidata ==
2823         \catcode`\[=12 \catcode`\]=12 \catcode`\==12 \catcode`\&=12
2824         \catcode`\;=12 \catcode`\|=12 \catcode`\-=14 \catcode`\-=12
2825         \bbl@info{Importing
2826             \ifcase#2font and identification \or basic \fi
2827             data for \language\name\\%
2828             from babel-#1.ini. Reported}%
2829         \ifnum#2=\z@
2830             \global\let\bbl@inidata\@empty
2831             \let\bbl@inistore\bbl@inistore@min % Remember it's local
2832         \fi
2833         \def\bbl@section{identification}%
2834         \let\bbl@required@inis\@empty
2835         \bbl@exp{\\bbl@inistore tag.ini=#1\\@@}%
2836         \bbl@inistore load.level=#2\@@
2837         \bbl@loop@ini
2838         \ifx\bbl@required@inis\@empty\else
2839             \bbl@replace\bbl@required@inis{ }{,}%
2840             \bbl@foreach\bbl@required@inis{
2841                 \openin\bbl@readstream=##1.ini
2842                 \bbl@loop@ini}%

```

```

2843 \fi
2844 % == Process stored data ==
2845 \bbl@csarg\xdef{lini@language}{#1}%
2846 \bbl@read@ini@aux
2847 % == 'Export' data ==
2848 \bbl@ini@exports{#2}%
2849 \global\bbl@csarg\let{inidata@language}\bbl@inidata
2850 \global\let\bbl@inidata\@empty
2851 \bbl@exp{\bbl@add@list\bbl@ini@loaded{language}}%
2852 \bbl@tglobal\bbl@ini@loaded
2853 \fi}
2854 \def\bbl@read@ini@aux{%
2855 \let\bbl@savestrings\@empty
2856 \let\bbl@savetoday\@empty
2857 \let\bbl@savestate\@empty
2858 \def\bbl@elt##1##2##3{%
2859 \def\bbl@section{##1}%
2860 \in@{=date.}{=##1}% Find a better place
2861 \ifin@
2862 \bbl@ifunset{bbl@inikv@##1}%
2863 {\bbl@ini@calendar{##1}}%
2864 {}%
2865 \fi
2866 \in@{=identification/extension.}{=##1/##2}%
2867 \ifin@
2868 \bbl@ini@extension{##2}%
2869 \fi
2870 \bbl@ifunset{bbl@inikv@##1}{}%
2871 {\csname bbl@inikv@##1\endcsname{##2}{##3}}%
2872 \bbl@inidata}

```

A variant to be used when the ini file has been already loaded, because it's not the first \babelprovide for this language.

```

2873 \def\bbl@extend@ini@aux#1{%
2874 \bbl@startcommands*{#1}{captions}%
2875 % Activate captions/... and modify exports
2876 \bbl@csarg\def{inikv@captions.licr}##1##2{%
2877 \setlocalecaption{#1}{##1}{##2}}%
2878 \def\bbl@inikv@captions##1##2{%
2879 \bbl@ini@captions@aux{##1}{##2}}%
2880 \def\bbl@stringdef##1##2{\gdef##1{##2}}%
2881 \def\bbl@exportkey##1##2##3{%
2882 \bbl@ifunset{bbl@kv@##2}{}%
2883 {\expandafter\ifx\csname bbl@kv@##2\endcsname\@empty\else
2884 \bbl@exp{\global\let<bbl@##1@language>\<bbl@kv@##2>}}%
2885 \fi}}%
2886 % As with \bbl@read@ini, but with some changes
2887 \bbl@read@ini@aux
2888 \bbl@ini@exports\tw@
2889 % Update inidata@lang by pretending the ini is read.
2890 \def\bbl@elt##1##2##3{%
2891 \def\bbl@section{##1}%
2892 \bbl@iniline##2=##3\bbl@iniline}%
2893 \csname bbl@inidata@#1\endcsname
2894 \global\bbl@csarg\let{inidata@#1}\bbl@inidata
2895 \StartBabelCommands*{#1}{date}% And from the import stuff
2896 \def\bbl@stringdef##1##2{\gdef##1{##2}}%
2897 \bbl@savetoday
2898 \bbl@savestate
2899 \bbl@endcommands}

```

A somewhat hackish tool to handle calendar sections. TODO. To be improved.

```

2900 \def\bbl@ini@calendar#1{%
2901 \lowercase{\def\bbl@tempa{=##1=}}%

```

```

2902 \bbl@replace\bbl@tempa{=date.gregorian}{}%
2903 \bbl@replace\bbl@tempa{=date.}{}%
2904 \in@{.licr={#1=}}%
2905 \ifin@
2906   \ifcase\bbl@engine
2907     \bbl@replace\bbl@tempa{.licr={}}%
2908   \else
2909     \let\bbl@tempa\relax
2910   \fi
2911 \fi
2912 \ifx\bbl@tempa\relax\else
2913   \bbl@replace\bbl@tempa{=}{}%
2914   \ifx\bbl@tempa\@empty\else
2915     \xdef\bbl@calendars{\bbl@calendars,\bbl@tempa}%
2916   \fi
2917   \bbl@exp{%
2918     \def<\bbl@inikv@#1>####1####2{%
2919       \\bbl@inidate####1...\relax{####2}{\bbl@tempa}}}%
2920 \fi}

```

A key with a slash in \babelprovide replaces the value in the ini file (which is ignored altogether). The mechanism is simple (but suboptimal): add the data to the ini one (at this point the ini file has not yet been read), and define a dummy macro. When the ini file is read, just skip the corresponding key and reset the macro (in \bbl@inistore above).

```

2921 \def\bbl@renewinikey#1/#2\@#3{%
2922   \edef\bbl@tempa{\zap@space #1 \@empty}%   section
2923   \edef\bbl@tempb{\zap@space #2 \@empty}%    key
2924   \bbl@trim\toks@{#3}%                      value
2925   \bbl@exp{%
2926     \edef\\bbl@key@list{\bbl@key@list \bbl@tempa/\bbl@tempb;}%
2927     \\g@addto@macro\\bbl@inidata{%
2928       \\bbl@elt{\bbl@tempa}{\bbl@tempb}{\the\toks@}}}%

```

The previous assignments are local, so we need to export them. If the value is empty, we can provide a default value.

```

2929 \def\bbl@exportkey#1#2#3{%
2930   \bbl@ifunset{bbl@@kv@#2}%
2931     {\bbl@csarg\gdef{#1@\language name}{#3}}%
2932     {\expandafter\ifx\csname bbl@@kv@#2\endcsname\@empty
2933       \bbl@csarg\gdef{#1@\language name}{#3}%
2934     \else
2935       \bbl@exp{\global\let<\bbl@#1@\language name>\<bbl@@kv@#2>}%
2936     \fi}}

```

Key-value pairs are treated differently depending on the section in the ini file. The following macros are the readers for identification and typography. Note \bbl@ini@exports is called always (via \bbl@inisec), while \bbl@after@ini must be called explicitly after \bbl@read@ini if necessary.

```

2937 \def\bbl@iniwarning#1{%
2938   \bbl@ifunset{bbl@@kv@identification.warning#1}{}%
2939   {\bbl@warning{%
2940     From babel-\bbl@cs{lini@\language name}.ini:\%
2941     \bbl@cs{@kv@identification.warning#1}\%
2942     Reported }}}
2943 %
2944 \let\bbl@release@transforms\@empty

```

BCP 47 extensions are separated by a single letter (eg, latin-x-medieval. The following macro handles this special case to create correctly the correspondig info.

```

2945 \def\bbl@ini@extension#1{%
2946   \def\bbl@tempa{#1}%
2947   \bbl@replace\bbl@tempa{extension.}{}%
2948   \bbl@replace\bbl@tempa{.tag.bcp47}{}%
2949   \bbl@ifunset{bbl@info@#1}%
2950   {\bbl@csarg\xdef{info@#1}{ext/\bbl@tempa}%

```

```

2951 \bbl@exp{%
2952 \\\g@addto@macro\\\bbl@moreinfo{%
2953 \\\bbl@exportkey{ext/\bbl@tempa}{identification.#1}{}}}%
2954 {}
2955 \let\bbl@moreinfo\@empty
2956 %
2957 \def\bbl@ini@exports#1{%
2958 % Identification always exported
2959 \bbl@iniwarning{}}%
2960 \ifcase\bbl@engine
2961 \bbl@iniwarning{.pdflatex}%
2962 \or
2963 \bbl@iniwarning{.lua\latex}%
2964 \or
2965 \bbl@iniwarning{.xel\latex}%
2966 \fi%
2967 \bbl@exportkey{lllevel}{identification.load.level}{}%
2968 \bbl@exportkey{elname}{identification.name.english}{}%
2969 \bbl@exp{\\\bbl@exportkey{lname}{identification.name.opentype}%
2970 {\csname bbl@elname\languagename\endcsname}}%
2971 \bbl@exportkey{tbc}{identification.tag.bcp47}{}%
2972 \bbl@exportkey{lbc}{identification.language.tag.bcp47}{}%
2973 \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
2974 \bbl@exportkey{esname}{identification.script.name}{}%
2975 \bbl@exp{\\\bbl@exportkey{sname}{identification.script.name.opentype}%
2976 {\csname bbl@esname\languagename\endcsname}}%
2977 \bbl@exportkey{sbc}{identification.script.tag.bcp47}{}%
2978 \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}%
2979 \bbl@exportkey{rbcp}{identification.region.tag.bcp47}{}%
2980 \bbl@exportkey{vbcp}{identification.variant.tag.bcp47}{}%
2981 \bbl@moreinfo
2982 % Also maps bcp47 -> languagename
2983 \ifbbl@bcptoname
2984 \bbl@csarg\xdef{bcp@map@\bbl@cl{tbc}}{\languagename}%
2985 \fi
2986 % Conditional
2987 \ifnum#1>\z@ % 0 = only info, 1, 2 = basic, (re)new
2988 \bbl@exportkey{calpr}{date.calendar.preferred}{}%
2989 \bbl@exportkey{lnbrk}{typography.linebreaking}{h}%
2990 \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
2991 \bbl@exportkey{lfthm}{typography.lefthyphenmin}{2}%
2992 \bbl@exportkey{rgthm}{typography.righthyphenmin}{3}%
2993 \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
2994 \bbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
2995 \bbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
2996 \bbl@exportkey{intsp}{typography.intraspaces}{}%
2997 \bbl@exportkey{frspc}{typography.frenchspacing}{u}%
2998 \bbl@exportkey{chrng}{characters.ranges}{}%
2999 \bbl@exportkey{quote}{characters.delimiters.quotes}{}%
3000 \bbl@exportkey{dgnat}{numbers.digits.native}{}%
3001 \ifnum#1=\tw@ % only (re)new
3002 \bbl@exportkey{rqtex}{identification.require.babel}{}%
3003 \bbl@tglobal\bbl@savetoday
3004 \bbl@tglobal\bbl@savestate
3005 \bbl@savestrings
3006 \fi
3007 \fi}

```

A shared handler for key=val lines to be stored in \bbl@kv@<section>.<key>.

```

3008 \def\bbl@inikv#1#2{%      key=value
3009 \toks@{#2}%              This hides #'s from ini values
3010 \bbl@csarg\edef{@kv@\bbl@section.#1}{\the\toks@}}

```

By default, the following sections are just read. Actions are taken later.

```

3011 \let\bbl@inikv@identification\bbl@inikv
3012 \let\bbl@inikv@date\bbl@inikv
3013 \let\bbl@inikv@typography\bbl@inikv
3014 \let\bbl@inikv@characters\bbl@inikv
3015 \let\bbl@inikv@numbers\bbl@inikv

```

Additive numerals require an additional definition. When .1 is found, two macros are defined – the basic one, without .1 called by \localenumeral, and another one preserving the trailing .1 for the ‘units’.

```

3016 \def\bbl@inikv@counters#1#2{%
3017   \bbl@ifsamestring{#1}{digits}%
3018     {\bbl@error{The counter name 'digits' is reserved for mapping\\%
3019       decimal digits}%
3020       {Use another name.}}%
3021   }%
3022 \def\bbl@tempc{#1}%
3023 \bbl@trim@def{\bbl@tempb*}{#2}%
3024 \in@{.1$}{#1$}%
3025 \ifin@
3026   \bbl@replace\bbl@tempc{.1}{}%
3027   \bbl@csarg\protected@xdef{cntr@\bbl@tempc @\language}{%
3028     \noexpand\bbl@alphanumeric{\bbl@tempc}}%
3029 \fi
3030 \in@{.F.}{#1}%
3031 \ifin@\else\in@{.S.}{#1}\fi
3032 \ifin@
3033   \bbl@csarg\protected@xdef{cntr@#1@\language}{\bbl@tempb*}%
3034 \else
3035   \toks@{}% Required by \bbl@buildifcase, which returns \bbl@tempa
3036   \expandafter\bbl@buildifcase\bbl@tempb* \ \ % Space after \ \
3037   \bbl@csarg{\global\expandafter\let}{cntr@#1@\language}\bbl@tempa
3038 \fi}

```

Now captions and captions.licr, depending on the engine. And below also for dates. They rely on a few auxiliary macros. It is expected the ini file provides the complete set in Unicode and LICR, in that order.

```

3039 \ifcase\bbl@engine
3040   \bbl@csarg\def{inikv@captions.licr}#1#2{%
3041     \bbl@ini@captions@aux{#1}{#2}}
3042 \else
3043   \def\bbl@inikv@captions#1#2{%
3044     \bbl@ini@captions@aux{#1}{#2}}
3045 \fi

```

The auxiliary macro for captions define \<caption>name.

```

3046 \def\bbl@ini@captions@template#1#2{% string language tempa=capt-name
3047   \bbl@replace\bbl@tempa{.template}{}%
3048   \def\bbl@toreplace{#1}{}%
3049   \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace}}%
3050   \bbl@replace\bbl@toreplace{[ ]}{\csname}%
3051   \bbl@replace\bbl@toreplace{[ ]}{\csname the}%
3052   \bbl@replace\bbl@toreplace{[ ]}{\name\endcsname}}%
3053   \bbl@replace\bbl@toreplace{[ ]}{\endcsname}}%
3054   \bbl@xin@{,\bbl@tempa,}{,chapter,appendix,part,}%
3055   \ifin@
3056     \@nameuse{\bbl@patch\bbl@tempa}%
3057     \global\bbl@csarg\let{\bbl@tempa fmt@#2}\bbl@toreplace
3058   \fi
3059   \bbl@xin@{,\bbl@tempa,}{,figure,table,}%
3060   \ifin@
3061     \global\bbl@csarg\let{\bbl@tempa fmt@#2}\bbl@toreplace
3062     \bbl@exp{\gdef\<fnum@\bbl@tempa>{%
3063       \ \ \bbl@ifunset{\bbl@tempa fmt@\ \ \language}%
3064       {\[fnum@\bbl@tempa]}%

```

```

3065      {\@nameuse{bbl@bbl@tempa fmt@\\language}}}%
3066 \fi}
3067 \def\bbl@ini@captions@aux#1#2{%
3068   \bbl@trim@def\bbl@tempa{#1}%
3069   \bbl@xin@{.template}{\bbl@tempa}%
3070   \ifin@
3071     \bbl@ini@captions@template{#2}\language
3072   \else
3073     \bbl@ifblank{#2}%
3074     {\bbl@exp{%
3075       \toks@{\@nameuse{bbl@nocaption\bbl@tempa}\language\bbl@tempa name}}}%
3076     {\bbl@trim\toks@{#2}}}%
3077   \bbl@exp{%
3078     \\bbl@add\\bbl@savestrings{%
3079       \\SetString<\bbl@tempa name>{\the\toks@}}}%
3080   \toks@\\expandafter{\bbl@captionslist}%
3081   \bbl@exp{\@nameuse{bbl@tempa name}}{\the\toks@}}%
3082   \ifin@\\else
3083     \bbl@exp{%
3084       \\bbl@add<\bbl@extracaps@language>{\<\bbl@tempa name>}}%
3085       \\bbl@toglobal<\bbl@extracaps@language>}%
3086   \fi
3087 \fi}

```

**Labels.** Captions must contain just strings, no format at all, so there is new group in ini files.

```

3088 \def\bbl@list@the{%
3089   part,chapter,section,subsection,subsubsection,paragraph,%
3090   subparagraph,enumi,enumii,enumiii,enumiv,equation,figure,%
3091   table,page,footnote,mpfootnote,mpfn}
3092 \def\bbl@map@cnt#1{% #1:roman,etc, // #2:enumi,etc
3093   \bbl@ifunset{bbl@map@#1\language}%
3094     {\@nameuse{#1}}%
3095     {\@nameuse{bbl@map@#1\language}}}
3096 \def\bbl@inikv@labels#1#2{%
3097   \in@{.map}{#1}%
3098   \ifin@
3099     \ifx\bbl@KVP@labels\@nnil\else
3100       \bbl@xin@{ map }{ \bbl@KVP@labels\space}%
3101       \ifin@
3102         \def\bbl@tempc{#1}%
3103         \bbl@replace\bbl@tempc{.map}{}%
3104         \in@{,#2,}{,arabic,roman,Roman,alph,Alph,fnsymbol,}%
3105         \bbl@exp{%
3106           \gdef<\bbl@map@bbl@tempc @language>%
3107             {\ifin@<#2>\else\\localecounter{#2}\fi}}%
3108         \bbl@foreach\bbl@list@the{%
3109           \bbl@ifunset{the##1}{}%
3110           {\bbl@exp{\let\\bbl@tempd<the##1>}%
3111             \bbl@exp{%
3112               \\bbl@sreplace<the##1>%
3113               {\<\bbl@tempc>{##1}}{\@nameuse{bbl@map@cnt\bbl@tempc}{##1}}}%
3114               \\bbl@sreplace<the##1>%
3115               {\<\@empty @bbl@tempc>\<c@##1>}{\@nameuse{bbl@map@cnt\bbl@tempc}{##1}}}%
3116             \expandafter\ifx\csname the##1\endcsname\bbl@tempd\else
3117               \toks@\\expandafter\expandafter\expandafter{%
3118                 \csname the##1\endcsname}%
3119               \expandafter\xdef\csname the##1\endcsname{\the\toks@}}%
3120             \fi}}%
3121       \fi
3122     \fi
3123   %
3124   \else
3125     %

```



```

3126 % The following code is still under study. You can test it and make
3127 % suggestions. Eg, enumerate.2 = ([enumi]).([enumii]). It's
3128 % language dependent.
3129 \in@{enumerate.}{#1}%
3130 \ifin@
3131 \def\bb1@tempa{#1}%
3132 \bb1@replace\bb1@tempa{enumerate.}{}%
3133 \def\bb1@toreplace{#2}%
3134 \bb1@replace\bb1@toreplace{[ ]}{\nobreakspace{}}%
3135 \bb1@replace\bb1@toreplace{[ ]}{\csname the}%
3136 \bb1@replace\bb1@toreplace{ ]}{\endcsname{}}%
3137 \toks@\expandafter{\bb1@toreplace}%
3138 % TODO. Execute only once:
3139 \bb1@exp{%
3140 \\\bb1@add\<extras\language>{%
3141 \\\babel@save\<labelenum\romannumeral\bb1@tempa>%
3142 \def\<labelenum\romannumeral\bb1@tempa>{\the\toks@}%
3143 \\\bb1@tglobal\<extras\language>%
3144 \fi
3145 \fi}

```

To show correctly some captions in a few languages, we need to patch some internal macros, because the order is hardcoded. For example, in Japanese the chapter number is surrounded by two string, while in Hungarian is placed after. These replacement works in many classes, but not all. Actually, the following lines are somewhat tentative.

```

3146 \def\bb1@chapttype{chapter}
3147 \ifx\@makechapterhead\@undefined
3148 \let\bb1@patchchapter\relax
3149 \else\ifx\thechapter\@undefined
3150 \let\bb1@patchchapter\relax
3151 \else\ifx\ps@headings\@undefined
3152 \let\bb1@patchchapter\relax
3153 \else
3154 \def\bb1@patchchapter{%
3155 \global\let\bb1@patchchapter\relax
3156 \gdef\bb1@chfmt{%
3157 \bb1@ifunset{bb1@bb1@chapttype fmt@\language}%
3158 {\@chapapp\space\thechapter}
3159 {\@nameuse{bb1@bb1@chapttype fmt@\language}}}}
3160 \bb1@add\appendix{\def\bb1@chapttype{appendix}}% Not harmful, I hope
3161 \bb1@sreplace\ps@headings{\@chapapp\ \thechapter}{\bb1@chfmt}%
3162 \bb1@sreplace\chaptermark{\@chapapp\ \thechapter}{\bb1@chfmt}%
3163 \bb1@sreplace\@makechapterhead{\@chapapp\space\thechapter}{\bb1@chfmt}%
3164 \bb1@tglobal\appendix
3165 \bb1@tglobal\ps@headings
3166 \bb1@tglobal\chaptermark
3167 \bb1@tglobal\@makechapterhead}
3168 \let\bb1@patchappendix\bb1@patchchapter
3169 \fi\fi\fi
3170 \ifx\@part\@undefined
3171 \let\bb1@patchpart\relax
3172 \else
3173 \def\bb1@patchpart{%
3174 \global\let\bb1@patchpart\relax
3175 \gdef\bb1@partformat{%
3176 \bb1@ifunset{bb1@partfmt@\language}%
3177 {\partname\nobreakspace\thepart}
3178 {\@nameuse{bb1@partfmt@\language}}}}
3179 \bb1@sreplace\@part{\partname\nobreakspace\thepart}{\bb1@partformat}%
3180 \bb1@tglobal\@part}
3181 \fi

```

**Date.** Arguments (year, month, day) are *not* protected, on purpose. In \today, arguments are always gregorian, and therefore always converted with other calendars. TODO. Document

```

3182 \let\bbl@calendar\@empty
3183 \DeclareRobustCommand\localedate[1][\bbl@localedate{#1}]
3184 \def\bbl@localedate#1#2#3#4{%
3185   \begingroup
3186     \edef\bbl@they{#2}%
3187     \edef\bbl@them{#3}%
3188     \edef\bbl@thed{#4}%
3189     \edef\bbl@tempe{%
3190       \bbl@ifunset\bbl@calpr@\language\name{}\bbl@cl{calpr}},%
3191       #1}%
3192     \bbl@replace\bbl@tempe{ }{}%
3193     \bbl@replace\bbl@tempe{CONVERT}{convert}% Hackish
3194     \bbl@replace\bbl@tempe{convert}{convert}%
3195     \let\bbl@ld@calendar\@empty
3196     \let\bbl@ld@variant\@empty
3197     \let\bbl@ld@convert\relax
3198     \def\bbl@tempb##1=##2\@@{\@namedef\bbl@ld##1}{##2}}%
3199     \bbl@foreach\bbl@tempe{\bbl@tempb##1\@@}%
3200     \bbl@replace\bbl@ld@calendar{gregorian}{}%
3201     \ifx\bbl@ld@calendar\@empty\else
3202       \ifx\bbl@ld@convert\relax\else
3203         \babelcalendar[\bbl@they-\bbl@them-\bbl@thed]%
3204         {\bbl@ld@calendar}\bbl@they\bbl@them\bbl@thed
3205       \fi
3206     \fi
3207     \@nameuse\bbl@precalendar}% Remove, eg, +, -civil (-ca-islamic)
3208     \edef\bbl@calendar{% Used in \month..., too
3209       \bbl@ld@calendar
3210       \ifx\bbl@ld@variant\@empty\else
3211         .\bbl@ld@variant
3212       \fi}%
3213     \bbl@cased
3214     {\@nameuse\bbl@date@\language\name @\bbl@calendar}%
3215     \bbl@they\bbl@them\bbl@thed}%
3216   \endgroup}
3217 % eg: 1=months, 2=wide, 3=1, 4=dummy, 5=value, 6=calendar
3218 \def\bbl@inidate#1.#2.#3.#4\relax#5#6{% TODO - ignore with 'captions'
3219   \bbl@trim\def\bbl@tempa{#1.#2}%
3220   \bbl@ifsamestring{\bbl@tempa}{months.wide}%      to savedate
3221   {\bbl@trim\def\bbl@tempa{#3}%
3222     \bbl@trim\toks@{#5}%
3223     \@temptokena\expandafter{\bbl@savedate}%
3224     \bbl@exp{% Reverse order - in ini last wins
3225       \def\\bbl@savedate{%
3226         \\SetString<\month\romannumeral\bbl@tempa#6name>{\the\toks@}%
3227         \the\@temptokena}}}%
3228   {\bbl@ifsamestring{\bbl@tempa}{date.long}%      defined now
3229     {\lowercase{\def\bbl@tempb{#6}}%
3230       \bbl@trim\def\bbl@toreplace{#5}%
3231       \bbl@TG@date
3232       \global\bbl@csarg\let{date@\language\name @\bbl@tempb}\bbl@toreplace
3233       \ifx\bbl@savetoday\@empty
3234         \bbl@exp{% TODO. Move to a better place.
3235           \\AfterBabelCommands{%
3236             \def<\language\name date>{\protect<\language\name date >}}%
3237             \\newcommand<\language\name date >[4][\%
3238               \\bbl@usedategroupttrue
3239               <\bbl@ensure@\language\name>{%
3240                 \\localedate[####1]{####2}{####3}{####4}}}%
3241             \def\\bbl@savetoday{%
3242               \\SetString\\today{%
3243                 <\language\name date>[convert]%
3244                 {\the\year}{\the\month}{\the\day}}}%

```

```

3245      \fi}%
3246      {}}}

```

**Dates** will require some macros for the basic formatting. They may be redefined by language, so “semi-public” names (camel case) are used. Oddly enough, the CLDR places particles like “de” inconsistently in either in the date or in the month name. Note after \bbl@replace\toks@ contains the resulting string, which is used by \bbl@replace@finish@iii (this implicit behavior doesn’t seem a good idea, but it’s efficient).

```

3247 \let\bbl@calendar\@empty
3248 \newcommand\babelcalendar[2][\the\year-\the\month-\the\day]{%
3249   \@nameuse{bbl@ca#2}#1\@}
3250 \newcommand\BabelDateSpace{\nobreakspace}
3251 \newcommand\BabelDateDot{.\@} % TODO. \let instead of repeating
3252 \newcommand\BabelDated[1]{\number#1}
3253 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}
3254 \newcommand\BabelDateM[1]{\number#1}
3255 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
3256 \newcommand\BabelDateMMMM[1]{%
3257   \csname month\romannumeral#1\bbl@calendar name\endcsname}%
3258 \newcommand\BabelDatey[1]{\number#1}%
3259 \newcommand\BabelDateyy[1]{%
3260   \ifnum#1<10 0\number#1 %
3261   \else\ifnum#1<100 \number#1 %
3262   \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
3263   \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
3264   \else
3265     \bbl@error
3266     {Currently two-digit years are restricted to the\
3267       range 0-9999.}%
3268     {There is little you can do. Sorry.}%
3269   \fi\fi\fi\fi}
3270 \newcommand\BabelDateyyyy[1]{\number#1} % TODO - add leading 0
3271 \def\bbl@replace@finish@iii#1{%
3272   \bbl@exp{\def\#1####1####2####3{\the\toks@}}
3273 \def\bbl@TG@@date{%
3274   \bbl@replace\bbl@toreplace{[ ]}{\BabelDateSpace{}}%
3275   \bbl@replace\bbl@toreplace{[.]}{\BabelDateDot{}}%
3276   \bbl@replace\bbl@toreplace{[d]}{\BabelDated{####3}}%
3277   \bbl@replace\bbl@toreplace{[dd]}{\BabelDatedd{####3}}%
3278   \bbl@replace\bbl@toreplace{[M]}{\BabelDateM{####2}}%
3279   \bbl@replace\bbl@toreplace{[MM]}{\BabelDateMM{####2}}%
3280   \bbl@replace\bbl@toreplace{[MMMM]}{\BabelDateMMMM{####2}}%
3281   \bbl@replace\bbl@toreplace{[y]}{\BabelDatey{####1}}%
3282   \bbl@replace\bbl@toreplace{[yy]}{\BabelDateyy{####1}}%
3283   \bbl@replace\bbl@toreplace{[yyyy]}{\BabelDateyyyy{####1}}%
3284   \bbl@replace\bbl@toreplace{[y|]}{\bbl@datecctr[####1|]}%
3285   \bbl@replace\bbl@toreplace{[m|]}{\bbl@datecctr[####2|]}%
3286   \bbl@replace\bbl@toreplace{[d|]}{\bbl@datecctr[####3|]}%
3287   \bbl@replace@finish@iii\bbl@toreplace}
3288 \def\bbl@datecctr{\expandafter\bbl@xdatecctr\expandafter}
3289 \def\bbl@xdatecctr[#1|#2]{\localenumeral{#2}{#1}}

```

### Transforms.

```

3290 \let\bbl@release@transforms\@empty
3291 \bbl@csarg\let{inikv@transforms.prehyphenation}\bbl@inikv
3292 \bbl@csarg\let{inikv@transforms.posthyphenation}\bbl@inikv
3293 \def\bbl@transforms@aux#1#2#3#4,#5\relax{%
3294   #1[#2]{#3}{#4}{#5}}
3295 \begingroup % A hack. TODO. Don't require an specific order
3296   \catcode`\%=12
3297   \catcode`\&=14
3298   \gdef\bbl@transforms#1#2#3{%&
3299     \directlua{
3300       local str = [==[#2]==]

```

```

3301     str = str:gsub('%.%d+%.%d+$', '')
3302     token.set_macro('babeltempa', str)
3303 }&%
3304 \def\babeltempc{}&%
3305 \bbl@xin@{, \babeltempa, }{, \bbl@KVP@transforms, }&%
3306 \ifin\else
3307     \bbl@xin@{: \babeltempa, }{, \bbl@KVP@transforms, }&%
3308 \fi
3309 \ifin@
3310     \bbl@foreach\bbl@KVP@transforms{&%
3311         \bbl@xin@{: \babeltempa, }{, ##1, }&%
3312         \ifin@ &% font:font:transform syntax
3313         \directlua{
3314             local t = {}
3315             for m in string.gmatch('##1'..'':, '(.):') do
3316                 table.insert(t, m)
3317             end
3318             table.remove(t)
3319             token.set_macro('babeltempc', ', fonts=' .. table.concat(t, ' '))
3320         }&%
3321     \fi}&%
3322 \in@{.0$}{#2$}&%
3323 \ifin@
3324     \directlua{&% (\attribute) syntax
3325         local str = string.match([[ \bbl@KVP@transforms]],
3326             '%(([^(-)]%)[^)]-\babeltempa')
3327         if str == nil then
3328             token.set_macro('babeltempb', '')
3329         else
3330             token.set_macro('babeltempb', ', attribute=' .. str)
3331         end
3332     }&%
3333 \toks@{#3}&%
3334 \bbl@exp{&%
3335     \g@addto@macro\bbl@release@transforms{&%
3336         \relax &% Closes previous \bbl@transforms@aux
3337         \bbl@transforms@aux
3338         \#1{label=\babeltempa\babeltempb\babeltempc}&%
3339         {\language\the\toks@}}&%
3340 \else
3341     \g@addto@macro\bbl@release@transforms{, {#3}}&%
3342 \fi
3343 \fi}
3344 \endgroup

```

Language and Script values to be used when defining a font or setting the direction are set with the following macros.

```

3345 \def\bbl@provide@lsys#1{%
3346     \bbl@ifunset{bbl@lname@#1}%
3347     {\bbl@load@info{#1}}%
3348     }%
3349 \bbl@csarg\let{lsys@#1}\@empty
3350 \bbl@ifunset{bbl@sname@#1}{\bbl@csarg\gdef{sname@#1}{Default}}{}%
3351 \bbl@ifunset{bbl@sotf@#1}{\bbl@csarg\gdef{sotf@#1}{DFLT}}{}%
3352 \bbl@csarg\bbl@add@list{lsys@#1}{Script=\bbl@cs{sname@#1}}%
3353 \bbl@ifunset{bbl@lname@#1}{%
3354     {\bbl@csarg\bbl@add@list{lsys@#1}{Language=\bbl@cs{lname@#1}}}%
3355 \ifcase\bbl@engine\or\or
3356     \bbl@ifunset{bbl@prehc@#1}{%
3357         {\bbl@exp{\bbl@ifblank{\bbl@cs{prehc@#1}}}%
3358         }%
3359         {\ifx\bbl@xenohyph\undefined
3360             \global\let\bbl@xenohyph\bbl@xenohyph@d

```

```

3361         \ifx\AtBeginDocument\@notprerr
3362         \expandafter\@secondoftwo % to execute right now
3363         \fi
3364         \AtBeginDocument{%
3365             \bbl@patchfont{\bbl@xenoxyph}%
3366             \expandafter\selectlanguage\expandafter{\language}%
3367         \fi}%
3368     \fi
3369     \bbl@csarg\bbl@tglobal{lsys@#1}}
3370 \def\bbl@xenoxyphd{%
3371     \bbl@ifset{bbl@prehc{\language}%
3372     {\ifnum\hyphenchar\font=\defaultshyphenchar
3373         \iffontchar\font\bbl@cl{prehc}\relax
3374         \hyphenchar\font\bbl@cl{prehc}\relax
3375     \else\iffontchar\font"200B
3376         \hyphenchar\font"200B
3377     \else
3378         \bbl@warning
3379         {Neither 0 nor ZERO WIDTH SPACE are available\\%
3380         in the current font, and therefore the hyphen\\%
3381         will be printed. Try changing the fontspec's\\%
3382         'HyphenChar' to another value, but be aware\\%
3383         this setting is not safe (see the manual).\\%
3384         Reported}%
3385         \hyphenchar\font\defaultshyphenchar
3386     \fi\fi
3387     \fi}%
3388     {\hyphenchar\font\defaultshyphenchar}}
3389     % \fi}

```

The following ini reader ignores everything but the identification section. It is called when a font is defined (ie, when the language is first selected) to know which script/language must be enabled. This means we must make sure a few characters are not active. The ini is not read directly, but with a proxy tex file named as the language (which means any code in it must be skipped, too).

```

3390 \def\bbl@load@info#1{%
3391     \def\BabelBeforeIni##1##2{%
3392         \begingroup
3393         \bbl@read@ini{##1}0%
3394         \endinput % babel- .tex may contain only preamble's
3395         \endgroup}% boxed, to avoid extra spaces:
3396     {\bbl@input@texini{#1}}}

```

A tool to define the macros for native digits from the list provided in the ini file. Somewhat convoluted because there are 10 digits, but only 9 arguments in T<sub>E</sub>X. Non-digits characters are kept. The first macro is the generic “localized” command.

```

3397 \def\bbl@setdigits#1#2#3#4#5{%
3398     \bbl@exp{%
3399         \def<\language digits>####1{% ie, \langdigits
3400             \<bbl@digits@\language>####1\\@nil}%
3401         \let\<bbl@cntr@digits@\language>\<\language digits>%
3402         \def<\language counter>####1{% ie, \langcounter
3403             \expandafter\<bbl@counter@\language>%
3404             \csname c#####1\endcsname}%
3405         \def\<bbl@counter@\language>####1{% ie, \bbl@counter@lang
3406             \expandafter\<bbl@digits@\language>%
3407             \number#####1\\@nil}}%
3408     \def\bbl@tempa##1##2##3##4##5{%
3409         \bbl@exp{% Wow, quite a lot of hashes! :-(
3410             \def\<bbl@digits@\language>#####1{%
3411                 \ifx#####1\\@nil % ie, \bbl@digits@lang
3412                 \else
3413                     \ifx0#####1#1%
3414                     \else\ifx1#####1#2%
3415                     \else\ifx2#####1#3%

```

[illegible]

```

3428 \def\bbl@buildifcase#1 {% Returns \bbl@tempa, requires \toks@={
3429   \ifx\\#1%           % \\ before, in case #1 is multiletter
3430     \bbl@exp{%
3431       \def\\ \bbl@tempa####1{%
3432         \<ifcase>####1\space\the\toks@\<else>\\@ctrerr\<fi>}}%
3433     \else
3434       \toks@\expandafter{\the\toks@\or #1}%
3435       \expandafter\bbl@buildifcase
3436     \fi}

```

```

3437 \newcommand\localenatural[2]{\bbl@cs{cntr@#1@language}{#2}}
3438 \def\bbl@localecntr#1#2{\localenatural{#2}{#1}}
3439 \newcommand\localecounter[2]{%
3440   \expandafter\bbl@localecntr
3441   \expandafter{\number\csname c@#2\endcsname}{#1}}
3442 \def\bbl@alphnumerical#1#2{%
3443   \expandafter\bbl@alphnumerical@i\number#2 76543210\@@{#1}}
3444 \def\bbl@alphnumerical@i#1#2#3#4#5#6#7#8\@@#9{%
3445   \ifcase\@car#8\@nil\or    % Currenty <10000, but prepared for bigger
3446     \bbl@alphnumerical@ii{#9}000000#1\or
3447     \bbl@alphnumerical@ii{#9}000000#1#2\or
3448     \bbl@alphnumerical@ii{#9}0000#1#2#3\or
3449     \bbl@alphnumerical@ii{#9}000#1#2#3#4\else
3450     \bbl@alphnum@invalid{>9999}%
3451   \fi}
3452 \def\bbl@alphnumerical@ii#1#2#3#4#5#6#7#8{%
3453   \bbl@ifunset{bbl@cntr@#1.F.\number#5#6#7#8@language}%
3454     {\bbl@cs{cntr@#1.4@language}{#5}
3455      \bbl@cs{cntr@#1.3@language}{#6}
3456      \bbl@cs{cntr@#1.2@language}{#7}
3457      \bbl@cs{cntr@#1.1@language}{#8}
3458      \ifnum#6#7#8>\z@ % TODO. An ad hoc rule for Greek. Ugly.
3459        \bbl@ifunset{bbl@cntr@#1.S.321@language}{}%
3460        {\bbl@cs{cntr@#1.S.321@language}}%
3461      \fi}%
3462   {\bbl@cs{cntr@#1.F.\number#5#6#7#8@language}}}
3463 \def\bbl@alphnum@invalid#1{%
3464   \bbl@error{Alphabetic numeral too large (#1)}%
3465   {Currently this is the limit.}}

```

```

3466 \def\bbl@localeinfo#1#2{%
3467   \bbl@ifunset{\bbl@info@#2}{#1}%
3468   {\bbl@ifunset{\bbl@\cscname\bbl@info@#2\endcsname @\language\name}{#1}%

```

```

3469      {\bbl@cs{ \csname bbl@info@#2\endcsname @\languagename}}}}
3470 \newcommand\localeinfo[1]{%
3471   \ifx*#1\@empty    % TODO. A bit hackish to make it expandable.
3472     \bbl@afterelse\bbl@localeinfo{}%
3473   \else
3474     \bbl@localeinfo
3475     {\bbl@error{I've found no info for the current locale.\%
3476               The corresponding ini file has not been loaded\%
3477               Perhaps it doesn't exist}%
3478      {See the manual for details.}}%
3479   {#1}%
3480 \fi}
3481 % \@namedef{bbl@info@name.locale}{lname}
3482 \@namedef{bbl@info@tag.ini}{lini}
3483 \@namedef{bbl@info@name.english}{elname}
3484 \@namedef{bbl@info@name.opentype}{lname}
3485 \@namedef{bbl@info@tag.bcp47}{tbc}
3486 \@namedef{bbl@info@language.tag.bcp47}{lbc}
3487 \@namedef{bbl@info@tag.opentype}{lotf}
3488 \@namedef{bbl@info@script.name}{esname}
3489 \@namedef{bbl@info@script.name.opentype}{sname}
3490 \@namedef{bbl@info@script.tag.bcp47}{sbc}
3491 \@namedef{bbl@info@script.tag.opentype}{sotf}
3492 \@namedef{bbl@info@region.tag.bcp47}{rbcp}
3493 \@namedef{bbl@info@variant.tag.bcp47}{vbc}
3494 % Extensions are dealt with in a special way
3495 % Now, an internal \LaTeX{} macro:
3496 \providecommand\BCPdata[1]{\localeinfo*{#1.tag.bcp47}}

```

With version 3.75 \BabelEnsureInfo is executed always, but there is an option to disable it.

```

3497 <<{*More package options}>> ≡
3498 \DeclareOption{ensureinfo=off}{}
3499 <</More package options>>
3500 %
3501 \let\bbl@ensureinfo\@gobble
3502 \newcommand\BabelEnsureInfo{%
3503   \ifx\InputIfFileExists\undefined\else
3504     \def\bbl@ensureinfo##1{%
3505       \bbl@ifunset{bbl@lname@##1}{\bbl@load@info{##1}}{}}%
3506   \fi
3507   \bbl@foreach\bbl@loaded{%
3508     \def\languagename{##1}%
3509     \bbl@ensureinfo{##1}}}%
3510 \@ifpackagewith{babel}{ensureinfo=off}{}%
3511 {\AtEndOfPackage{% Test for plain.
3512   \ifx\undefined\bbl@loaded\else\BabelEnsureInfo\fi}}

```

More general, but non-expandable, is \getLocaleproperty. To inspect every possible loaded ini, we define \LocaleForEach, where \bbl@ini@loaded is a comma-separated list of locales, built by \bbl@read@ini.

```

3513 \newcommand\getLocaleproperty{%
3514   \@ifstar\bbl@getproperty@s\bbl@getproperty@x}
3515 \def\bbl@getproperty@s#1#2#3{%
3516   \let#1\relax
3517   \def\bbl@elt##1##2##3{%
3518     \bbl@ifsamestring{##1/##2}{##3}%
3519     {\providecommand#1{##3}%
3520      \def\bbl@elt####1####2####3{}}}%
3521   {}}%
3522   \bbl@cs{inidata@#2}}%
3523 \def\bbl@getproperty@x#1#2#3{%
3524   \bbl@getproperty@s{#1}{#2}{#3}%
3525   \ifx#1\relax
3526     \bbl@error

```

```

3527      {Unknown key for locale '#2':\%
3528      #3\}%
3529      \string#1 will be set to \relax}%
3530      {Perhaps you misspelled it.}%
3531    \fi}
3532 \let\bbl@ini@loaded\empty
3533 \newcommand\LocaleForEach{\bbl@foreach\bbl@ini@loaded}

```

## 8 Adjusting the Babel bahavior

A generic high level inteface is provided to adjust some global and general settings.

```

3534 \newcommand\babeladjust[1]{% TODO. Error handling.
3535   \bbl@forkv{#1}{%
3536     \bbl@ifunset{\bbl@ADJ@##1@##2}%
3537     {\bbl@cs{ADJ@##1}{##2}}%
3538     {\bbl@cs{ADJ@##1@##2}}}
3539 %
3540 \def\bbl@adjust@lua#1#2{%
3541   \ifvmode
3542     \ifnum\currentgrouplevel=\z@
3543       \directlua{ Babel.#2 }%
3544       \expandafter\expandafter\expandafter\@gobble
3545     \fi
3546   \fi
3547   {\bbl@error % The error is gobbled if everything went ok.
3548     {Currently, #1 related features can be adjusted only\%
3549     in the main vertical list.}%
3550     {Maybe things change in the future, but this is what it is.}}}
3551 \@namedef{\bbl@ADJ@bidi.mirroring@on}{%
3552   \bbl@adjust@lua{bidi}{mirroring_enabled=true}}
3553 \@namedef{\bbl@ADJ@bidi.mirroring@off}{%
3554   \bbl@adjust@lua{bidi}{mirroring_enabled=false}}
3555 \@namedef{\bbl@ADJ@bidi.text@on}{%
3556   \bbl@adjust@lua{bidi}{bidi_enabled=true}}
3557 \@namedef{\bbl@ADJ@bidi.text@off}{%
3558   \bbl@adjust@lua{bidi}{bidi_enabled=false}}
3559 \@namedef{\bbl@ADJ@bidi.math@on}{%
3560   \let\bbl@noamsmath\empty}
3561 \@namedef{\bbl@ADJ@bidi.math@off}{%
3562   \let\bbl@noamsmath\relax}
3563 \@namedef{\bbl@ADJ@bidi.mapdigits@on}{%
3564   \bbl@adjust@lua{bidi}{digits_mapped=true}}
3565 \@namedef{\bbl@ADJ@bidi.mapdigits@off}{%
3566   \bbl@adjust@lua{bidi}{digits_mapped=false}}
3567 %
3568 \@namedef{\bbl@ADJ@linebreak.sea@on}{%
3569   \bbl@adjust@lua{linebreak}{sea_enabled=true}}
3570 \@namedef{\bbl@ADJ@linebreak.sea@off}{%
3571   \bbl@adjust@lua{linebreak}{sea_enabled=false}}
3572 \@namedef{\bbl@ADJ@linebreak.cjk@on}{%
3573   \bbl@adjust@lua{linebreak}{cjk_enabled=true}}
3574 \@namedef{\bbl@ADJ@linebreak.cjk@off}{%
3575   \bbl@adjust@lua{linebreak}{cjk_enabled=false}}
3576 \@namedef{\bbl@ADJ@justify.arabic@on}{%
3577   \bbl@adjust@lua{linebreak}{arabic.justify_enabled=true}}
3578 \@namedef{\bbl@ADJ@justify.arabic@off}{%
3579   \bbl@adjust@lua{linebreak}{arabic.justify_enabled=false}}
3580 %
3581 \def\bbl@adjust@layout#1{%
3582   \ifvmode
3583     #1%
3584     \expandafter\@gobble

```



```

3585 \fi
3586 {\bbl@error % The error is gobbled if everything went ok.
3587 {Currently, layout related features can be adjusted only\\%
3588 in vertical mode.}%
3589 {Maybe things change in the future, but this is what it is.}}
3590 \@namedef{bbl@ADJ@layout.tabular@on}{%
3591 \bbl@adjust@layout{\let\@tabular\bbl@NL@tabular}}
3592 \@namedef{bbl@ADJ@layout.tabular@off}{%
3593 \bbl@adjust@layout{\let\@tabular\bbl@OL@tabular}}
3594 \@namedef{bbl@ADJ@layout.lists@on}{%
3595 \bbl@adjust@layout{\let\list\bbl@NL@list}}
3596 \@namedef{bbl@ADJ@layout.lists@off}{%
3597 \bbl@adjust@layout{\let\list\bbl@OL@list}}
3598 %
3599 \@namedef{bbl@ADJ@autoload.bcp47@on}{%
3600 \bbl@bcpallowedtrue}
3601 \@namedef{bbl@ADJ@autoload.bcp47@off}{%
3602 \bbl@bcpallowedfalse}
3603 \@namedef{bbl@ADJ@autoload.bcp47.prefix#1}{%
3604 \def\bbl@bcp@prefix#1}}
3605 \def\bbl@bcp@prefix{bcp47-}
3606 \@namedef{bbl@ADJ@autoload.options#1}{%
3607 \def\bbl@autoload@options#1}}
3608 \let\bbl@autoload@bcptoptions\@empty
3609 \@namedef{bbl@ADJ@autoload.bcp47.options#1}{%
3610 \def\bbl@autoload@bcptoptions#1}}
3611 \newif\ifbbl@bcptoname
3612 \@namedef{bbl@ADJ@bcp47.toname@on}{%
3613 \bbl@bcptonametrue}
3614 \BabelEnsureInfo}
3615 \@namedef{bbl@ADJ@bcp47.toname@off}{%
3616 \bbl@bcptonamefalse}
3617 \@namedef{bbl@ADJ@prehyphenation.disable@nohyphenation}{%
3618 \directlua{ Babel.ignore_pre_char = function(node)
3619 return (node.lang == \the\csname l@nohyphenation\endcsname)
3620 end }}
3621 \@namedef{bbl@ADJ@prehyphenation.disable@off}{%
3622 \directlua{ Babel.ignore_pre_char = function(node)
3623 return false
3624 end }}
3625 \@namedef{bbl@ADJ@select.write@shift}{%
3626 \let\bbl@restorelastskip\relax
3627 \def\bbl@savelastskip{%
3628 \let\bbl@restorelastskip\relax
3629 \ifvmode
3630 \ifdim\lastskip=\z@
3631 \let\bbl@restorelastskip\nobreak
3632 \else
3633 \bbl@exp{%
3634 \def\\bbl@restorelastskip{%
3635 \skip@=\the\lastskip
3636 \\nobreak \vskip-\skip@ \vskip\skip@}}%
3637 \fi
3638 \fi}}
3639 \@namedef{bbl@ADJ@select.write@keep}{%
3640 \let\bbl@restorelastskip\relax
3641 \let\bbl@savelastskip\relax}
3642 \@namedef{bbl@ADJ@select.write@omit}{%
3643 \AddBabelHook{babel-select}{beforestart}{%
3644 \expandafter\babel@aux\expandafter{\bbl@main@language}}}%
3645 \let\bbl@restorelastskip\relax
3646 \def\bbl@savelastskip##1\bbl@restorelastskip}}
3647 \@namedef{bbl@ADJ@select.encoding@off}{%

```

```
3648 \let\bbl@encoding@select@off@empty}
```

As the final task, load the code for lua. TODO: use babel name, override

```
3649 \ifx\directlua\@undefined\else
3650 \ifx\bbl@luapatterns\@undefined
3651 \input luababel.def
3652 \fi
3653 \fi
```

Continue with  $\LaTeX$ .

```
3654 </package | core>
3655 <*package>
```

## 8.1 Cross referencing macros

The  $\LaTeX$  book states:

The *key* argument is any sequence of letters, digits, and punctuation symbols; upper- and lowercase letters are regarded as different.

When the above quote should still be true when a document is typeset in a language that has active characters, special care has to be taken of the category codes of these characters when they appear in an argument of the cross referencing macros.

When a cross referencing command processes its argument, all tokens in this argument should be character tokens with category ‘letter’ or ‘other’.

The following package options control which macros are to be redefined.

```
3656 <(*More package options)> ≡
3657 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
3658 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
3659 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
3660 \DeclareOption{safe=refbib}{\def\bbl@opt@safe{BR}}
3661 \DeclareOption{safe=bibref}{\def\bbl@opt@safe{BR}}
3662 <(/More package options)>
```

`\@newl@bel` First we open a new group to keep the changed setting of `\protect` local and then we set the `@safe@actives` switch to true to make sure that any shorthand that appears in any of the arguments immediately expands to its non-active self.

```
3663 \bbl@trace{Cross referencing macros}
3664 \ifx\bbl@opt@safe\@empty\else % ie, if 'ref' and/or 'bib'
3665 \def\@newl@bel#1#2#3{%
3666   {\@safe@activetrue
3667     \bbl@ifunset{#1@#2}%
3668     \relax
3669     {\gdef\@multiplelabels{%
3670       \@latex@warning@no@line{There were multiply-defined labels}}%
3671       \@latex@warning@no@line{Label `#2' multiply defined}}%
3672     \global\@namedef{#1@#2}{#3}}}
```

`\@testdef` An internal  $\LaTeX$  macro used to test if the labels that have been written on the .aux file have changed. It is called by the `\enddocument` macro.

```
3673 \CheckCommand*\@testdef[3]{%
3674   \def\reserved@a{#3}%
3675   \expandafter\ifx\csname#1@#2\endcsname\reserved@a
3676   \else
3677     \@tempswatrue
3678   \fi}
```

Now that we made sure that `\@testdef` still has the same definition we can rewrite it. First we make the shorthands ‘safe’. Then we use `\bbl@tempa` as an ‘alias’ for the macro that contains the label which is being checked. Then we define `\bbl@tempb` just as `\@newl@bel` does it. When the label is defined we replace the definition of `\bbl@tempa` by its meaning. If the label didn’t change, `\bbl@tempa` and `\bbl@tempb` should be identical macros.

```
3679 \def\@testdef#1#2#3{% TODO. With @samestring?
3680   \@safe@activetrue
```

```

3681 \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname
3682 \def\bbl@tempb{#3}%
3683 \@safe@activesfalse
3684 \ifx\bbl@tempa\relax
3685 \else
3686 \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
3687 \fi
3688 \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
3689 \ifx\bbl@tempa\bbl@tempb
3690 \else
3691 \@tempswatrue
3692 \fi}
3693 \fi

```

\ref The same holds for the macro \ref that references a label and \pageref to reference a page. We make them robust as well (if they weren't already) to prevent problems if they should become expanded at the wrong moment.

```

3694 \bbl@xin@{R}\bbl@opt@safe
3695 \ifin@
3696 \edef\bbl@tempc{\expandafter\string\csname ref code\endcsname}%
3697 \bbl@xin@{\expandafter\strip@prefix\meaning\bbl@tempc}%
3698 {\expandafter\strip@prefix\meaning\ref}%
3699 \ifin@
3700 \bbl@redefine\@kernel@ref#1{%
3701 \@safe@activetrue\org@@kernel@ref{#1}\@safe@activesfalse}
3702 \bbl@redefine\@kernel@pageref#1{%
3703 \@safe@activetrue\org@@kernel@pageref{#1}\@safe@activesfalse}
3704 \bbl@redefine\@kernel@sref#1{%
3705 \@safe@activetrue\org@@kernel@sref{#1}\@safe@activesfalse}
3706 \bbl@redefine\@kernel@spageref#1{%
3707 \@safe@activetrue\org@@kernel@spageref{#1}\@safe@activesfalse}
3708 \else
3709 \bbl@redefineroobust\ref#1{%
3710 \@safe@activetrue\org@ref{#1}\@safe@activesfalse}
3711 \bbl@redefineroobust\pageref#1{%
3712 \@safe@activetrue\org@pageref{#1}\@safe@activesfalse}
3713 \fi
3714 \else
3715 \let\org@ref\ref
3716 \let\org@pageref\pageref
3717 \fi

```

\@citex The macro used to cite from a bibliography, \cite, uses an internal macro, \@citex. It is this internal macro that picks up the argument(s), so we redefine this internal macro and leave \cite alone. The first argument is used for typesetting, so the shorthands need only be deactivated in the second argument.

```

3718 \bbl@xin@{B}\bbl@opt@safe
3719 \ifin@
3720 \bbl@redefine\@citex[#1]#2{%
3721 \@safe@activetrue\edef\@tempa{#2}\@safe@activesfalse
3722 \org@@citex[#1]{\@tempa}}

```

Unfortunately, the packages natbib and cite need a different definition of \@citex... To begin with, natbib has a definition for \@citex with *three* arguments... We only know that a package is loaded when \begin{document} is executed, so we need to postpone the different redefinition.

```

3723 \AtBeginDocument{%
3724 \ifpackageloaded{natbib}{%

```

Notice that we use \def here instead of \bbl@redefine because \org@@citex is already defined and we don't want to overwrite that definition (it would result in parameter stack overflow because of a circular definition).

(Recent versions of natbib change dynamically \@citex, so PR4087 doesn't seem fixable in a simple way. Just load natbib before.)

```

3725 \def\@citex[#1][#2]#3{%
3726     \@safe@activestruedef\@tempa{#3}\@safe@activestruedefalse
3727     \org@@citex[#1][#2]{\@tempa}}%
3728 }{}}

```

The package cite has a definition of \@citex where the shorthands need to be turned off in both arguments.

```

3729 \AtBeginDocument{%
3730     \@ifpackageloaded{cite}{%
3731         \def\@citex[#1]#2{%
3732             \@safe@activestruedef\org@@citex[#1][#2]\@safe@activestruedefalse}%
3733         }{}}

```

`\nocite` The macro `\nocite` which is used to instruct BiBTeX to extract uncited references from the database.

```

3734 \bbl@redefine\nocite#1{%
3735     \@safe@activestruedef\org@nocite{#1}\@safe@activestruedefalse}

```

`\bibcite` The macro that is used in the .aux file to define citation labels. When packages such as natbib or cite are not loaded its second argument is used to typeset the citation label. In that case, this second argument can contain active characters but is used in an environment where \@safe@activestruedef is in effect. This switch needs to be reset inside the \hbox which contains the citation label. In order to determine during .aux file processing which definition of \bibcite is needed we define \bibcite in such a way that it redefines itself with the proper definition. We call \bbl@cite@choice to select the proper definition for \bibcite. This new definition is then activated.

```

3736 \bbl@redefine\bibcite{%
3737     \bbl@cite@choice
3738     \bibcite}

```

`\bbl@bibcite` The macro `\bbl@bibcite` holds the definition of \bibcite needed when neither natbib nor cite is loaded.

```

3739 \def\bbl@bibcite#1#2{%
3740     \org@bibcite{#1}{\@safe@activestruedefalse#2}}

```

`\bbl@cite@choice` The macro `\bbl@cite@choice` determines which definition of \bibcite is needed. First we give \bibcite its default definition.

```

3741 \def\bbl@cite@choice{%
3742     \global\let\bibcite\bbl@bibcite
3743     \@ifpackageloaded{natbib}{\global\let\bibcite\org@bibcite}}%
3744     \@ifpackageloaded{cite}{\global\let\bibcite\org@bibcite}}%
3745     \global\let\bbl@cite@choice\relax}

```

When a document is run for the first time, no .aux file is available, and \bibcite will not yet be properly defined. In this case, this has to happen before the document starts.

```

3746 \AtBeginDocument{\bbl@cite@choice}

```

`\@bibitem` One of the two internal L<sup>A</sup>T<sub>E</sub>X macros called by \bibitem that write the citation label on the .aux file.

```

3747 \bbl@redefine\@bibitem#1{%
3748     \@safe@activestruedef\org@bibitem{#1}\@safe@activestruedefalse}
3749 \else
3750     \let\org@nocite\nocite
3751     \let\org@@citex\@citex
3752     \let\org@bibcite\bibcite
3753     \let\org@bibitem\@bibitem
3754 \fi

```

## 8.2 Marks

`\markright` Because the output routine is asynchronous, we must pass the current language attribute to the head lines. To achieve this we need to adapt the definition of \markright and \markboth somewhat. However, headlines and footlines can contain text outside marks; for that we must take some actions in the output routine if the 'headfoot' options is used.

We need to make some redefinitions to the output routine to avoid an endless loop and to correctly handle the page number in bidi documents.

```

3755 \bbl@trace{Marks}
3756 \IfBabelLayout{sectioning}
3757   {\ifx\bbl@opt@headfoot\@nnil
3758     \g@addto@macro\@resetactivechars{%
3759       \set@typeset@protect
3760       \expandafter\select@language@x\expandafter{\bbl@main@language}%
3761       \let\protect\noexpand
3762       \ifcase\bbl@bidimode\else % Only with bidi. See also above
3763         \edef\thepage{%
3764           \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}%
3765       \fi}%
3766   \fi}
3767 {\ifbbl@single\else
3768   \bbl@ifunset{markright }{\bbl@redefine\bbl@redefineroobust
3769     \markright#1{%
3770       \bbl@ifblank{#1}%
3771       {\org@markright{}}}%
3772       {\toks@{#1}%
3773         \bbl@exp{%
3774           \org@markright{\protect\foreignlanguage{\language}%
3775             {\protect\bbl@restore@actives\the\toks@}}}%

```

`\markboth` The definition of `\markboth` is equivalent to that of `\markright`, except that we need two token registers. The documentclasses report and book define and set the headings for the page. While doing so they also store a copy of `\markboth` in `\mkboth`. Therefore we need to check whether `\mkboth` has already been set. If so we need to do that again with the new definition of `\markboth`. (As of Oct 2019,  $\TeX$  stores the definition in an intermediate macro, so it's not necessary anymore, but it's preserved for older versions.)

```

3776   \ifx\@mkboth\markboth
3777     \def\bbl@tempc{\let\@mkboth\markboth}%
3778   \else
3779     \def\bbl@tempc{%
3780       \fi
3781       \bbl@ifunset{markboth }{\bbl@redefine\bbl@redefineroobust
3782         \markboth#1#2{%
3783           \protected@edef\bbl@tempb##1{%
3784             \protect\foreignlanguage
3785               {\language}{\protect\bbl@restore@actives##1}}%
3786           \bbl@ifblank{#1}%
3787           {\toks@{}}%
3788           {\toks@\expandafter{\bbl@tempb{#1}}}%
3789           \bbl@ifblank{#2}%
3790           {\@temptokena{}}%
3791           {\@temptokena\expandafter{\bbl@tempb{#2}}}%
3792           \bbl@exp{\org@markboth{\the\toks@}{\the\@temptokena}}}%
3793         \bbl@tempc
3794       \fi} % end ifbbl@single, end \IfBabelLayout

```

## 8.3 Preventing clashes with other packages

### 8.3.1 ifthen

`\ifthenelse` Sometimes a document writer wants to create a special effect depending on the page a certain fragment of text appears on. This can be achieved by the following piece of code:

```

\ifthenelse{\isodd{\pageref{some:label}}}
  {code for odd pages}
  {code for even pages}

```

In order for this to work the argument of `\isodd` needs to be fully expandable. With the above redefinition of `\pageref` it is not in the case of this example. To overcome that, we add some code to the definition of `\ifthenelse` to make things work.

We want to revert the definition of `\pageref` and `\ref` to their original definition for the first argument of `\ifthenelse`, so we first need to store their current meanings.

Then we can set the `\@safe@actives` switch and call the original `\ifthenelse`. In order to be able to use shorthands in the second and third arguments of `\ifthenelse` the resetting of the switch *and* the definition of `\pageref` happens inside those arguments.

```

3795 \bbl@trace{Preventing clashes with other packages}
3796 \ifx\org@ref\undefined\else
3797   \bbl@xin@{R}\bbl@opt@safe
3798   \ifin@
3799     \AtBeginDocument{%
3800       \@ifpackageloaded{ifthen}{%
3801         \bbl@redefine@long\ifthenelse#1#2#3{%
3802           \let\bbl@temp@pref\pageref
3803           \let\pageref\org@pageref
3804           \let\bbl@temp@ref\ref
3805           \let\ref\org@ref
3806           \@safe@activestru
3807           \org@ifthenelse{#1}%
3808             {\let\pageref\bbl@temp@pref
3809              \let\ref\bbl@temp@ref
3810              \@safe@activesfalse
3811              #2}%
3812             {\let\pageref\bbl@temp@pref
3813              \let\ref\bbl@temp@ref
3814              \@safe@activesfalse
3815              #3}%
3816           }%
3817         }{}%
3818       }
3819 \fi

```

### 8.3.2 varioref

`\@vpageref` When the package `varioref` is in use we need to modify its internal command `\@vpageref` in order to prevent problems when an active character ends up in the argument of `\vref`. The same needs to happen for `\vrefpagenum`.

```

3820 \AtBeginDocument{%
3821   \@ifpackageloaded{varioref}{%
3822     \bbl@redefine\@vpageref#1[#2]#3{%
3823       \@safe@activestru
3824       \org@@@vpageref{#1}#2#3}%
3825     \@safe@activesfalse}%
3826   \bbl@redefine\vrefpagenum#1#2{%
3827     \@safe@activestru
3828     \org@vrefpagenum{#1}#2}%
3829   \@safe@activesfalse}%

```

The package `varioref` defines `\Ref` to be a robust command which uppercases the first character of the reference text. In order to be able to do that it needs to access the expandable form of `\ref`. So we employ a little trick here. We redefine the (internal) command `\Ref_` to call `\org@ref` instead of `\ref`. The disadvantage of this solution is that whenever the definition of `\Ref` changes, this definition needs to be updated as well.

```

3830   \expandafter\def\csname Ref \endcsname#1{%
3831     \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
3832   }{}%
3833 }
3834 \fi

```

### 8.3.3 hhline

`\hhline` Delaying the activation of the shorthand characters has introduced a problem with the `hhline` package. The reason is that it uses the ‘.’ character which is made active by the french support in `babel`. Therefore we need to *reload* the package when the ‘.’ is an active character. Note that this happens *after* the category code of the @-sign has been changed to other, so we need to temporarily change it to letter again.

```
3835 \AtEndOfPackage{%
3836   \AtBeginDocument{%
3837     \@ifpackageloaded{hhline}%
3838       {\expandafter\ifx\csname normal@char\string\endcsname\relax
3839         \else
3840           \makeatletter
3841           \def\@currname{hhline}\input{hhline.sty}\makeatother
3842           \fi}%
3843     {}}}
```

`\substitutefontfamily` Deprecated. Use the tools provides by `TeX`. The command `\substitutefontfamily` creates an .fd file on the fly. The first argument is an encoding mnemonic, the second and third arguments are font family names.

```
3844 \def\substitutefontfamily#1#2#3{%
3845   \lowercase{\immediate\openout15=#1#2.fd\relax}%
3846   \immediate\write15{%
3847     \string\ProvidesFile{#1#2.fd}%
3848     [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
3849     \space generated font description file]^{}J
3850     \string\DeclareFontFamily{#1}{#2}{ }^{}J
3851     \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{ }^{}J
3852     \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{ }^{}J
3853     \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{ }^{}J
3854     \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{ }^{}J
3855     \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{ }^{}J
3856     \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{ }^{}J
3857     \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{ }^{}J
3858     \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{ }^{}J
3859   }%
3860   \closeout15
3861 }
3862 \@onlypreamble\substitutefontfamily
```

## 8.4 Encoding and fonts

Because documents may use non-ASCII font encodings, we make sure that the logos of `TeX` and `TeX` always come out in the right encoding. There is a list of non-ASCII encodings. Requested encodings are currently stored in `\@fontenc@load@list`. If a non-ASCII has been loaded, we define versions of `\TeX` and `\LaTeX` for them using `\ensureascii`. The default ASCII encoding is set, too (in reverse order): the “main” encoding (when the document begins), the last loaded, or OT1.

`\ensureascii`

```
3863 \bbl@trace{Encoding and fonts}
3864 \newcommand\BabelNonASCII{LGR,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU}
3865 \newcommand\BabelNonText{TS1,T3,TS3}
3866 \let\org@TeX\TeX
3867 \let\org@LaTeX\LaTeX
3868 \let\ensureascii\@firstofone
3869 \AtBeginDocument{%
3870   \def\@elt#1{, #1,}%
3871   \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
3872   \let\@elt\relax
3873   \let\bbl@tempb\@empty
3874   \def\bbl@tempc{OT1}%
3875   \bbl@foreach\BabelNonASCII{% LGR loaded in a non-standard way
3876     \bbl@ifunset{T@#1}{ }\def\bbl@tempb{#1}}}%
```

```

3877 \bbl@foreach\bbl@tempa{%
3878 \bbl@xin@{#1}{\BabelNonASCII}%
3879 \ifin@
3880 \def\bbl@tempb{#1}% Store last non-ascii
3881 \else\bbl@xin@{#1}{\BabelNonText}% Pass
3882 \ifin@ \else
3883 \def\bbl@tempc{#1}% Store last ascii
3884 \fi
3885 \fi}%
3886 \ifx\bbl@tempb\empty\else
3887 \bbl@xin@{,\cf@encoding,}{,\BabelNonASCII,\BabelNonText,}%
3888 \ifin@ \else
3889 \edef\bbl@tempc{\cf@encoding}% The default if ascii wins
3890 \fi
3891 \edef\ensureascii#1{%
3892 {\noexpand\fontencoding{\bbl@tempc}\noexpand\selectfont#1}}%
3893 \DeclareTextCommandDefault{\TeX}{\ensureascii{\org@TeX}}%
3894 \DeclareTextCommandDefault{\LaTeX}{\ensureascii{\org@LaTeX}}%
3895 \fi}

```

Now comes the old deprecated stuff (with a little change in 3.9l, for fontspec). The first thing we need to do is to determine, at `\begin{document}`, which latin fontencoding to use.

`\latinencoding` When text is being typeset in an encoding other than ‘latin’ (OT1 or T1), it would be nice to still have Roman numerals come out in the Latin encoding. So we first assume that the current encoding at the end of processing the package is the Latin encoding.

```

3896 \AtEndOfPackage{\edef\latinencoding{\cf@encoding}}

```

But this might be overruled with a later loading of the package fontenc. Therefore we check at the execution of `\begin{document}` whether it was loaded with the T1 option. The normal way to do this (using `\ifpackageloaded`) is disabled for this package. Now we have to revert to parsing the internal macro `\@filelist` which contains all the filenames loaded.

```

3897 \AtBeginDocument{%
3898 \ifpackageloaded{fontspec}%
3899 {\xdef\latinencoding{%
3900 \ifx\UTFencname\undefined
3901 EU\ifcase\bbl@engine\or2\or1\fi
3902 \else
3903 \UTFencname
3904 \fi}}%
3905 {\gdef\latinencoding{OT1}%
3906 \ifx\cf@encoding\bbl@t@one
3907 \xdef\latinencoding{\bbl@t@one}%
3908 \else
3909 \def\@elt#1{,#1,}%
3910 \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
3911 \let\@elt\relax
3912 \bbl@xin@{,T1,}\bbl@tempa
3913 \ifin@
3914 \xdef\latinencoding{\bbl@t@one}%
3915 \fi
3916 \fi}}

```

`\latintext` Then we can define the command `\latintext` which is a declarative switch to a latin font-encoding. Usage of this macro is deprecated.

```

3917 \DeclareRobustCommand{\latintext}{%
3918 \fontencoding{\latinencoding}\selectfont
3919 \def\encodingdefault{\latinencoding}}

```

`\textlatin` This command takes an argument which is then typeset using the requested font encoding. In order to avoid many encoding switches it operates in a local scope.

```

3920 \ifx\@undefined\DeclareTextFontCommand
3921 \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}

```



```

3922 \else
3923   \DeclareTextFontCommand{\textlatin}{\latintext}
3924 \fi

```

For several functions, we need to execute some code with `\selectfont`. With  $\TeX$  2021-06-01, there is a hook for this purpose.

```

3925 \def\bbl@patchfont#1{\AddToHook{selectfont}{#1}}

```

## 8.5 Basic bidi support

**Work in progress.** This code is currently placed here for practical reasons. It will be moved to the correct place soon, I hope.

It is loosely based on `rlbabel.def`, but most of it has been developed from scratch. This `babel` module (by Johannes Braams and Boris Lavva) has served the purpose of typesetting R documents for two decades, and despite its flaws I think it is still a good starting point (some parts have been copied here almost verbatim), partly thanks to its simplicity. I’ve also looked at `ARABI` (by Youssef Jabri), which is compatible with `babel`.

There are two ways of modifying macros to make them “bidi”, namely, by patching the internal low-level macros (which is what I have done with lists, columns, counters, tocs, much like `rlbabel` did), and by introducing a “middle layer” just below the user interface (sectioning, footnotes).

- `pdfTeX` provides a minimal support for bidi text, and it must be done by hand. Vertical typesetting is not possible.
- `xetex` is somewhat better, thanks to its font engine (even if not always reliable) and a few additional tools. However, very little is done at the paragraph level. Another challenging problem is text direction does not honour  $\TeX$  grouping.
- `luatex` can provide the most complete solution, as we can manipulate almost freely the node list, the generated lines, and so on, but bidi text does not work out of the box and some development is necessary. It also provides tools to properly set left-to-right and right-to-left page layouts. As `Lua $\TeX$ -ja` shows, vertical typesetting is possible, too.

```

3926 \bbl@trace{Loading basic (internal) bidi support}
3927 \ifodd\bbl@engine
3928 \else % TODO. Move to txtbabel
3929   \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
3930     \bbl@error
3931       {The bidi method 'basic' is available only in\\%
3932       luatex. I'll continue with 'bidi=default', so\\%
3933       expect wrong results}%
3934       {See the manual for further details.}%
3935   \let\bbl@beforeforeign\leavevmode
3936   \AtEndOfPackage{%
3937     \EnableBabelHook{babel-bidi}%
3938     \bbl@xebidipar}
3939 \fi\fi
3940 \def\bbl@loadxebidi#1{%
3941   \ifx\RTLfootnotetext\@undefined
3942     \AtEndOfPackage{%
3943       \EnableBabelHook{babel-bidi}%
3944       \bbl@loadfontspec % bidi needs fontspec
3945       \usepackage#1{bidi}}%
3946   \fi}
3947 \ifnum\bbl@bidimode>200
3948   \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
3949     \bbl@tentative{bidi=bidi}
3950     \bbl@loadxebidi{}
3951   \or
3952     \bbl@loadxebidi{[rldocument]}
3953   \or
3954     \bbl@loadxebidi{}
3955   \fi
3956 \fi
3957 \fi
3958 % TODO? Separate:

```

```

3959 \ifnum\bb@bidimode=\@ne
3960   \let\bb@beforeforeign\leavevmode
3961   \ifodd\bb@engine
3962     \newattribute\bb@attr@dir
3963     \directlua{ Babel.attr_dir = luatexbase.registernumber'bb@attr@dir' }
3964     \bb@exp{\output{\bodydir\pagedir\the\output}}
3965   \fi
3966   \AtEndOfPackage{%
3967     \EnableBabelHook{babel-bidi}%
3968     \ifodd\bb@engine\else
3969       \bb@xebidipar
3970     \fi}
3971 \fi

```

Now come the macros used to set the direction when a language is switched. First the (mostly) common macros.

```

3972 \bb@trace{Macros to switch the text direction}
3973 \def\bb@alscripts{,Arabic,Syriac,Thaana,}
3974 \def\bb@rscripts{% TODO. Base on codes ??
3975   ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
3976   Old Hungarian,Lydian,Mandaean,Manichaean,%
3977   Meroitic Cursive,Meroitic,Old North Arabian,%
3978   Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
3979   Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%
3980   Old South Arabian,}%
3981 \def\bb@provide@dirs#1{%
3982   \bb@xin@{\csname bbl@sname@#1\endcsname}{\bb@alscripts\bb@rscripts}%
3983   \ifin@
3984     \global\bb@csarg\chardef{wdir@#1}\@ne
3985     \bb@xin@{\csname bbl@sname@#1\endcsname}{\bb@alscripts}%
3986     \ifin@
3987       \global\bb@csarg\chardef{wdir@#1}\tw@ % useless in xetex
3988     \fi
3989   \else
3990     \global\bb@csarg\chardef{wdir@#1}\z@
3991   \fi
3992   \ifodd\bb@engine
3993     \bb@csarg\ifcase{wdir@#1}%
3994       \directlua{ Babel.locale_props[\the\localeid].textdir = 'l' }%
3995     \or
3996       \directlua{ Babel.locale_props[\the\localeid].textdir = 'r' }%
3997     \or
3998       \directlua{ Babel.locale_props[\the\localeid].textdir = 'al' }%
3999     \fi
4000   \fi}
4001 \def\bb@switchdir{%
4002   \bb@ifunset{bb@lsys@\languagename}{\bb@provide@lsys{\languagename}}{}%
4003   \bb@ifunset{bb@wdir@\languagename}{\bb@provide@dirs{\languagename}}{}%
4004   \bb@exp{\bb@setdirs\bb@cl{wdir}}
4005 \def\bb@setdirs#1{% TODO - math
4006   \ifcase\bb@select@type % TODO - strictly, not the right test
4007     \bb@bodydir{#1}%
4008     \bb@pardir{#1}% <- Must precede \bb@textdir
4009   \fi
4010   \bb@textdir{#1}}
4011 % TODO. Only if \bb@bidimode > 0?:
4012 \AddBabelHook{babel-bidi}{afterextras}{\bb@switchdir}
4013 \DisableBabelHook{babel-bidi}

```

Now the engine-dependent macros. TODO. Must be moved to the engine files.

```

4014 \ifodd\bb@engine % luatex=1
4015 \else % pdftex=0, xetex=2
4016   \newcount\bb@dirlevel
4017   \chardef\bb@thetextdir\z@

```

```

4018 \chardef\bbl@thepardir\z@
4019 \def\bbl@textdir#1{%
4020   \ifcase#1\relax
4021     \chardef\bbl@thetextdir\z@
4022     \bbl@textdir@i\begin\endL
4023   \else
4024     \chardef\bbl@thetextdir\@ne
4025     \bbl@textdir@i\beginR\endR
4026   \fi}
4027 \def\bbl@textdir@i#1#2{%
4028   \ifhmode
4029     \ifnum\currentgrouplevel>\z@
4030       \ifnum\currentgrouplevel=\bbl@dirlevel
4031         \bbl@error{Multiple bidi settings inside a group}%
4032         {I'll insert a new group, but expect wrong results.}%
4033         \bgroup\aftergroup#2\aftergroup\egroup
4034       \else
4035         \ifcase\currentgrouptype\or % 0 bottom
4036           \aftergroup#2% 1 simple {}
4037         \or
4038           \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
4039         \or
4040           \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
4041           \or\or\or % vbox vtop align
4042         \or
4043           \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
4044           \or\or\or\or\or\or % output math disc insert vcent mathchoice
4045         \or
4046           \aftergroup#2% 14 \begingroup
4047       \else
4048         \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
4049       \fi
4050     \fi
4051     \bbl@dirlevel\currentgrouplevel
4052   \fi
4053   #1%
4054 \fi}
4055 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
4056 \let\bbl@bodydir@gobble
4057 \let\bbl@pagedir@gobble
4058 \def\bbl@dirparastext{\chardef\bbl@thepardir\bbl@thetextdir}

```

The following command is executed only if there is a right-to-left script (once). It activates the `\everypar` hack for xetex, to properly handle the par direction. Note text and par dirs are decoupled to some extent (although not completely).

```

4059 \def\bbl@xebidipar{%
4060   \let\bbl@xebidipar\relax
4061   \TeXeTstate\@ne
4062   \def\bbl@xeeverypar{%
4063     \ifcase\bbl@thepardir
4064       \ifcase\bbl@thetextdir\else\beginR\fi
4065     \else
4066       {\setbox\z@\lastbox\beginR\box\z@}%
4067     \fi}%
4068   \let\bbl@severypar\everypar
4069   \newtoks\everypar
4070   \everypar=\bbl@severypar
4071   \bbl@severypar{\bbl@xeeverypar\the\everypar}}
4072 \ifnum\bbl@bidimode>200
4073   \let\bbl@textdir@i@gobbletwo
4074   \let\bbl@xebidipar@empty
4075   \AddBabelHook{bidi}{foreign}{%
4076     \def\bbl@tempa{\def\BabelText####1}%

```

```

4077 \ifcase\bbl@thetextdir
4078 \expandafter\bbl@tempa\expandafter{\BabelText{\LR{##1}}}%
4079 \else
4080 \expandafter\bbl@tempa\expandafter{\BabelText{\RL{##1}}}%
4081 \fi}
4082 \def\bbl@pardir#1{\ifcase#1\relax\setLR\else\setRL\fi}
4083 \fi
4084 \fi

```

A tool for weak L (mainly digits). We also disable warnings with hyperref.

```

4085 \DeclareRobustCommand\babelsublr[1]{\leavevmode{\bbl@textdir\z@#1}}
4086 \AtBeginDocument{%
4087 \ifx\pdfstringdefDisableCommands\@undefined\else
4088 \ifx\pdfstringdefDisableCommands\relax\else
4089 \pdfstringdefDisableCommands{\let\babelsublr\@firstofone}%
4090 \fi
4091 \fi}

```

## 8.6 Local Language Configuration

`\loadlocalcfg` At some sites it may be necessary to add site-specific actions to a language definition file. This can be done by creating a file with the same name as the language definition file, but with the extension `.cfg`. For instance the file `norsk.cfg` will be loaded when the language definition file `norsk.ldf` is loaded.

For plain-based formats we don't want to override the definition of `\loadlocalcfg` from `plain.def`.

```

4092 \bbl@trace{Local Language Configuration}
4093 \ifx\loadlocalcfg\@undefined
4094 \@ifpackagewith{babel}{noconfigs}%
4095 {\let\loadlocalcfg\@gobble}%
4096 {\def\loadlocalcfg#1{%
4097 \InputIfFileExists{#1.cfg}%
4098 {\typeout{*****^J%
4099 * Local config file #1.cfg used^^J%
4100 *}}%
4101 \@empty}}
4102 \fi

```

## 8.7 Language options

Languages are loaded when processing the corresponding option *except* if a main language has been set. In such a case, it is not loaded until all options has been processed. The following macro inputs the `ldf` file and does some additional checks (`\input` works, too, but possible errors are not caught).

```

4103 \bbl@trace{Language options}
4104 \let\bbl@afterlang\relax
4105 \let\BabelModifiers\relax
4106 \let\bbl@loaded\@empty
4107 \def\bbl@load@language#1{%
4108 \InputIfFileExists{#1.ldf}%
4109 {\edef\bbl@loaded{\CurrentOption
4110 \ifx\bbl@loaded\@empty\else,\bbl@loaded\fi}%
4111 \expandafter\let\expandafter\bbl@afterlang
4112 \csname\CurrentOption.ldf-h@k\endcsname
4113 \expandafter\let\expandafter\BabelModifiers
4114 \csname\bbl@mod@\CurrentOption\endcsname}%
4115 {\bbl@error{%
4116 Unknown option '\CurrentOption'. Either you misspelled it\\%
4117 or the language definition file \CurrentOption.ldf was not found}%
4118 Valid options are, among others: shorthands=, KeepShorthandsActive,\\%
4119 activeacute, activegrave, noconfigs, safe=, main=, math=\\%
4120 headfoot=, strings=, config=, hyphenmap=, or a language name.}}

```

Now, we set a few language options whose names are different from ldf files. These declarations are preserved for backwards compatibility, but they must be eventually removed. Use proxy files instead.

```

4121 \def\bbl@try@load@lang#1#2#3{%
4122   \IfFileExists{\CurrentOption.lda}%
4123   {\bbl@load@language{\CurrentOption}}%
4124   {#1\bbl@load@language{#2}#3}}
4125 %
4126 \DeclareOption{hebrew}{%
4127   \input{rlbabel.def}%
4128   \bbl@load@language{hebrew}}
4129 \DeclareOption{hungarian}{\bbl@try@load@lang{magyar}}
4130 \DeclareOption{lowersorbian}{\bbl@try@load@lang{lsorbian}}
4131 \DeclareOption{nynorsk}{\bbl@try@load@lang{norsk}}
4132 \DeclareOption{polutonikogreek}{%
4133   \bbl@try@load@lang{greek}{\languageattribute{greek}{polutoniko}}}
4134 \DeclareOption{russian}{\bbl@try@load@lang{russianb}}
4135 \DeclareOption{ukrainian}{\bbl@try@load@lang{ukraineb}}
4136 \DeclareOption{uppersorbian}{\bbl@try@load@lang{usorbian}}

```

Another way to extend the list of ‘known’ options for babel was to create the file `bblopts.cfg` in which one can add option declarations. However, this mechanism is deprecated – if you want an alternative name for a language, just create a new .lda file loading the actual one. You can also set the name of the file with the package option `config=<name>`, which will load `<name>.lda` instead.

```

4137 \ifx\bbl@opt@config\@nnil
4138   \@ifpackagewith{babel}{noconfigs}}%
4139   {\InputIfFileExists{bblopts.cfg}%
4140     {\typeout{*****^J%
4141               * Local config file bblopts.cfg used^J%
4142               *}}%
4143     {}}%
4144 \else
4145   \InputIfFileExists{\bbl@opt@config.cfg}%
4146   {\typeout{*****^J%
4147             * Local config file \bbl@opt@config.cfg used^J%
4148             *}}%
4149   {\bbl@error{%
4150     Local config file '\bbl@opt@config.cfg' not found}%
4151     Perhaps you misspelled it.}}%
4152 \fi

```

Recognizing global options in packages not having a closed set of them is not trivial, as for them to be processed they must be defined explicitly. So, package options not yet taken into account and stored in `bbl@language@opts` are assumed to be languages. If not declared above, the names of the option and the file are the same. We first pre-process the class and package options to determine the main language, which is processed in the third ‘main’ pass, *except* if all files are lda *and* there is no main key. In the latter case (`\bbl@opt@main` is still `\@nnil`), the traditional way to set the main language is kept — the last loaded is the main language.

```

4153 \ifx\bbl@opt@main\@nnil
4154   \ifnum\bbl@iniflag>\z@ % if all lda's: set implicitly, no main pass
4155     \let\bbl@tempb\@empty
4156     \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}%
4157     \bbl@foreach\bbl@tempa{\edef\bbl@tempb{#1,\bbl@tempb}}%
4158     \bbl@foreach\bbl@tempb{\bbl@tempb is a reversed list
4159       \ifx\bbl@opt@main\@nnil % ie, if not yet assigned
4160         \ifodd\bbl@iniflag % =
4161           \IfFileExists{babel-#1.tex}{\def\bbl@opt@main{#1}}}%
4162         \else % n +=
4163           \IfFileExists{#1.lda}{\def\bbl@opt@main{#1}}}%
4164       \fi
4165     \fi}%
4166 \fi
4167 \else

```

```

4168 \bbl@info{Main language set with 'main='. Except if you have\\%
4169         problems, prefer the default mechanism for setting\\%
4170         the main language. Reported}
4171 \fi

```

A few languages are still defined explicitly. They are stored in case they are needed in the ‘main’ pass (the value can be \relax).

```

4172 \ifx\bbl@opt@main@nnil\else
4173   \bbl@ncarg\let\bbl@loadmain{ds@\bbl@opt@main}%
4174   \expandafter\let\csname ds@\bbl@opt@main\endcsname\relax
4175 \fi

```

Now define the corresponding loaders. With package options, assume the language exists. With class options, check if the option is a language by checking if the correspondin file exists.

```

4176 \bbl@foreach\bbl@language@opts{%
4177   \def\bbl@tempa{#1}%
4178   \ifx\bbl@tempa\bbl@opt@main\else
4179     \ifnum\bbl@iniflag<\tw@ % 0 0 (other = ldf)
4180       \bbl@ifunset{ds@#1}%
4181       {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4182       {}%
4183     \else % + * (other = ini)
4184       \DeclareOption{#1}{%
4185         \bbl@ldfinit
4186         \babelprovide[import]{#1}%
4187         \bbl@afterldf{}}%
4188     \fi
4189   \fi}
4190 \bbl@foreach\@classoptionslist{%
4191   \def\bbl@tempa{#1}%
4192   \ifx\bbl@tempa\bbl@opt@main\else
4193     \ifnum\bbl@iniflag<\tw@ % 0 0 (other = ldf)
4194       \bbl@ifunset{ds@#1}%
4195       {\IfFileExists{#1.ldf}%
4196        {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4197        {}}%
4198     \else % + * (other = ini)
4199       \IfFileExists{babel-#1.tex}%
4200       {\DeclareOption{#1}{%
4201         \bbl@ldfinit
4202         \babelprovide[import]{#1}%
4203         \bbl@afterldf{}}}%
4204       {}%
4205     \fi
4206   \fi}
4207 \fi}

```

And we are done, because all options for this pass has been declared. Those already processed in the first pass are just ignored.

The options have to be processed in the order in which the user specified them (but remember class options are processes before):

```

4208 \def\AfterBabelLanguage#1{%
4209   \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang{}}
4210   \DeclareOption*{}
4211   \ProcessOptions*

```

This finished the second pass. Now the third one begins, which loads the main language set with the key main. A warning is raised if the main language is not the same as the last named one, or if the value of the key main is not a language. With some options in provide, the package luatexbase is loaded (and immediately used), and therefore \babelprovide can’t go inside a \DeclareOption; this explains why it’s executed directly, with a dummy declaration. Then all languages have been loaded, so we deactivate \AfterBabelLanguage.

```

4212 \bbl@trace{Option 'main'}
4213 \ifx\bbl@opt@main@nnil

```

```

4214 \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
4215 \let\bbl@tempc\@empty
4216 \edef\bbl@templ{\bbl@loaded,}
4217 \edef\bbl@templ{\expandafter\strip@prefix\meaning\bbl@templ}
4218 \bbl@for\bbl@tempb\bbl@tempa{%
4219   \edef\bbl@tempd{\bbl@tempb,}%
4220   \edef\bbl@tempd{\expandafter\strip@prefix\meaning\bbl@tempd}%
4221   \bbl@xin{\bbl@tempd}{\bbl@templ}%
4222   \ifin\edef\bbl@tempc{\bbl@tempb}\fi}
4223 \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
4224 \expandafter\bbl@tempa\bbl@loaded,\@nnil
4225 \ifx\bbl@tempb\bbl@tempc\else
4226   \bbl@warning{%
4227     Last declared language option is '\bbl@tempc',\%
4228     but the last processed one was '\bbl@tempb'.\%
4229     The main language can't be set as both a global\%
4230     and a package option. Use 'main=\bbl@tempc' as\%
4231     option. Reported}
4232   \fi
4233 \else
4234   \ifodd\bbl@iniflag % case 1,3 (main is ini)
4235     \bbl@ldfinit
4236     \let\CurrentOption\bbl@opt@main
4237     \bbl@exp{% \bbl@opt@provide = empty if *
4238       \\babelprovide[\bbl@opt@provide,import,main]{\bbl@opt@main}}%
4239     \bbl@afterldf{}
4240     \DeclareOption{\bbl@opt@main}{}
4241   \else % case 0,2 (main is ldf)
4242     \ifx\bbl@loadmain\relax
4243       \DeclareOption{\bbl@opt@main}{\bbl@load@language{\bbl@opt@main}}
4244     \else
4245       \DeclareOption{\bbl@opt@main}{\bbl@loadmain}
4246     \fi
4247     \ExecuteOptions{\bbl@opt@main}
4248     \@namedef{ds@\bbl@opt@main}{}%
4249   \fi
4250   \DeclareOption*{}
4251   \ProcessOptions*
4252 \fi
4253 \def\AfterBabelLanguage{%
4254   \bbl@error
4255   {Too late for \string\AfterBabelLanguage}%
4256   {Languages have been loaded, so I can do nothing}}
In order to catch the case where the user didn't specify a language we check whether
\bbl@main@language, has become defined. If not, the nil language is loaded.
4257 \ifx\bbl@main@language\@undefined
4258   \bbl@info{%
4259     You haven't specified a language as a class or package\%
4260     option. I'll load 'nil'. Reported}
4261   \bbl@load@language{nil}
4262 \fi
4263 \</package>

```

## 9 The kernel of Babel (babel.def, common)

The kernel of the babel system is currently stored in babel.def. The file babel.def contains most of the code. The file hyphen.cfg is a file that can be loaded into the format, which is necessary when you want to be able to switch hyphenation patterns.

Because plain T<sub>E</sub>X users might want to use some of the features of the babel system too, care has to be taken that plain T<sub>E</sub>X can process the files. For this reason the current format will have to be checked in a number of places. Some of the code below is common to plain T<sub>E</sub>X and L<sup>A</sup>T<sub>E</sub>X, some of it is for the L<sup>A</sup>T<sub>E</sub>X case only.

Plain formats based on etex (etex, xetex, luatex) don't load hyphen.cfg but etex.src, which follows a different naming convention, so we need to define the babel names. It presumes language.def exists and it is the same file used when formats were created.

A proxy file for switch.def

```
4264 <*kernel>
4265 \let\bbl@onlyswitch\@empty
4266 \input babel.def
4267 \let\bbl@onlyswitch\@undefined
4268 </kernel>
4269 <*patterns>
```

## 10 Loading hyphenation patterns

The following code is meant to be read by init<sub>TeX</sub> because it should instruct <sub>TeX</sub> to read hyphenation patterns. To this end the docstrip option patterns is used to include this code in the file hyphen.cfg. Code is written with lower level macros.

```
4270 <<Make sure ProvidesFile is defined>>
4271 \ProvidesFile{hyphen.cfg}[\<<date>>] \<<version>> Babel hyphens]
4272 \xdef\bbl@format{\jobname}
4273 \def\bbl@version{\<<version>>}
4274 \def\bbl@date{\<<date>>}
4275 \ifx\AtBeginDocument\@undefined
4276   \def\@empty{}
4277 \fi
4278 <<Define core switching macros>>
```

`\process@line` Each line in the file language.dat is processed by `\process@line` after it is read. The first thing this macro does is to check whether the line starts with =. When the first token of a line is an =, the macro `\process@synonym` is called; otherwise the macro `\process@language` will continue.

```
4279 \def\process@line#1#2 #3 #4 {%
4280   \ifx=#1%
4281     \process@synonym{#2}%
4282   \else
4283     \process@language{#1#2}{#3}{#4}%
4284   \fi
4285   \ignorespaces}
```

`\process@synonym` This macro takes care of the lines which start with an =. It needs an empty token register to begin with. `\bbl@languages` is also set to empty.

```
4286 \toks@{}
4287 \def\bbl@languages{}
```

When no languages have been loaded yet, the name following the = will be a synonym for hyphenation register 0. So, it is stored in a token register and executed when the first pattern file has been processed. (The `\relax` just helps to the `\if` below catching synonyms without a language.) Otherwise the name will be a synonym for the language loaded last. We also need to copy the hyphenmin parameters for the synonym.

```
4288 \def\process@synonym#1{%
4289   \ifnum\last@language=\m@ne
4290     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
4291   \else
4292     \expandafter\chardef\csname l@#1\endcsname\last@language
4293     \wlog{\string\l@#1=\string\language\the\last@language}%
4294     \expandafter\let\csname #1hyphenmins\endcsname\expandafter\endcsname
4295     \csname\language\endcsname hyphenmins\endcsname
4296     \let\bbl@elt\relax
4297     \edef\bbl@languages{\bbl@languages\bbl@elt{#1}{\the\last@language}}}%
4298   \fi}
```

`\process@language` The macro `\process@language` is used to process a non-empty line from the 'configuration file'. It has three arguments, each delimited by white space. The first argument is the 'name' of a language;



the second is the name of the file that contains the patterns. The optional third argument is the name of a file containing hyphenation exceptions.

The first thing to do is call `\addlanguage` to allocate a pattern register and to make that register ‘active’. Then the pattern file is read.

For some hyphenation patterns it is needed to load them with a specific font encoding selected. This can be specified in the file `language.dat` by adding for instance ‘:T1’ to the name of the language.

The macro `\bbl@get@enc` extracts the font encoding from the language name and stores it in `\bbl@hyph@enc`. The latter can be used in hyphenation files if you need to set a behavior depending on the given encoding (it is set to empty if no encoding is given).

Pattern files may contain assignments to `\lefthyphenmin` and `\righthyphenmin`. T<sub>E</sub>X does not keep track of these assignments. Therefore we try to detect such assignments and store them in the `\(lang)hyphenmins` macro. When no assignments were made we provide a default setting.

Some pattern files contain changes to the `\lccode` en `\uccode` arrays. Such changes should remain local to the language; therefore we process the pattern file in a group; the `\patterns` command acts globally so its effect will be remembered.

Then we globally store the settings of `\lefthyphenmin` and `\righthyphenmin` and close the group.

When the hyphenation patterns have been processed we need to see if a file with hyphenation exceptions needs to be read. This is the case when the third argument is not empty and when it does not contain a space token. (Note however there is no need to save hyphenation exceptions into the format.)

`\bbl@languages` saves a snapshot of the loaded languages in the form

`\bbl@elt{<language-name>}{<number>}{<patterns-file>}{<exceptions-file>}`. Note the last 2

arguments are empty in ‘dialects’ defined in `language.dat` with `=`. Note also the language name can have encoding info.

Finally, if the counter `\language` is equal to zero we execute the synonyms stored.

```

4299 \def\process@language#1#2#3{%
4300   \expandafter\addlanguage\csname l@#1\endcsname
4301   \expandafter\language\csname l@#1\endcsname
4302   \edef\language#1{%
4303     \bbl@hook@everylanguage{#1}%
4304     % > luatex
4305     \bbl@get@enc#1::\@@@
4306     \begingroup
4307       \lefthyphenmin\m@ne
4308       \bbl@hook@loadpatterns{#2}%
4309       % > luatex
4310       \ifnum\lefthyphenmin=\m@ne
4311       \else
4312         \expandafter\xdef\csname #1hyphenmins\endcsname{%
4313           \the\lefthyphenmin\the\righthyphenmin}%
4314         \fi
4315       \endgroup
4316       \def\bbl@tempa{#3}%
4317       \ifx\bbl@tempa\@empty\else
4318         \bbl@hook@loadexceptions{#3}%
4319         % > luatex
4320       \fi
4321       \let\bbl@elt\relax
4322       \edef\bbl@languages{%
4323         \bbl@languages\bbl@elt{#1}{\the\language}{#2}{\bbl@tempa}}%
4324       \ifnum\the\language=\z@
4325         \expandafter\ifx\csname #1hyphenmins\endcsname\relax
4326           \set@hyphenmins\tw@\thr@@\relax
4327         \else
4328           \expandafter\expandafter\expandafter\set@hyphenmins
4329             \csname #1hyphenmins\endcsname
4330         \fi
4331         \the\toks@
4332         \toks@{}%
4333       \fi}

```

`\bbl@get@enc` The macro `\bbl@get@enc` extracts the font encoding from the language name and stores it in `\bbl@hyph@enc`. It uses delimited arguments to achieve this.

```
4334 \def\bbl@get@enc#1:#2:#3\@@@\def\bbl@hyph@enc{#2}}
```

Now, hooks are defined. For efficiency reasons, they are dealt here in a special way. Besides luatex, format-specific configuration files are taken into account. loadkernel currently loads nothing, but define some basic macros instead.

```
4335 \def\bbl@hook@everylanguage#1{}
4336 \def\bbl@hook@loadpatterns#1{\input #1\relax}
4337 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
4338 \def\bbl@hook@loadkernel#1{%
4339   \def\addlanguage{\csname newlanguage\endcsname}%
4340   \def\adddialect##1##2{%
4341     \global\chardef##1##2\relax
4342     \wlog{\string##1 = a dialect from \string\language##2}}%
4343   \def\iflanguage##1{%
4344     \expandafter\ifx\csname l@##1\endcsname\relax
4345       \nolanerr{##1}%
4346     \else
4347       \ifnum\csname l@##1\endcsname=\language
4348         \expandafter\expandafter\expandafter\@firstoftwo
4349       \else
4350         \expandafter\expandafter\expandafter\@secondoftwo
4351       \fi
4352     \fi}%
4353   \def\providehyphenmins##1##2{%
4354     \expandafter\ifx\csname ##1hyphenmins\endcsname\relax
4355       \@namedef{##1hyphenmins}{##2}%
4356     \fi}%
4357   \def\set@hyphenmins##1##2{%
4358     \lefthyphenmin##1\relax
4359     \righthyphenmin##2\relax}%
4360   \def\selectlanguage{%
4361     \errhelp{Selecting a language requires a package supporting it}%
4362     \errmessage{Not loaded}}%
4363   \let\foreignlanguage\selectlanguage
4364   \let\otherlanguage\selectlanguage
4365   \expandafter\let\csname otherlanguage*\endcsname\selectlanguage
4366   \def\bbl@usehooks##1##2{}% TODO. Temporary!!
4367   \def\setlocale{%
4368     \errhelp{Find an armchair, sit down and wait}%
4369     \errmessage{Not yet available}}%
4370   \let\uselocale\setlocale
4371   \let\locale\setlocale
4372   \let\selectlocale\setlocale
4373   \let\localename\setlocale
4374   \let\textlocale\setlocale
4375   \let\textlanguage\setlocale
4376   \let\languagetext\setlocale}
4377 \begingroup
4378   \def\AddBabelHook#1#2{%
4379     \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
4380       \def\next{\toks1}%
4381     \else
4382       \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname####1}%
4383     \fi
4384     \next}
4385   \ifx\directlua@undefined
4386     \ifx\XeTeXinputencoding@undefined\else
4387       \input xebabel.def
4388     \fi
4389   \else
4390     \input luababel.def
4391   \fi
4392   \openin1 = babel-\bbl@format.cfg
```

```

4393 \ifeof1
4394 \else
4395 \input babel-\bbl@format.cfg\relax
4396 \fi
4397 \closein1
4398 \endgroup
4399 \bbl@hook@loadkernel{switch.def}

```

\readconfigfile The configuration file can now be opened for reading.

```
4400 \openin1 = language.dat
```

See if the file exists, if not, use the default hyphenation file hyphen.tex. The user will be informed about this.

```

4401 \def\language{english}%
4402 \ifeof1
4403 \message{I couldn't find the file language.dat,\space
4404         I will try the file hyphen.tex}
4405 \input hyphen.tex\relax
4406 \chardef\l@english\z@
4407 \else

```

Pattern registers are allocated using count register \last@language. Its initial value is 0. The definition of the macro \newlanguage is such that it first increments the count register and then defines the language. In order to have the first patterns loaded in pattern register number 0 we initialize \last@language with the value -1.

```
4408 \last@language\m@ne
```

We now read lines from the file until the end is found. While reading from the input, it is useful to switch off recognition of the end-of-line character. This saves us stripping off spaces from the contents of the control sequence.

```

4409 \loop
4410 \endlinechar\m@ne
4411 \read1 to \bbl@line
4412 \endlinechar``^^M

```

If the file has reached its end, exit from the loop here. If not, empty lines are skipped. Add 3 space characters to the end of \bbl@line. This is needed to be able to recognize the arguments of \process@line later on. The default language should be the very first one.

```

4413 \if T\ifeof1F\fi T\relax
4414 \ifx\bbl@line\@empty\else
4415 \edef\bbl@line{\bbl@line\space\space\space}%
4416 \expandafter\process@line\bbl@line\relax
4417 \fi
4418 \repeat

```

Check for the end of the file. We must reverse the test for \ifeof without \else. Then reactivate the default patterns, and close the configuration file.

```

4419 \begingroup
4420 \def\bbl@elt#1#2#3#4{%
4421 \global\language=#2\relax
4422 \gdef\language{#1}%
4423 \def\bbl@elt##1##2##3##4{}}%
4424 \bbl@languages
4425 \endgroup
4426 \fi
4427 \closein1

```

We add a message about the fact that babel is loaded in the format and with which language patterns to the \everyjob register.

```

4428 \if/\the\toks@\else
4429 \errhelp{language.dat loads no language, only synonyms}
4430 \errmessage{Orphan language synonym}
4431 \fi

```

Also remove some macros from memory and raise an error if \toks@ is not empty. Finally load switch.def, but the latter is not required and the line inputting it may be commented out.

```

4432 \let\bbl@line\@undefined
4433 \let\process@line\@undefined
4434 \let\process@synonym\@undefined
4435 \let\process@language\@undefined
4436 \let\bbl@get@enc\@undefined
4437 \let\bbl@hyph@enc\@undefined
4438 \let\bbl@tempa\@undefined
4439 \let\bbl@hook@loadkernel\@undefined
4440 \let\bbl@hook@everylanguage\@undefined
4441 \let\bbl@hook@loadpatterns\@undefined
4442 \let\bbl@hook@loadexceptions\@undefined
4443 </patterns>

```

Here the code for init $\TeX$  ends.

## 11 Font handling with fontspec

Add the bidi handler just before luaoffload, which is loaded by default by LaTeX. Just in case, consider the possibility it has not been loaded. First, a couple of definitions related to bidi [misplaced].

```

4444 <(*More package options)> \equiv
4445 \chardef\bbl@bidimode\z@
4446 \DeclareOption{bidi=default}{\chardef\bbl@bidimode=\@ne}
4447 \DeclareOption{bidi=basic}{\chardef\bbl@bidimode=101 }
4448 \DeclareOption{bidi=basic-r}{\chardef\bbl@bidimode=102 }
4449 \DeclareOption{bidi=bidi}{\chardef\bbl@bidimode=201 }
4450 \DeclareOption{bidi=bidi-r}{\chardef\bbl@bidimode=202 }
4451 \DeclareOption{bidi=bidi-l}{\chardef\bbl@bidimode=203 }
4452 <(/More package options)>

```

With explicit languages, we could define the font at once, but we don't. Just wait and see if the language is actually activated. bbl@font replaces hardcoded font names inside \. . family by the corresponding macro \. . default.

At the time of this writing, fontspec shows a warning about there are languages not available, which some people think refers to babel, even if there is nothing wrong. Here is hack to patch fontspec to avoid the misleading (and mostly useless) message.

```

4453 <(*Font selection)> \equiv
4454 \bbl@trace{Font handling with fontspec}
4455 \ifx\ExplSyntaxOn\@undefined\else
4456   \def\bbl@fs@warn@nx#1#2{\bbl@tempfs is the original macro
4457     \in@{, #1, }, {, no-script, language-not-exist, }%
4458     \ifin\else\bbl@tempfs@nx{#1}{#2}\fi}
4459   \def\bbl@fs@warn@nxx#1#2#3{\bbl@tempfs
4460     \in@{, #1, }, {, no-script, language-not-exist, }%
4461     \ifin\else\bbl@tempfs@nxx{#1}{#2}{#3}\fi}
4462   \def\bbl@loadfontspec{%
4463     \let\bbl@loadfontspec\relax
4464     \ifx\fontspec\@undefined
4465       \usepackage{fontspec}%
4466       \fi}%
4467 \fi
4468 \@onlypreamble\babelfont
4469 \newcommand\babelfont[2][{}]{% 1=langs/scripts 2=fam
4470   \bbl@foreach{#1}{%
4471     \expandafter\ifx\csname date##1\endcsname\relax
4472       \IfFileExists{babel-##1.tex}%
4473       {\babelprovide{##1}}%
4474       {}%
4475     \fi}%
4476   \edef\bbl@tempa{#1}%
4477   \def\bbl@tempb{#2}% Used by \bbl@bblfont

```

```

4478 \bbl@loadfontspec
4479 \EnableBabelHook{babel-fontspec}% Just calls \bbl@switchfont
4480 \bbl@bblfont}
4481 \newcommand\bbl@bblfont[2][{}]{% 1=features 2=fontname, @font=rm|sf|tt
4482 \bbl@ifunset{\bbl@tempb family}%
4483 {\bbl@providfam{\bbl@tempb}}%
4484 {}%
4485 % For the default font, just in case:
4486 \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
4487 \expandafter\bbl@ifblank\expandafter{\bbl@tempa}%
4488 {\bbl@csarg\edef{\bbl@tempb dflt@}{<{#1}{#2}}% save bbl@rmdflt@
4489 \bbl@exp{%
4490 \let<\bbl@tempb dflt@\languagename>\<\bbl@tempb dflt@>%
4491 \<\bbl@font@set<\bbl@tempb dflt@\languagename>%
4492 \<\bbl@tempb default>\<\bbl@tempb family>}}%
4493 {\bbl@foreach\bbl@tempa{% ie bbl@rmdflt@lang / *scrt
4494 \bbl@csarg\def{\bbl@tempb dflt@##1}{<{#1}{#2}}}}%

```

If the family in the previous command does not exist, it must be defined. Here is how:

```

4495 \def\bbl@providfam#1{%
4496 \bbl@exp{%
4497 \<\newcommand<#1default>{}% Just define it
4498 \<\bbl@add@list<\bbl@font@fams{#1}%
4499 \<\DeclareRobustCommand<#1family>{%
4500 \<\not@math@alphabet<#1family>\relax
4501 % \<\prepare@family@series@update{#1}<#1default>% TODO. Fails
4502 \<\fontfamily<#1default>%
4503 \<\ifx>\<\UseHooks<\<\undefined>\<else>\<\UseHook{#1family}<\<fi>%
4504 \<\selectfont}%
4505 \<\DeclareTextFontCommand{\<text#1>}{<#1family>}}%

```

The following macro is activated when the hook babel-fontspec is enabled. But before, we define a macro for a warning, which sets a flag to avoid duplicate them.

```

4506 \def\bbl@nostdfont#1{%
4507 \bbl@ifunset{\bbl@WFF@\f@family}%
4508 {\bbl@csarg\gdef{WFF@\f@family}}% Flag, to avoid dupl warns
4509 \bbl@infowarn{The current font is not a babel standard family:\%
4510 #1%
4511 \fontname\font\%
4512 There is nothing intrinsically wrong with this warning, and\%
4513 you can ignore it altogether if you do not need these\%
4514 families. But if they are used in the document, you should be\%
4515 aware 'babel' will not set Script and Language for them, so\%
4516 you may consider defining a new family with \string\babelfont.\%
4517 See the manual for further details about \string\babelfont.\%
4518 Reported}}
4519 {}%
4520 \gdef\bbl@switchfont{%
4521 \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
4522 \bbl@exp{% eg Arabic -> arabic
4523 \lowercase{\edef\bbl@tempa{\bbl@cl{sname}}}}%
4524 \bbl@foreach\bbl@font@fams{%
4525 \bbl@ifunset{\bbl@##1dflt@\languagename}% (1) language?
4526 {\bbl@ifunset{\bbl@##1dflt@*\bbl@tempa}% (2) from script?
4527 {\bbl@ifunset{\bbl@##1dflt@}% 2=F - (3) from generic?
4528 {}% 123=F - nothing!
4529 {\bbl@exp{% 3=T - from generic
4530 \global\let<\bbl@##1dflt@\languagename>%
4531 \<\bbl@##1dflt@>}}%
4532 {\bbl@exp{% 2=T - from script
4533 \global\let<\bbl@##1dflt@\languagename>%
4534 \<\bbl@##1dflt@*\bbl@tempa>}}}%
4535 {}% 1=T - language, already defined
4536 \def\bbl@tempa{\bbl@nostdfont}}% TODO. Don't use \bbl@tempa

```

```

4537 \bbl@foreach\bbl@font@fams{%      don't gather with prev for
4538 \bbl@ifunset{\bbl@##1dflt@\language}%
4539 {\bbl@cs{famrst@##1}%
4540 \global\bbl@csarg\let{famrst@##1}\relax}%
4541 {\bbl@exp{% order is relevant. TODO: but sometimes wrong!
4542 \\\bbl@add\\\originalTeX{%
4543 \\\bbl@font@rst{\bbl@cl{##1dflt}}%
4544 \<##1default>\<##1family>{##1}}%
4545 \\\bbl@font@set{\bbl@##1dflt@\language}% the main part!
4546 \<##1default>\<##1family>}}}%
4547 \bbl@ifrestoring{{\bbl@tempa}}%

```

The following is executed at the beginning of the aux file or the document to warn about fonts not defined with `\babelfont`.

```

4548 \ifx\@family\undefined\else      % if latex
4549 \ifcase\bbl@engine                % if pdftex
4550 \let\bbl@ckeckstdfonts\relax
4551 \else
4552 \def\bbl@ckeckstdfonts{%
4553 \begingroup
4554 \global\let\bbl@ckeckstdfonts\relax
4555 \let\bbl@tempa\@empty
4556 \bbl@foreach\bbl@font@fams{%
4557 \bbl@ifunset{\bbl@##1dflt@}%
4558 {\@nameuse{##1family}%
4559 \bbl@csarg\gdef{WFF@\@family}}}% Flag
4560 \bbl@exp{\\\bbl@add\\\bbl@tempa{* \<##1family>= \@family\\
4561 \space\space\fontname\font\\}}}%
4562 \bbl@csarg\xdef{##1dflt@}{\@family}%
4563 \expandafter\xdef\csname ##1default\endcsname{\@family}}%
4564 {}}%
4565 \ifx\bbl@tempa\@empty\else
4566 \bbl@infowarn{The following font families will use the default\\
4567 settings for all or some languages:\\
4568 \bbl@tempa
4569 There is nothing intrinsically wrong with it, but\\
4570 'babel' will no set Script and Language, which could\\
4571 be relevant in some languages. If your document uses\\
4572 these families, consider redefining them with \string\babelfont.\\
4573 Reported}%
4574 \fi
4575 \endgroup}
4576 \fi
4577 \fi

```

Now the macros defining the font with fontspec.

When there are repeated keys in fontspec, the last value wins. So, we just place the ini settings at the beginning, and user settings will take precedence. We must deactivate temporarily `\bbl@mapselect` because `\selectfont` is called internally when a font is defined.

```

4578 \def\bbl@font@set#1#2#3{% eg \bbl@rmdflt@lang \rmdefault \rmfamily
4579 \bbl@xin@{<>}{#1}%
4580 \ifin@
4581 \bbl@exp{\\\bbl@fontspec@set\\#1\expandafter\@gobbletwo#1\\#3}%
4582 \fi
4583 \bbl@exp{%
4584 \def\\#2{#1}% eg, \rmdefault{\bbl@rmdflt@lang}
4585 \\\bbl@ifsamestring{#2}{\@family}%
4586 {\\#3%
4587 \\\bbl@ifsamestring{\@series}{\bfdefault}{\\bfseries}}}%
4588 \let\\bbl@tempa\relax}%
4589 {}}}
4590 % TODO - next should be global?, but even local does its job. I'm
4591 % still not sure -- must investigate:
4592 \def\bbl@fontspec@set#1#2#3#4{% eg \bbl@rmdflt@lang fnt-opt fnt-nme \xxfamily

```

```

4593 \let\bbl@tempe\bbl@mapselect
4594 \let\bbl@mapselect\relax
4595 \let\bbl@temp@fam#4% eg, '\rmfamily', to be restored below
4596 \let#4\@empty % Make sure \renewfontfamily is valid
4597 \bbl@exp{%
4598 \let\\bbl@temp@pfam<\bbl@stripslash#4\space>% eg, '\rmfamily '
4599 \<keys_if_exist:nnF>{fontspec-opentype}{Script/\bbl@cl{sname}}%
4600 {\newfontscript{\bbl@cl{sname}}{\bbl@cl{sotf}}}%
4601 \<keys_if_exist:nnF>{fontspec-opentype}{Language/\bbl@cl{lname}}%
4602 {\newfontlanguage{\bbl@cl{lname}}{\bbl@cl{lotf}}}%
4603 \let\\bbl@tempfs@nx<__fontspec_warning:nx>%
4604 \let<__fontspec_warning:nx>\\bbl@fs@warn@nx
4605 \let\\bbl@tempfs@nxx<__fontspec_warning:nxx>%
4606 \let<__fontspec_warning:nxx>\\bbl@fs@warn@nxx
4607 \\renewfontfamily\\#4%
4608 [\bbl@cl{lsys},#2]}{#3}% ie \bbl@exp{..}{#3}
4609 \bbl@exp{%
4610 \let<__fontspec_warning:nx>\\bbl@tempfs@nx
4611 \let<__fontspec_warning:nxx>\\bbl@tempfs@nxx}%
4612 \begingroup
4613 #4%
4614 \xdef#1{\f@family}% eg, \bbl@rmdflt@lang{FreeSerif(0)}
4615 \endgroup
4616 \let#4\bbl@temp@fam
4617 \bbl@exp{\let<\bbl@stripslash#4\space>\bbl@temp@pfam
4618 \let\bbl@mapselect\bbl@tempe}%

```

font@rst and famrst are only used when there is no global settings, to save and restore de previous families. Not really necessary, but done for optimization.

```

4619 \def\bbl@font@rst#1#2#3#4{%
4620 \bbl@csarg\def{famrst@#4}{\bbl@font@set{#1}#2#3}}

```

The default font families. They are eurocentric, but the list can be expanded easily with \babelfont.

```

4621 \def\bbl@font@fams{rm,sf,tt}
4622 <{/Font selection>

```

## 12 Hooks for XeTeX and LuaTeX

### 12.1 XeTeX

Unfortunately, the current encoding cannot be retrieved and therefore it is reset always to utf8, which seems a sensible default.

```

4623 <(*Footnote changes)> ≡
4624 \bbl@trace{Bidi footnotes}
4625 \ifnum\bbl@bidimode>\z@
4626 \def\bbl@footnote#1#2#3{%
4627 \ifnextchar[%
4628 {\bbl@footnote@o{#1}{#2}{#3}}%
4629 {\bbl@footnote@x{#1}{#2}{#3}}%
4630 \long\def\bbl@footnote@x#1#2#3#4{%
4631 \bgroup
4632 \select@language@x{\bbl@main@language}%
4633 \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
4634 \egroup}
4635 \long\def\bbl@footnote@o#1#2#3[#4]#5{%
4636 \bgroup
4637 \select@language@x{\bbl@main@language}%
4638 \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
4639 \egroup}
4640 \def\bbl@footnotetext#1#2#3{%
4641 \ifnextchar[%
4642 {\bbl@footnotetext@o{#1}{#2}{#3}}%

```

```

4643     {\bbl@footnotetext@x{#1}{#2}{#3}}
4644 \long\def\bbl@footnotetext@x#1#2#3#4{%
4645     \bgroup
4646     \select@language@x{\bbl@main@language}%
4647     \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
4648     \egroup}
4649 \long\def\bbl@footnotetext@o#1#2#3[#4]#5{%
4650     \bgroup
4651     \select@language@x{\bbl@main@language}%
4652     \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
4653     \egroup}
4654 \def\BabelFootnote#1#2#3#4{%
4655     \ifx\bbl@fn@footnote\@undefined
4656     \let\bbl@fn@footnote\footnote
4657     \fi
4658     \ifx\bbl@fn@footnotetext\@undefined
4659     \let\bbl@fn@footnotetext\footnotetext
4660     \fi
4661     \bbl@ifblank{#2}%
4662     {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
4663     \@namedef{\bbl@stripslash#1text}%
4664     {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
4665     {\def#1{\bbl@exp{\bbl@footnote{\foreignlanguage{#2}}}{#3}{#4}}%
4666     \@namedef{\bbl@stripslash#1text}%
4667     {\bbl@exp{\bbl@footnotetext{\foreignlanguage{#2}}}{#3}{#4}}}%
4668 \fi
4669 <</Footnote changes>>

```

Now, the code.

```

4670 <*\xetex>
4671 \def\BabelStringsDefault{unicode}
4672 \let\xebbl@stop\relax
4673 \AddBabelHook{xetex}{encodedcommands}{%
4674     \def\bbl@tempa{#1}%
4675     \ifx\bbl@tempa\@empty
4676     \XeTeXinputencoding"bytes"%
4677     \else
4678     \XeTeXinputencoding"#1"%
4679     \fi
4680     \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
4681 \AddBabelHook{xetex}{stopcommands}{%
4682     \xebbl@stop
4683     \let\xebbl@stop\relax}
4684 \def\bbl@intraspace#1 #2 #3\@{%
4685     \bbl@csarg\gdef{\xeisp@{language}}%
4686     {\XeTeXlinebreakskip #1em plus #2em minus #3em\relax}}
4687 \def\bbl@intrapenalty#1\@{%
4688     \bbl@csarg\gdef{\xeipn@{language}}%
4689     {\XeTeXlinebreakpenalty #1\relax}}
4690 \def\bbl@provide@intraspace{%
4691     \bbl@xin@{/s}{/\bbl@cl{lbrk}}}%
4692     \ifin@ \else \bbl@xin@{/c}{/\bbl@cl{lbrk}} \fi
4693     \ifin@
4694     \bbl@ifunset{\bbl@intsp@{language}}{%
4695         {\expandafter\ifx\csname\bbl@intsp@{language}\endcsname\@empty\else
4696         \ifx\bbl@KVP@intraspace\@nnil
4697         \bbl@exp{%
4698             \bbl@intraspace\bbl@cl{intsp}\@}%
4699         \fi
4700         \ifx\bbl@KVP@intrapenalty\@nnil
4701         \bbl@intrapenalty0\@
4702         \fi
4703         \fi

```



```

4704 \ifx\bbbl@KVP@intraspace\@nnil\else % We may override the ini
4705 \expandafter\bbbl@intraspace\bbbl@KVP@intraspace\@@
4706 \fi
4707 \ifx\bbbl@KVP@intrapenalty\@nnil\else
4708 \expandafter\bbbl@intrapenalty\bbbl@KVP@intrapenalty\@@
4709 \fi
4710 \bbbl@exp{%
4711 % TODO. Execute only once (but redundant):
4712 \\\bbbl@add\<extras\language>{%
4713 \XeTeXlinebreaklocale "\bbbl@cl{tbcpr}"%
4714 \<bbbl@xeisp@\language>%
4715 \<bbbl@xeipn@\language>}%
4716 \\\bbbl@tglobal\<extras\language>%
4717 \\\bbbl@add\<noextras\language>{%
4718 \XeTeXlinebreaklocale ""}%
4719 \\\bbbl@tglobal\<noextras\language>}%
4720 \ifx\bbbl@ispace\@undefined
4721 \gdef\bbbl@ispace{\bbbl@cl{xeisp}}%
4722 \ifx\AtBeginDocument\@notprerr
4723 \expandafter\@secondoftwo % to execute right now
4724 \fi
4725 \AtBeginDocument{\bbbl@patchfont{\bbbl@ispace}}%
4726 \fi}%
4727 \fi}
4728 \ifx\DisableBabelHook\@undefined\endinput\fi
4729 \AddBabelHook{babel-fontspec}{afterextras}{\bbbl@switchfont}
4730 \AddBabelHook{babel-fontspec}{beforestart}{\bbbl@ckeckstdfonts}
4731 \DisableBabelHook{babel-fontspec}
4732 <(Font selection)>
4733 \def\bbbl@provide@extra#1{}
4734 </xetex>

```

## 12.2 Layout

Note elements like headlines and margins can be modified easily with packages like fancyhdr, typearea or titles, and geometry.

\bbbl@startskip and \bbbl@endskip are available to package authors. Thanks to the T<sub>E</sub>X expansion mechanism the following constructs are valid: \adim\bbbl@startskip, \advance\bbbl@startskip\adim, \bbbl@startskip\adim.

Consider txtbabel as a shorthand for *tex-xet babel*, which is the bidi model in both pdf<sub>TEX</sub> and xet<sub>EX</sub>.

```

4735 <*xetex | texxet>
4736 \providecommand\bbbl@provide@intraspace{}
4737 \bbbl@trace{Redefinitions for bidi layout}
4738 \def\bbbl@sspre@caption{%
4739 \bbbl@exp{\everyhbox{\\\bbbl@texdir\bbbl@cs{wdir@\bbbl@main@language}}}}
4740 \ifx\bbbl@opt@layout\@nnil\else % if layout=..
4741 \def\bbbl@startskip{\ifcase\bbbl@thepardir\leftskip\else\rightskip\fi}
4742 \def\bbbl@endskip{\ifcase\bbbl@thepardir\rightskip\else\leftskip\fi}
4743 \ifx\bbbl@beforeforeign\leavevmode % A poor test for bidi=
4744 \def\@hangfrom#1{%
4745 \setbox\@tempboxa\hbox{#1}}%
4746 \hangindent\ifcase\bbbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
4747 \noindent\box\@tempboxa}
4748 \def\raggedright{%
4749 \let\@centercr
4750 \bbbl@startskip\z@skip
4751 \@rightskip\@flushglue
4752 \bbbl@endskip\@rightskip
4753 \parindent\z@
4754 \parfillskip\bbbl@startskip}
4755 \def\raggedleft{%
4756 \let\@centercr
4757 \bbbl@startskip\@flushglue

```

```

4758 \bbl@endskip\z@skip
4759 \parindent\z@
4760 \parfillskip\bbl@endskip}
4761 \fi
4762 \IfBabelLayout{lists}
4763 {\bbl@sreplace\list
4764 {\@totalleftmargin\leftmargin}{\@totalleftmargin\bbl@listleftmargin}%
4765 \def\bbl@listleftmargin{%
4766 \ifcase\bbl@thepardir\leftmargin\else\rightmargin\fi}%
4767 \ifcase\bbl@engine
4768 \def\labelenumii{}\theenumii{}\pdfTeX doesn't reverse ()
4769 \def\p@enumiii{\p@enumii}\theenumii{}\fi
4770 \fi
4771 \bbl@sreplace\@verbatim
4772 {\leftskip\@totalleftmargin}%
4773 {\bbl@startskip\textwidth
4774 \advance\bbl@startskip-\linewidth}%
4775 \bbl@sreplace\@verbatim
4776 {\rightskip\z@skip}%
4777 {\bbl@endskip\z@skip}}%
4778 {}
4779 \IfBabelLayout{contents}
4780 {\bbl@sreplace\@dottedtocline{\leftskip}{\bbl@startskip}%
4781 \bbl@sreplace\@dottedtocline{\rightskip}{\bbl@endskip}}
4782 {}
4783 \IfBabelLayout{columns}
4784 {\bbl@sreplace\@outputdblcol{\hb@xt@\textwidth}{\bbl@outputbox}%
4785 \def\bbl@outputbox#1{%
4786 \hb@xt@\textwidth{%
4787 \hskip\columnwidth
4788 \hfil
4789 {\normalcolor\vrule \@width\columnseprule}%
4790 \hfil
4791 \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
4792 \hskip-\textwidth
4793 \hb@xt@\columnwidth{\box\@outputbox \hss}%
4794 \hskip\columnsep
4795 \hskip\columnwidth}}}%
4796 {}
4797 <<Footnote changes>>
4798 \IfBabelLayout{footnotes}%
4799 {\BabelFootnote\footnote\languagename{}\}%
4800 \BabelFootnote\localfootnote\languagename{}\}%
4801 \BabelFootnote\mainfootnote{}\}\}%
4802 {}

```

Implicitly reverses sectioning labels in bidi=basic, because the full stop is not in contact with L numbers any more. I think there must be a better way.

```

4803 \IfBabelLayout{counters*}%
4804 {\bbl@add\bbl@opt@layout{.counters.}%
4805 \AddToHook{shipout/before}{%
4806 \let\bbl@tempa\babelsublr
4807 \let\babelsublr\@firstofone
4808 \let\bbl@save@thepage\thepage
4809 \protected@edef\thepage{\thepage}%
4810 \let\babelsublr\bbl@tempa}%
4811 \AddToHook{shipout/after}{%
4812 \let\thepage\bbl@save@thepage}}}%
4813 \IfBabelLayout{counters}%
4814 {\let\bbl@latinarabic=\@arabic
4815 \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
4816 \let\bbl@asciroman=\@roman
4817 \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%

```

```

4818 \let\bbl@asciiRoman=\@Roman
4819 \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}{}}
4820 \fi % end if layout
4821 </xetex | texpet>

```

## 12.3 8-bit TeX

Which start just above, because some code is shared with xetex. Now, 8-bit specific stuff.

```

4822 <*texpet>
4823 \def\bbl@provide@extra#1{%
4824 % == auto-select encoding ==
4825 \ifx\bbl@encoding@select@off\@empty\else
4826 \bbl@ifunset{\bbl@encoding@#1}%
4827 {\def\@elt##1{,##1,}%
4828 \edef\bbl@tempe{\expandafter\@gobbletwo\@fontenc@load@list}%
4829 \count@z@
4830 \bbl@foreach\bbl@tempe{%
4831 \def\bbl@tempd{##1}% Save last declared
4832 \advance\count@\@ne}%
4833 \ifnum\count@>\@ne
4834 \getlocaleproperty*\bbl@tempa{#1}{identification/encodings}%
4835 \ifx\bbl@tempa\relax \let\bbl@tempa\@empty \fi
4836 \bbl@replace\bbl@tempa{ }{,}%
4837 \global\bbl@csarg\let{encoding@#1}\@empty
4838 \bbl@xin@{,\bbl@tempd,}{,\bbl@tempa,}%
4839 \ifin@ \else % if main encoding included in ini, do nothing
4840 \let\bbl@tempb\relax
4841 \bbl@foreach\bbl@tempa{%
4842 \ifx\bbl@tempb\relax
4843 \bbl@xin@{,##1,}{,\bbl@tempe,}%
4844 \ifin@\def\bbl@tempb{##1}\fi
4845 \fi}%
4846 \ifx\bbl@tempb\relax\else
4847 \bbl@exp{%
4848 \global\<bbl@add>\<bbl@preextras@#1>{\<bbl@encoding@#1>}%
4849 \gdef\<bbl@encoding@#1>{%
4850 \\\babel@save\\f@encoding
4851 \\\bbl@add\\originalTeX{\\\selectfont}%
4852 \\\fontencoding{\bbl@tempb}%
4853 \\\selectfont}}}%
4854 \fi
4855 \fi
4856 \fi}%
4857 {}%
4858 \fi}
4859 </texpet>

```

## 12.4 LuaTeX

The loader for luatex is based solely on language.dat, which is read on the fly. The code shouldn't be executed when the format is build, so we check if \AddBabelHook is defined. Then comes a modified version of the loader in hyphen.cfg (without the hyphenmins stuff, which is under the direct control of babel).

The names \l@<language> are defined and take some value from the beginning because all ldf files assume this for the corresponding language to be considered valid, but patterns are not loaded (except the first one). This is done later, when the language is first selected (which usually means when the ldf finishes). If a language has been loaded, \bbl@hyphendata@<num> exists (with the names of the files read).

The default setup preloads the first language into the format. This is intended mainly for 'english', so that it's available without further intervention from the user. To avoid duplicating it, the following rule applies: if the "0th" language and the first language in language.dat have the same name then just ignore the latter. If there are new synonymous, they are added, but note if the language patterns have not been preloaded they won't at run time.

Other preloaded languages could be read twice, if they have been preloaded into the format. This is not optimal, but it shouldn't happen very often – with luatex patterns are best loaded when the document is typeset, and the “0th” language is preloaded just for backwards compatibility.

As of 1.1b, lua(e)tex is taken into account. Formerly, loading of patterns on the fly didn't work in this format, but with the new loader it does. Unfortunately, the format is not based on babel, and data could be duplicated, because languages are reassigned above those in the format (nothing serious, anyway). Note even with this format language.dat is used (under the principle of a single source), instead of language.def.

Of course, there is room for improvements, like tools to read and reassign languages, which would require modifying the language list, and better error handling.

We need catcode tables, but no format (targeted by babel) provide a command to allocate them (although there are packages like ctablestack). FIX - This isn't true anymore. For the moment, a dangerous approach is used - just allocate a high random number and cross the fingers. To complicate things, etex.sty changes the way languages are allocated.

This files is read at three places: (1) when plain.def, babel.sty starts, to read the list of available languages from language.dat (for the base option); (2) at hyphen.cfg, to modify some macros; (3) in the middle of plain.def and babel.sty, by babel.def, with the commands and other definitions for luatex (eg, \babelpatterns).

```

4860 (*luatex)
4861 \ifx\AddBabelHook\@undefined % When plain.def, babel.sty starts
4862 \bbl@trace{Read language.dat}
4863 \ifx\bbl@readstream\@undefined
4864 \csname newread\endcsname\bbl@readstream
4865 \fi
4866 \begingroup
4867 \toks@{}
4868 \count@ \z@ % 0=start, 1=0th, 2=normal
4869 \def\bbl@process@line#1#2 #3 #4 {%
4870 \ifx=#1%
4871 \bbl@process@synonym{#2}%
4872 \else
4873 \bbl@process@language{#1#2}{#3}{#4}%
4874 \fi
4875 \ignorespaces}
4876 \def\bbl@manylang{%
4877 \ifnum\bbl@last>\@ne
4878 \bbl@info{Non-standard hyphenation setup}%
4879 \fi
4880 \let\bbl@manylang\relax}
4881 \def\bbl@process@language#1#2#3{%
4882 \ifcase\count@
4883 \@ifundefined{zth#1}{\count@\tw@}{\count@\@ne}%
4884 \or
4885 \count@\tw@
4886 \fi
4887 \ifnum\count@=\tw@
4888 \expandafter\addlanguage\csname l@#1\endcsname
4889 \language\allocationnumber
4890 \chardef\bbl@last\allocationnumber
4891 \bbl@manylang
4892 \let\bbl@elt\relax
4893 \xdef\bbl@languages{%
4894 \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
4895 \fi
4896 \the\toks@
4897 \toks@{}}
4898 \def\bbl@process@synonym#1#2{%
4899 \global\expandafter\chardef\csname l@#1\endcsname#2\relax
4900 \let\bbl@elt\relax
4901 \xdef\bbl@languages{%
4902 \bbl@languages\bbl@elt{#1}{#2}{}}}%
4903 \def\bbl@process@synonym#1{%
4904 \ifcase\count@

```

```

4905 \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
4906 \or
4907 \ifundefined{zth@#1}{\bbl@process@synonym@aux{#1}{0}}}%
4908 \else
4909 \bbl@process@synonym@aux{#1}{\the\bbl@last}%
4910 \fi}
4911 \ifx\bbl@languages\@undefined % Just a (sensible?) guess
4912 \chardef\l@english\z@
4913 \chardef\l@USenglish\z@
4914 \chardef\bbl@last\z@
4915 \global\@namedef{bbl@hyphendata@0}{{hyphen.tex}}%
4916 \gdef\bbl@languages{%
4917 \bbl@elt{english}{0}{hyphen.tex}}}%
4918 \bbl@elt{USenglish}{0}{}%
4919 \else
4920 \global\let\bbl@languages@format\bbl@languages
4921 \def\bbl@elt#1#2#3#4{% Remove all except language 0
4922 \ifnum#2>\z@\else
4923 \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
4924 \fi}%
4925 \xdef\bbl@languages{\bbl@languages}%
4926 \fi
4927 \def\bbl@elt#1#2#3#4{\@namedef{zth@#1}}% % Define flags
4928 \bbl@languages
4929 \openin\bbl@readstream=language.dat
4930 \ifeof\bbl@readstream
4931 \bbl@warning{I couldn't find language.dat. No additional\\%
4932 patterns loaded. Reported}%
4933 \else
4934 \loop
4935 \endlinechar\m@ne
4936 \read\bbl@readstream to \bbl@line
4937 \endlinechar\^^M
4938 \if T\ifeof\bbl@readstream F\fi T\relax
4939 \ifx\bbl@line\@empty\else
4940 \edef\bbl@line{\bbl@line\space\space\space}%
4941 \expandafter\bbl@process@line\bbl@line\relax
4942 \fi
4943 \repeat
4944 \fi
4945 \endgroup
4946 \bbl@trace{Macros for reading patterns files}
4947 \def\bbl@get@enc#1:#2:#3\@@@{\def\bbl@hyph@enc{#2}}
4948 \ifx\babelcatcodetablenum\@undefined
4949 \ifx\newcatcodetable\@undefined
4950 \def\babelcatcodetablenum{5211}
4951 \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4952 \else
4953 \newcatcodetable\babelcatcodetablenum
4954 \newcatcodetable\bbl@pattcodes
4955 \fi
4956 \else
4957 \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4958 \fi
4959 \def\bbl@luapatterns#1#2{%
4960 \bbl@get@enc#1::\@@@
4961 \setbox\z@\hbox\bgroup
4962 \begingroup
4963 \savecatcodetable\babelcatcodetablenum\relax
4964 \initcatcodetable\bbl@pattcodes\relax
4965 \catcodetable\bbl@pattcodes\relax
4966 \catcode\#=6 \catcode\$_=3 \catcode\&=4 \catcode\^=7
4967 \catcode\_ =8 \catcode\{=1 \catcode\}=2 \catcode\~=13

```

```

4968 \catcode`\@=11 \catcode`\^^I=10 \catcode`\^^J=12
4969 \catcode`\<=12 \catcode`\>=12 \catcode`\*=12 \catcode`\.=12
4970 \catcode`\-=12 \catcode`\/=12 \catcode`\[=12 \catcode`\]=12
4971 \catcode`\'=12 \catcode`\'=12 \catcode`\`=12
4972 \input #1\relax
4973 \catcodetable\babelcatcodetablenum\relax
4974 \endgroup
4975 \def\bb1@tempa{#2}%
4976 \ifx\bb1@tempa\@empty\else
4977 \input #2\relax
4978 \fi
4979 \egroup}%
4980 \def\bb1@patterns@lua#1{%
4981 \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
4982 \csname l@#1\endcsname
4983 \edef\bb1@tempa{#1}%
4984 \else
4985 \csname l@#1:\f@encoding\endcsname
4986 \edef\bb1@tempa{#1:\f@encoding}%
4987 \fi\relax
4988 \@namedef{luatexhyphen@loaded@the\language}{}% Temp
4989 \@ifundefined{bb1@hyphendata@the\language}%
4990 {\def\bb1@elt##1###2###3###4{%
4991 \ifnum##2=\csname l@bb1@tempa\endcsname % #2=spanish, dutch:OT1...
4992 \def\bb1@tempb{##3}%
4993 \ifx\bb1@tempb\@empty\else % if not a synonymous
4994 \def\bb1@tempc{##3}{##4}}%
4995 \fi
4996 \bb1@csarg\xdef{hyphendata@##2}{\bb1@tempc}%
4997 \fi}%
4998 \bb1@languages
4999 \@ifundefined{bb1@hyphendata@the\language}%
5000 {\bb1@info{No hyphenation patterns were set for\%
5001 language '\bb1@tempa'. Reported}}%
5002 {\expandafter\expandafter\expandafter\bb1@luapatterns
5003 \csname bb1@hyphendata@the\language\endcsname}}}%
5004 \endinput\fi
5005 % Here ends \ifx\AddBabelHook\@undefined
5006 % A few lines are only read by hyphen.cfg
5007 \ifx\DisableBabelHook\@undefined
5008 \AddBabelHook{luatex}{everylanguage}{%
5009 \def\process@language##1##2##3{%
5010 \def\process@line####1####2 ####3 ####4 {}}%
5011 \AddBabelHook{luatex}{loadpatterns}{%
5012 \input #1\relax
5013 \expandafter\gdef\csname bb1@hyphendata@the\language\endcsname
5014 {{#1}{}}}
5015 \AddBabelHook{luatex}{loadexceptions}{%
5016 \input #1\relax
5017 \def\bb1@tempb##1##2{##1}{#1}}%
5018 \expandafter\xdef\csname bb1@hyphendata@the\language\endcsname
5019 {\expandafter\expandafter\expandafter\bb1@tempb
5020 \csname bb1@hyphendata@the\language\endcsname}}
5021 \endinput\fi
5022 % Here stops reading code for hyphen.cfg
5023 % The following is read the 2nd time it's loaded
5024 \begingroup % TODO - to a lua file
5025 \catcode`\%=12
5026 \catcode`\'=12
5027 \catcode`\`=12
5028 \catcode`\:=12
5029 \directlua{
5030 Babel = Babel or {}

```

```

5031 function Babel.bytes(line)
5032   return line:gsub("(.)",
5033     function (chr) return unicode.utf8.char(string.byte(chr)) end)
5034 end
5035 function Babel.begin_process_input()
5036   if luatexbase and luatexbase.add_to_callback then
5037     luatexbase.add_to_callback('process_input_buffer',
5038       Babel.bytes, 'Babel.bytes')
5039   else
5040     Babel.callback = callback.find('process_input_buffer')
5041     callback.register('process_input_buffer', Babel.bytes)
5042   end
5043 end
5044 function Babel.end_process_input ()
5045   if luatexbase and luatexbase.remove_from_callback then
5046     luatexbase.remove_from_callback('process_input_buffer', 'Babel.bytes')
5047   else
5048     callback.register('process_input_buffer', Babel.callback)
5049   end
5050 end
5051 function Babel.addpatterns(pp, lg)
5052   local lg = lang.new(lg)
5053   local pats = lang.patterns(lg) or ''
5054   lang.clear_patterns(lg)
5055   for p in pp:gmatch('[^%s]+') do
5056     ss = ''
5057     for i in string.utfcharacters(p:gsub('%d', '')) do
5058       ss = ss .. '%d?' .. i
5059     end
5060     ss = ss:gsub('^%%d%?%.', '%%.') .. '%d?'
5061     ss = ss:gsub('%.%%d%?$', '%%.')
5062     pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
5063     if n == 0 then
5064       tex.sprint(
5065         [[\string\csname\space bbl@info\endcsname{New pattern: }]]
5066         .. p .. [[{}]])
5067       pats = pats .. ' ' .. p
5068     else
5069       tex.sprint(
5070         [[\string\csname\space bbl@info\endcsname{Renew pattern: }]]
5071         .. p .. [[{}]])
5072     end
5073   end
5074   lang.patterns(lg, pats)
5075 end
5076 Babel.characters = Babel.characters or {}
5077 Babel.ranges = Babel.ranges or {}
5078 function Babel.hlist_has_bidi(head)
5079   local has_bidi = false
5080   local ranges = Babel.ranges
5081   for item in node.traverse(head) do
5082     if item.id == node.id'glyph' then
5083       local itemchar = item.char
5084       local chardata = Babel.characters[itemchar]
5085       local dir = chardata and chardata.d or nil
5086       if not dir then
5087         for nn, et in ipairs(ranges) do
5088           if itemchar < et[1] then
5089             break
5090           elseif itemchar <= et[2] then
5091             dir = et[3]
5092             break
5093           end
5094         end
5095       end
5096     end
5097   end
5098 end

```

```

5094         end
5095     end
5096     if dir and (dir == 'al' or dir == 'r') then
5097         has_bidi = true
5098     end
5099 end
5100 end
5101 return has_bidi
5102 end
5103 function Babel.set_chrnges_b (script, chrng)
5104     if chrng == '' then return end
5105     texio.write('Replacing ' .. script .. ' script ranges')
5106     Babel.script_blocks[script] = {}
5107     for s, e in string.gmatch(chrng..' ', '(-)%.%(-)%s') do
5108         table.insert(
5109             Babel.script_blocks[script], {tonumber(s,16), tonumber(e,16)})
5110     end
5111 end
5112 function Babel.discard_sublr(str)
5113     if str:find( [[\string\indexentry]] ) and
5114        str:find( [[\string\babelsublr]] ) then
5115         str = str:gsub( [[\string\babelsublr%s*(%b{})]],
5116                        function(m) return m:sub(2,-2) end )
5117     end
5118     return str
5119 end
5120 }
5121 \endgroup
5122 \ifx\newattribute\@undefined\else
5123     \newattribute\bbl@attr@locale
5124     \directlua{ Babel.attr_locale = luatexbase.registernumber'bbl@attr@locale' }
5125     \AddBabelHook{luatex}{beforeextras}{%
5126         \setattribute\bbl@attr@locale\localeid}
5127 \fi
5128 \def\BabelStringsDefault{unicode}
5129 \let\luabbl@stop\relax
5130 \AddBabelHook{luatex}{encodedcommands}{%
5131     \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
5132     \ifx\bbl@tempa\bbl@tempb\else
5133         \directlua{Babel.begin_process_input()}%
5134         \def\luabbl@stop{%
5135             \directlua{Babel.end_process_input()}}%
5136     \fi}%
5137 \AddBabelHook{luatex}{stopcommands}{%
5138     \luabbl@stop
5139     \let\luabbl@stop\relax}
5140 \AddBabelHook{luatex}{patterns}{%
5141     \@ifundefined{bbl@hyphendata@the\language}%
5142     {\def\bbl@elt##1##2##3##4{%
5143         \ifnum##2=\csname l@#2\endcsname % #2=spanish, dutch:OT1...
5144         \def\bbl@tempb{##3}%
5145         \ifx\bbl@tempb\empty\else % if not a synonymous
5146             \def\bbl@tempc{##3}{##4}}%
5147         \fi
5148         \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
5149         \fi}%
5150     \bbl@languages
5151     \@ifundefined{bbl@hyphendata@the\language}%
5152     {\bbl@info{No hyphenation patterns were set for\\%
5153         language '#2'. Reported}}%
5154     {\expandafter\expandafter\expandafter\bbl@luapatterns
5155         \csname bbl@hyphendata@the\language\endcsname}}}%
5156     \@ifundefined{bbl@patterns@}{%

```



```

5157 \begingroup
5158 \bbl@xin@{,\number\language,}{,\bbl@pttnlist}%
5159 \ifin@ \else
5160 \ifx\bbl@patterns@\empty \else
5161 \directlua{ Babel.addpatterns(
5162 [[\bbl@patterns@]], \number\language) }%
5163 \fi
5164 \ifundefined{bbl@patterns@#1}%
5165 \empty
5166 {\directlua{ Babel.addpatterns(
5167 [[\space\csname bbl@patterns@#1\endcsname]],
5168 \number\language) }}%
5169 \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
5170 \fi
5171 \endgroup}%
5172 \bbl@exp{%
5173 \bbl@ifunset{bbl@prehc@\languagename}{}%
5174 {\bbl@ifblank{\bbl@cs{prehc@\languagename}}{}}%
5175 {\prehyphenchar=\bbl@cl{prehc}\relax}}

```

**\babelpatterns** This macro adds patterns. Two macros are used to store them: `\bbl@patterns@` for the global ones and `\bbl@patterns@<lang>` for language ones. We make sure there is a space between words when multiple commands are used.

```

5176 \@onlypreamble\babelpatterns
5177 \AtEndOfPackage{%
5178 \newcommand\babelpatterns[2][\empty]{%
5179 \ifx\bbl@patterns\relax
5180 \let\bbl@patterns@\empty
5181 \fi
5182 \ifx\bbl@pttnlist\empty \else
5183 \bbl@warning{%
5184 You must not intermingle \string\selectlanguage\space and\%
5185 \string\babelpatterns\space or some patterns will not\%
5186 be taken into account. Reported}%
5187 \fi
5188 \ifx\empty#1%
5189 \protected@edef\bbl@patterns@{\bbl@patterns@\space#2}%
5190 \else
5191 \edef\bbl@tempb{\zap@space#1 \empty}%
5192 \bbl@for\bbl@tempa\bbl@tempb{%
5193 \bbl@fixname\bbl@tempa
5194 \bbl@iflanguage\bbl@tempa{%
5195 \bbl@csarg\protected@edef{patterns@\bbl@tempa}{%
5196 \@ifundefined{bbl@patterns@\bbl@tempa}%
5197 \empty
5198 {\csname bbl@patterns@\bbl@tempa\endcsname\space}%
5199 #2}}}%
5200 \fi}}

```

## 12.5 Southeast Asian scripts

First, some general code for line breaking, used by `\babelposthyphenation`. Replace regular (ie, implicit) discretionaries by spaceskips, based on the previous glyph (which I think makes sense, because the hyphen and the previous char go always together). Other discretionaries are not touched. See Unicode UAX 14.

```

5201% TODO - to a lua file
5202 \directlua{
5203 Babel = Babel or {}
5204 Babel.linebreaking = Babel.linebreaking or {}
5205 Babel.linebreaking.before = {}
5206 Babel.linebreaking.after = {}
5207 Babel.locale = {} % Free to use, indexed by \localeid

```

```

5208 function Babel.linebreaking.add_before(func, pos)
5209     tex.print([[\\noexpand\\csname bbl@luahyphenate\\endcsname]])
5210     if pos == nil then
5211         table.insert(Babel.linebreaking.before, func)
5212     else
5213         table.insert(Babel.linebreaking.before, pos, func)
5214     end
5215 end
5216 function Babel.linebreaking.add_after(func)
5217     tex.print([[\\noexpand\\csname bbl@luahyphenate\\endcsname]])
5218     table.insert(Babel.linebreaking.after, func)
5219 end
5220 }
5221 \\def\\bbl@intraspace#1 #2 #3\\@@{%
5222     \\directlua{
5223         Babel = Babel or {}
5224         Babel.intraspaces = Babel.intraspaces or {}
5225         Babel.intraspaces['\\csname bbl@sbc@\\language\\endcsname'] = %
5226             {b = #1, p = #2, m = #3}
5227         Babel.locale_props[\\the\\localeid].intraspace = %
5228             {b = #1, p = #2, m = #3}
5229     }}
5230 \\def\\bbl@intrapenalty#1\\@@{%
5231     \\directlua{
5232         Babel = Babel or {}
5233         Babel.intrapenalties = Babel.intrapenalties or {}
5234         Babel.intrapenalties['\\csname bbl@sbc@\\language\\endcsname'] = #1
5235         Babel.locale_props[\\the\\localeid].intrapenalty = #1
5236     }}
5237 \\begingroup
5238 \\catcode\\%=12
5239 \\catcode\\^=14
5240 \\catcode\\'=12
5241 \\catcode\\~=12
5242 \\gdef\\bbl@seaintraspace{^
5243     \\let\\bbl@seaintraspace\\relax
5244     \\directlua{
5245         Babel = Babel or {}
5246         Babel.sea_enabled = true
5247         Babel.sea_ranges = Babel.sea_ranges or {}
5248         function Babel.set_chrngs (script, chrng)
5249             local c = 0
5250             for s, e in string.gmatch(chrng..' ', '(.)%.%.(.%)s') do
5251                 Babel.sea_ranges[script..c]={tonumber(s,16), tonumber(e,16)}
5252                 c = c + 1
5253             end
5254         end
5255         function Babel.sea_disc_to_space (head)
5256             local sea_ranges = Babel.sea_ranges
5257             local last_char = nil
5258             local quad = 655360 ^% 10 pt = 655360 = 10 * 65536
5259             for item in node.traverse(head) do
5260                 local i = item.id
5261                 if i == node.id'glyph' then
5262                     last_char = item
5263                 elseif i == 7 and item.subtype == 3 and last_char
5264                     and last_char.char > 0x0C99 then
5265                     quad = font.getfont(last_char.font).size
5266                     for lg, rg in pairs(sea_ranges) do
5267                         if last_char.char > rg[1] and last_char.char < rg[2] then
5268                             lg = lg:sub(1, 4) ^% Remove trailing number of, eg, Cyril1
5269                             local intraspace = Babel.intraspaces[lg]
5270                             local intrapenalty = Babel.intrapenalties[lg]

```

```

5271         local n
5272         if intrapenalty ~= 0 then
5273             n = node.new(14, 0)      ^% penalty
5274             n.penalty = intrapenalty
5275             node.insert_before(head, item, n)
5276         end
5277         n = node.new(12, 13)        ^% (glue, spaceskip)
5278         node.setglue(n, intraspace.b * quad,
5279                     intraspace.p * quad,
5280                     intraspace.m * quad)
5281         node.insert_before(head, item, n)
5282         node.remove(head, item)
5283     end
5284 end
5285 end
5286 end
5287 end
5288 }^^
5289 \bbl@luahyphenate}

```

## 12.6 CJK line breaking

Minimal line breaking for CJK scripts, mainly intended for simple documents and short texts as a secondary language. Only line breaking, with a little stretching for justification, without any attempt to adjust the spacing. It is based on (but does not strictly follow) the Unicode algorithm. We first need a little table with the corresponding line breaking properties. A few characters have an additional key for the width (fullwidth vs. halfwidth), not yet used. There is a separate file, defined below.

```

5290 \catcode`\%=14
5291 \gdef\bbl@cjkintraspac{%
5292   \let\bbl@cjkintraspac\relax
5293   \directlua{
5294     Babel = Babel or {}
5295     require('babel-data-cjk.lua')
5296     Babel.cjk_enabled = true
5297     function Babel.cjk_linebreak(head)
5298       local GLYPH = node.id'glyph'
5299       local last_char = nil
5300       local quad = 655360      % 10 pt = 655360 = 10 * 65536
5301       local last_class = nil
5302       local last_lang = nil
5303
5304       for item in node.traverse(head) do
5305         if item.id == GLYPH then
5306
5307           local lang = item.lang
5308
5309           local LOCALE = node.get_attribute(item,
5310             Babel.attr_locale)
5311           local props = Babel.locale_props[LOCALE]
5312
5313           local class = Babel.cjk_class[item.char].c
5314
5315           if props.cjk_quotes and props.cjk_quotes[item.char] then
5316             class = props.cjk_quotes[item.char]
5317           end
5318
5319           if class == 'cp' then class = 'cl' end % )) as CL
5320           if class == 'id' then class = 'I' end
5321
5322           local br = 0
5323           if class and last_class and Babel.cjk_breaks[last_class][class] then
5324             br = Babel.cjk_breaks[last_class][class]

```

```

5325         end
5326
5327         if br == 1 and props.linebreak == 'c' and
5328             lang ~= \the\l@nohyphenation\space and
5329             last_lang ~= \the\l@nohyphenation then
5330             local intrapenalty = props.intrapenalty
5331             if intrapenalty ~= 0 then
5332                 local n = node.new(14, 0)    % penalty
5333                 n.penalty = intrapenalty
5334                 node.insert_before(head, item, n)
5335             end
5336             local intraspace = props.intraspace
5337             local n = node.new(12, 13)    % (glue, spaceskip)
5338             node.setglue(n, intraspace.b * quad,
5339                 intraspace.p * quad,
5340                 intraspace.m * quad)
5341             node.insert_before(head, item, n)
5342         end
5343
5344         if font.getfont(item.font) then
5345             quad = font.getfont(item.font).size
5346         end
5347         last_class = class
5348         last_lang = lang
5349     else % if penalty, glue or anything else
5350         last_class = nil
5351     end
5352 end
5353 lang.hyphenate(head)
5354 end
5355 }%
5356 \bbl@luahyphenate}
5357 \gdef\bbl@luahyphenate{%
5358 \let\bbl@luahyphenate\relax
5359 \directlua{
5360     luatexbase.add_to_callback('hyphenate',
5361         function (head, tail)
5362             if Babel.linebreaking.before then
5363                 for k, func in ipairs(Babel.linebreaking.before) do
5364                     func(head)
5365                 end
5366             end
5367             if Babel.cjk_enabled then
5368                 Babel.cjk_linebreak(head)
5369             end
5370             lang.hyphenate(head)
5371             if Babel.linebreaking.after then
5372                 for k, func in ipairs(Babel.linebreaking.after) do
5373                     func(head)
5374                 end
5375             end
5376             if Babel.sea_enabled then
5377                 Babel.sea_disc_to_space(head)
5378             end
5379         end,
5380         'Babel.hyphenate')
5381     }
5382 }
5383 \endgroup
5384 \def\bbl@provide@intraspace{%
5385     \bbl@ifunset\bbl@intsp@\languagename}{}%
5386     {\expandafter\ifx\csname bbl@intsp@\languagename\endcsname\@empty\else
5387         \bbl@xin@{/c}{/\bbl@c{l{lnbrk}}}%

```

```

5388 \ifin@ % cjk
5389 \bbl@cjk intraspace
5390 \directlua{
5391     Babel = Babel or {}
5392     Babel.locale_props = Babel.locale_props or {}
5393     Babel.locale_props[\the\localeid].linebreak = 'c'
5394 }%
5395 \bbl@exp{\bbl@intraspace\bbl@cl{intsp}\bbl@@}%
5396 \ifx\bbl@KVP@intrapenalty\@nnil
5397     \bbl@intrapenalty0\@@
5398 \fi
5399 \else % sea
5400 \bbl@seaintraspace
5401 \bbl@exp{\bbl@intraspace\bbl@cl{intsp}\bbl@@}%
5402 \directlua{
5403     Babel = Babel or {}
5404     Babel.sea_ranges = Babel.sea_ranges or {}
5405     Babel.set_chranges('\bbl@cl{sbcpr}',
5406                       '\bbl@cl{chrng}')
5407 }%
5408 \ifx\bbl@KVP@intrapenalty\@nnil
5409     \bbl@intrapenalty0\@@
5410 \fi
5411 \fi
5412 \fi
5413 \ifx\bbl@KVP@intrapenalty\@nnil\else
5414 \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
5415 \fi}}

```

## 12.7 Arabic justification

```

5416 \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
5417 \def\bblar@chars{%
5418     0628,0629,062A,062B,062C,062D,062E,062F,0630,0631,0632,0633,%
5419     0634,0635,0636,0637,0638,0639,063A,063B,063C,063D,063E,063F,%
5420     0640,0641,0642,0643,0644,0645,0646,0647,0649}
5421 \def\bblar@elongated{%
5422     0626,0628,062A,062B,0633,0634,0635,0636,063B,%
5423     063C,063D,063E,063F,0641,0642,0643,0644,0646,%
5424     0649,064A}
5425 \begingroup
5426 \catcode`\_ =11 \catcode`\:=11
5427 \gdef\bblar@nofswarn{\gdef\msg_warning:nx##1##2##3{}}
5428 \endgroup
5429 \gdef\bbl@arabicjust{%
5430     \let\bbl@arabicjust\relax
5431     \newattribute\bblar@kashida
5432     \directlua{ Babel.attr_kashida = luatexbase.registernumber'bblar@kashida' }%
5433     \bblar@kashida=\z@
5434     \bbl@patchfont{\bbl@parsejalt}}%
5435     \directlua{
5436         Babel.arabic.elong_map = Babel.arabic.elong_map or {}
5437         Babel.arabic.elong_map[\the\localeid] = {}
5438         luatexbase.add_to_callback('post_linebreak_filter',
5439             Babel.arabic.justify, 'Babel.arabic.justify')
5440         luatexbase.add_to_callback('hpack_filter',
5441             Babel.arabic.justify_hbox, 'Babel.arabic.justify_hbox')
5442     }%
5443 % Save both node lists to make replacement. TODO. Save also widths to
5444 % make computations
5445 \def\bblar@fetchjalt#1#2#3#4{%
5446     \bbl@exp{\bbl@foreach{#1}}{%
5447         \bbl@ifunset\bblar@JE##1}%

```

```

5448     {\setbox\z@\hbox{^^^^200d\char"##1#2}}%
5449     {\setbox\z@\hbox{^^^^200d\char"@nameuse{bblar@JE@##1}#2}}%
5450     \directlua{%
5451         local last = nil
5452         for item in node.traverse(tex.box[0].head) do
5453             if item.id == node.id'glyph' and item.char > 0x600 and
5454                 not (item.char == 0x200D) then
5455                 last = item
5456             end
5457         end
5458         Babel.arabic.#3['##1#4'] = last.char
5459     }}
5460 % Brute force. No rules at all, yet. The ideal: look at jalt table. And
5461 % perhaps other tables (falt?, csw?). What about kaf? And diacritic
5462 % positioning?
5463 \gdef\bbl@parsejalt{%
5464     \ifx\addfontfeature\undefined\else
5465         \bbl@xin{/e}{/\bbl@c1{lnbrk}}%
5466     \ifin@
5467         \directlua{%
5468             if Babel.arabic.elong_map[\the\localeid][\fontid\font] == nil then
5469                 Babel.arabic.elong_map[\the\localeid][\fontid\font] = {}
5470                 tex.print([[string\csname\space bbl@parsejalti\endcsname]])
5471             end
5472         }%
5473     \fi
5474 \fi}
5475 \gdef\bbl@parsejalti{%
5476     \begingroup
5477         \let\bbl@parsejalt\relax      % To avoid infinite loop
5478         \edef\bbl@tempb{\fontid\font}%
5479         \bblar@nofswarn
5480         \bblar@fetchjalt\bblar@elongated{}{from}{}%
5481         \bblar@fetchjalt\bblar@chars{^^^^064a}{from}{a}% Alef maksura
5482         \bblar@fetchjalt\bblar@chars{^^^^0649}{from}{y}% Yeh
5483         \addfontfeature{RawFeature+=jalt}%
5484         % \@namedef{bblar@JE@0643}{06AA}% todo: catch medial kaf
5485         \bblar@fetchjalt\bblar@elongated{}{dest}{}%
5486         \bblar@fetchjalt\bblar@chars{^^^^064a}{dest}{a}%
5487         \bblar@fetchjalt\bblar@chars{^^^^0649}{dest}{y}%
5488         \directlua{%
5489             for k, v in pairs(Babel.arabic.from) do
5490                 if Babel.arabic.dest[k] and
5491                     not (Babel.arabic.from[k] == Babel.arabic.dest[k]) then
5492                     Babel.arabic.elong_map[\the\localeid][\bbl@tempb]
5493                         [Babel.arabic.from[k]] = Babel.arabic.dest[k]
5494                 end
5495             end
5496         }%
5497     \endgroup}
5498 %
5499 \begingroup
5500 \catcode`#=11
5501 \catcode`~=11
5502 \directlua{
5503
5504 Babel.arabic = Babel.arabic or {}
5505 Babel.arabic.from = {}
5506 Babel.arabic.dest = {}
5507 Babel.arabic.justify_factor = 0.95
5508 Babel.arabic.justify_enabled = true
5509
5510 function Babel.arabic.justify(head)

```

```

5511 if not Babel.arabic.justify_enabled then return head end
5512 for line in node.traverse_id(node.id'hlist', head) do
5513     Babel.arabic.justify_hlist(head, line)
5514 end
5515 return head
5516 end
5517
5518 function Babel.arabic.justify_hbox(head, gc, size, pack)
5519     local has_inf = false
5520     if Babel.arabic.justify_enabled and pack == 'exactly' then
5521         for n in node.traverse_id(12, head) do
5522             if n.stretch_order > 0 then has_inf = true end
5523         end
5524         if not has_inf then
5525             Babel.arabic.justify_hlist(head, nil, gc, size, pack)
5526         end
5527     end
5528     return head
5529 end
5530
5531 function Babel.arabic.justify_hlist(head, line, gc, size, pack)
5532     local d, new
5533     local k_list, k_item, pos_inline
5534     local width, width_new, full, k_curr, wt_pos, goal, shift
5535     local subst_done = false
5536     local elong_map = Babel.arabic.elong_map
5537     local last_line
5538     local GLYPH = node.id'glyph'
5539     local KASHIDA = Babel.attr_kashida
5540     local LOCALE = Babel.attr_locale
5541
5542     if line == nil then
5543         line = {}
5544         line.glue_sign = 1
5545         line.glue_order = 0
5546         line.head = head
5547         line.shift = 0
5548         line.width = size
5549     end
5550
5551     % Exclude last line. todo. But-- it discards one-word lines, too!
5552     % ? Look for glue = 12:15
5553     if (line.glue_sign == 1 and line.glue_order == 0) then
5554         elongs = {}      % Stores elongated candidates of each line
5555         k_list = {}      % And all letters with kashida
5556         pos_inline = 0   % Not yet used
5557
5558         for n in node.traverse_id(GLYPH, line.head) do
5559             pos_inline = pos_inline + 1 % To find where it is. Not used.
5560
5561             % Elongated glyphs
5562             if elong_map then
5563                 local locale = node.get_attribute(n, LOCALE)
5564                 if elong_map[locale] and elong_map[locale][n.font] and
5565                     elong_map[locale][n.font][n.char] then
5566                     table.insert(elongs, {node = n, locale = locale} )
5567                     node.set_attribute(n.prev, KASHIDA, 0)
5568                 end
5569             end
5570
5571             % Tatwil
5572             if Babel.kashida_wts then
5573                 local k_wt = node.get_attribute(n, KASHIDA)

```

```

5574         if k_wt > 0 then % todo. parameter for multi inserts
5575             table.insert(k_list, {node = n, weight = k_wt, pos = pos_inline})
5576         end
5577     end
5578
5579 end % of node.traverse_id
5580
5581 if #elongs == 0 and #k_list == 0 then goto next_line end
5582 full = line.width
5583 shift = line.shift
5584 goal = full * Babel.arabic.justify_factor % A bit crude
5585 width = node.dimensions(line.head) % The 'natural' width
5586
5587 % == Elongated ==
5588 % Original idea taken from 'chickenize'
5589 while (#elongs > 0 and width < goal) do
5590     subst_done = true
5591     local x = #elongs
5592     local curr = elongs[x].node
5593     local oldchar = curr.char
5594     curr.char = elong_map[elongs[x].locale][curr.font][curr.char]
5595     width = node.dimensions(line.head) % Check if the line is too wide
5596     % Substitute back if the line would be too wide and break:
5597     if width > goal then
5598         curr.char = oldchar
5599         break
5600     end
5601     % If continue, pop the just substituted node from the list:
5602     table.remove(elongs, x)
5603 end
5604
5605 % == Tatwil ==
5606 if #k_list == 0 then goto next_line end
5607
5608 width = node.dimensions(line.head) % The 'natural' width
5609 k_curr = #k_list
5610 wt_pos = 1
5611
5612 while width < goal do
5613     subst_done = true
5614     k_item = k_list[k_curr].node
5615     if k_list[k_curr].weight == Babel.kashida_wts[wt_pos] then
5616         d = node.copy(k_item)
5617         d.char = 0x0640
5618         line.head, new = node.insert_after(line.head, k_item, d)
5619         width_new = node.dimensions(line.head)
5620         if width > goal or width == width_new then
5621             node.remove(line.head, new) % Better compute before
5622             break
5623         end
5624         width = width_new
5625     end
5626     if k_curr == 1 then
5627         k_curr = #k_list
5628         wt_pos = (wt_pos >= table.getn(Babel.kashida_wts)) and 1 or wt_pos+1
5629     else
5630         k_curr = k_curr - 1
5631     end
5632 end
5633
5634 ::next_line::
5635
5636 % Must take into account marks and ins, see luatex manual.

```



```

5637 % Have to be executed only if there are changes. Investigate
5638 % what's going on exactly.
5639 if subst_done and not gc then
5640     d = node.hpack(line.head, full, 'exactly')
5641     d.shift = shift
5642     node.insert_before(head, line, d)
5643     node.remove(head, line)
5644 end
5645 end % if process line
5646 end
5647 }
5648 \endgroup
5649 \fi\fi % Arabic just block

```

## 12.8 Common stuff

```

5650 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
5651 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@cckstdfonts}
5652 \DisableBabelHook{babel-fontspec}
5653 <<Font selection>>

```

## 12.9 Automatic fonts and ids switching

After defining the blocks for a number of scripts (must be extended and very likely fine tuned), we define a short function which just traverse the node list to carry out the replacements. The table `loc_to_scr` gets the locale form a script range (note the locale is the key, and that there is an intermediate table built on the fly for optimization). This locale is then used to get the `\language` and the `\localeid` as stored in `locale_props`, as well as the font (as requested). In the latter table a key starting with `/` maps the font from the global one (the key) to the local one (the value). Maths are skipped and discretionaries are handled in a special way.

```

5654 % TODO - to a lua file
5655 \directlua{
5656 Babel.script_blocks = {
5657   ['dflt'] = {},
5658   ['Arab'] = {{0x0600, 0x06FF}, {0x08A0, 0x08FF}, {0x0750, 0x077F},
5659               {0xFE70, 0xFEFF}, {0xFB50, 0xFDFF}, {0x1EE00, 0x1EEFF}},
5660   ['Armn'] = {{0x0530, 0x058F}},
5661   ['Beng'] = {{0x0980, 0x09FF}},
5662   ['Cher'] = {{0x13A0, 0x13FF}, {0xAB70, 0xABBF}},
5663   ['Copt'] = {{0x03E2, 0x03EF}, {0x2C80, 0x2CFF}, {0x102E0, 0x102FF}},
5664   ['Cyr1'] = {{0x0400, 0x04FF}, {0x0500, 0x052F}, {0x1C80, 0x1C8F},
5665               {0x2DE0, 0x2DFF}, {0xA640, 0xA69F}},
5666   ['Deva'] = {{0x0900, 0x097F}, {0xA8E0, 0xA8FF}},
5667   ['Ethi'] = {{0x1200, 0x137F}, {0x1380, 0x139F}, {0x2D80, 0x2DDF},
5668               {0xAB00, 0xAB2F}},
5669   ['Geor'] = {{0x10A0, 0x10FF}, {0x2D00, 0x2D2F}},
5670   % Don't follow strictly Unicode, which places some Coptic letters in
5671   % the 'Greek and Coptic' block
5672   ['Grek'] = {{0x0370, 0x03E1}, {0x03F0, 0x03FF}, {0x1F00, 0x1FFF}},
5673   ['Hans'] = {{0x2E80, 0x2EFF}, {0x3000, 0x303F}, {0x31C0, 0x31EF},
5674               {0x3300, 0x33FF}, {0x3400, 0x4DBF}, {0x4E00, 0x9FFF},
5675               {0xF900, 0xFAFF}, {0xFE30, 0xFE4F}, {0xFF00, 0xFFEF},
5676               {0x20000, 0x2A6DF}, {0x2A700, 0x2B73F},
5677               {0x2B740, 0x2B81F}, {0x2B820, 0x2CEAF},
5678               {0x2CEB0, 0x2EBEF}, {0x2F800, 0x2FA1F}},
5679   ['Hebr'] = {{0x0590, 0x05FF}},
5680   ['Jpan'] = {{0x3000, 0x303F}, {0x3040, 0x309F}, {0x30A0, 0x30FF},
5681               {0x4E00, 0x9FAF}, {0xFF00, 0xFFEF}},
5682   ['Khmr'] = {{0x1780, 0x17FF}, {0x19E0, 0x19FF}},
5683   ['Knda'] = {{0x0C80, 0x0CFF}},
5684   ['Kore'] = {{0x1100, 0x11FF}, {0x3000, 0x303F}, {0x3130, 0x318F},
5685               {0x4E00, 0x9FAF}, {0xA960, 0xA97F}, {0xAC00, 0xD7AF},
5686               {0xD7B0, 0xD7FF}, {0xFF00, 0xFFEF}},
5687   ['Laoo'] = {{0x0E80, 0x0EFF}},

```

```

5688 ['Latn'] = {{0x0000, 0x007F}, {0x0080, 0x00FF}, {0x0100, 0x017F},
5689             {0x0180, 0x024F}, {0x1E00, 0x1EFF}, {0x2C60, 0x2C7F},
5690             {0xA720, 0xA7FF}, {0xAB30, 0xAB6F}},
5691 ['Mahj'] = {{0x1150, 0x117F}},
5692 ['Mlym'] = {{0x0D00, 0x0D7F}},
5693 ['Mymr'] = {{0x1000, 0x109F}, {0xAA60, 0xAA7F}, {0xA9E0, 0xA9FF}},
5694 ['Orya'] = {{0x0B00, 0x0B7F}},
5695 ['Sinh'] = {{0x0D80, 0x0DFF}, {0x11E0, 0x11FF}},
5696 ['Sycr'] = {{0x0700, 0x074F}, {0x0860, 0x086F}},
5697 ['Taml'] = {{0x0B80, 0x0BFF}},
5698 ['Telu'] = {{0x0C00, 0x0C7F}},
5699 ['Tfng'] = {{0x2D30, 0x2D7F}},
5700 ['Thai'] = {{0x0E00, 0x0E7F}},
5701 ['Tibt'] = {{0x0F00, 0x0FFF}},
5702 ['Vaii'] = {{0xA500, 0xA63F}},
5703 ['Yiii'] = {{0xA000, 0xA48F}, {0xA490, 0xA4CF}}
5704 }
5705
5706 Babel.script_blocks.Cyrs = Babel.script_blocks.Cyrl
5707 Babel.script_blocks.Hant = Babel.script_blocks.Hans
5708 Babel.script_blocks.Kana = Babel.script_blocks.Jpan
5709
5710 function Babel.locale_map(head)
5711   if not Babel.locale_mapped then return head end
5712
5713   local LOCALE = Babel.attr_locale
5714   local GLYPH = node.id('glyph')
5715   local inmath = false
5716   local toloc_save
5717   for item in node.traverse(head) do
5718     local toloc
5719     if not inmath and item.id == GLYPH then
5720       % Optimization: build a table with the chars found
5721       if Babel.chr_to_loc[item.char] then
5722         toloc = Babel.chr_to_loc[item.char]
5723       else
5724         for lc, maps in pairs(Babel.loc_to_scr) do
5725           for _, rg in pairs(maps) do
5726             if item.char >= rg[1] and item.char <= rg[2] then
5727               Babel.chr_to_loc[item.char] = lc
5728               toloc = lc
5729               break
5730             end
5731           end
5732         end
5733       end
5734       % Now, take action, but treat composite chars in a different
5735       % fashion, because they 'inherit' the previous locale. Not yet
5736       % optimized.
5737       if not toloc and
5738         (item.char >= 0x0300 and item.char <= 0x036F) or
5739         (item.char >= 0x1AB0 and item.char <= 0x1AFF) or
5740         (item.char >= 0x1DC0 and item.char <= 0x1DFF) then
5741         toloc = toloc_save
5742       end
5743       if toloc and Babel.locale_props[toloc] and
5744         Babel.locale_props[toloc].letters and
5745         tex.getcatcode(item.char) \string~= 11 then
5746         toloc = nil
5747       end
5748       if toloc and toloc > -1 then
5749         if Babel.locale_props[toloc].lg then
5750           item.lang = Babel.locale_props[toloc].lg

```

```

5751         node.set_attribute(item, LOCALE, toloc)
5752     end
5753     if Babel.locale_props[toloc]['/'..item.font] then
5754         item.font = Babel.locale_props[toloc]['/'..item.font]
5755     end
5756     toloc_save = toloc
5757 end
5758 elseif not inmath and item.id == 7 then % Apply recursively
5759     item.replace = item.replace and Babel.locale_map(item.replace)
5760     item.pre      = item.pre and Babel.locale_map(item.pre)
5761     item.post     = item.post and Babel.locale_map(item.post)
5762 elseif item.id == node.id'math' then
5763     inmath = (item.subtype == 0)
5764 end
5765 end
5766 return head
5767 end
5768 }

```

The code for `\babelcharproperty` is straightforward. Just note the modified lua table can be different.

```

5769 \newcommand\babelcharproperty[1]{%
5770   \count@=#1\relax
5771   \ifvmode
5772     \expandafter\bbl@chprop
5773   \else
5774     \bbl@error{\string\babelcharproperty\space can be used only in\%
5775               vertical mode (preamble or between paragraphs)}%
5776     {See the manual for futher info}%
5777   \fi}
5778 \newcommand\bbl@chprop[3][\the\count@]{%
5779   \@tempcnta=#1\relax
5780   \bbl@ifunset{\bbl@chprop@#2}%
5781   {\bbl@error{No property named '#2'. Allowed values are\%
5782             direction (bc), mirror (bmg), and linebreak (lb)}%
5783   {See the manual for futher info}}%
5784   {}%
5785   \loop
5786     \bbl@cs{chprop@#2}{#3}%
5787     \ifnum\count@<\@tempcnta
5788       \advance\count@\@ne
5789     \repeat}
5790 \def\bbl@chprop@direction#1{%
5791   \directlua{
5792     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
5793     Babel.characters[\the\count@]['d'] = '#1'
5794   }}
5795 \let\bbl@chprop@bc\bbl@chprop@direction
5796 \def\bbl@chprop@mirror#1{%
5797   \directlua{
5798     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
5799     Babel.characters[\the\count@]['m'] = '\number#1'
5800   }}
5801 \let\bbl@chprop@bmg\bbl@chprop@mirror
5802 \def\bbl@chprop@linebreak#1{%
5803   \directlua{
5804     Babel.cjk_characters[\the\count@] = Babel.cjk_characters[\the\count@] or {}
5805     Babel.cjk_characters[\the\count@]['c'] = '#1'
5806   }}
5807 \let\bbl@chprop@lb\bbl@chprop@linebreak
5808 \def\bbl@chprop@locale#1{%
5809   \directlua{
5810     Babel.chr_to_loc = Babel.chr_to_loc or {}

```

```

5811 Babel.chr_to_loc[\the\count@] =
5812     \bbl@ifblank{#1}{-1000}{\the\bbl@cs{id@@#1}}\space
5813 }

```

Post-handling hyphenation patterns for non-standard rules, like ff to ff-f. There are still some issues with speed (not very slow, but still slow). The Lua code is below.

```

5814 \directlua{
5815     Babel.nohyphenation = \the\l@nohyphenation
5816 }

```

Now the  $\TeX$  high level interface, which requires the function defined above for converting strings to functions returning a string. These functions handle the  $\{n\}$  syntax. For example,  $\text{pre}=\{1\}\{1\}$ - becomes  $\text{function}(m) \text{ return } m[1]..m[1]..'-' \text{ end}$ , where  $m$  are the matches returned after applying the pattern. With a mapped capture the functions are similar to  $\text{function}(m) \text{ return Babel.capt\_map}(m[1],1) \text{ end}$ , where the last argument identifies the mapping to be applied to  $m[1]$ . The way it is carried out is somewhat tricky, but the effect is not dissimilar to lua load – save the code as string in a  $\TeX$  macro, and expand this macro at the appropriate place. As  $\text{\directlua}$  does not take into account the current catcode of  $\text{\@}$ , we just avoid this character in macro names (which explains the internal group, too).

```

5817 \begingroup
5818 \catcode\~ = 12
5819 \catcode\% = 12
5820 \catcode\& = 14
5821 \catcode\| = 12
5822 \gdef\babelprehyphenation{&
5823     \@ifnextchar[{\bbl@settransform{0}}{\bbl@settransform{0}}{]]}
5824 \gdef\babelposthyphenation{&
5825     \@ifnextchar[{\bbl@settransform{1}}{\bbl@settransform{1}}{]]}
5826 \gdef\bbl@postlinebreak{\bbl@settransform{2}}{]]} & WIP
5827 \gdef\bbl@settransform#1[#2]#3#4#5{&
5828     \ifcase#1
5829         \bbl@activateprehyphen
5830     \or
5831         \bbl@activateposthyphen
5832     \fi
5833 \begingroup
5834     \def\babeltempa{\bbl@add@list\babeltempb}&
5835     \let\babeltempb\empty
5836     \def\bbl@tempa{#5}&
5837     \bbl@replace\bbl@tempa{,}{,}& TODO. Ugly trick to preserve {}
5838     \expandafter\bbl@foreach\expandafter{\bbl@tempa}{&
5839         \bbl@ifsamestring{##1}{remove}&
5840         {\bbl@add@list\babeltempb{nil}}&
5841         {\directlua{
5842             local rep = [=[#1]=]
5843             rep = rep:gsub('^%s*(remove)%s*$', 'remove = true')
5844             rep = rep:gsub('^%s*(insert)%s*$', 'insert = true, ')
5845             rep = rep:gsub('(string)%s*=%s*([^\s,]*)', Babel.capture_func)
5846             if #1 == 0 or #1 == 2 then
5847                 rep = rep:gsub('(space)%s*=%s*([%d%.]+)%s+([%d%.]+)%s+([%d%.]+)',
5848                     'space = {' .. '%2, %3, %4' .. '}')
5849                 rep = rep:gsub('(spacefactor)%s*=%s*([%d%.]+)%s+([%d%.]+)%s+([%d%.]+)',
5850                     'spacefactor = {' .. '%2, %3, %4' .. '}')
5851                 rep = rep:gsub('(kashida)%s*=%s*([^\s,]*)', Babel.capture_kashida)
5852             else
5853                 rep = rep:gsub('(no)%s*=%s*([^\s,]*)', Babel.capture_func)
5854                 rep = rep:gsub('(pre)%s*=%s*([^\s,]*)', Babel.capture_func)
5855                 rep = rep:gsub('(post)%s*=%s*([^\s,]*)', Babel.capture_func)
5856             end
5857             tex.print([[\string\babeltempa{]] .. rep .. []]])
5858         }}&
5859     \bbl@foreach\babeltempb{&
5860         \bbl@forkv{##1}{&
5861             \in@{,###1,}{,nil,step,data,remove,insert,string,no,pre,&

```

```

5862         no,post,penalty,kashida,space,spacefactor,}%&
5863     \ifin\else
5864         \bbl@error
5865         {Bad option '####' in a transform.\\&
5866         I'll ignore it but expect more errors}&
5867         {See the manual for further info.}&
5868     \fi}&
5869 \let\bbl@kv@attribute\relax
5870 \let\bbl@kv@label\relax
5871 \let\bbl@kv@fonts\@empty
5872 \bbl@forkv{#2}{\bbl@csarg\edef{kv##1}{##2}}&
5873 \ifx\bbl@kv@fonts\@empty\else\bbl@settransfont\fi
5874 \ifx\bbl@kv@attribute\relax
5875     \ifx\bbl@kv@label\relax\else
5876         \bbl@exp{\bbl@trim@def\bbl@kv@fonts{\bbl@kv@fonts}}&
5877         \bbl@replace\bbl@kv@fonts{ },}&
5878         \edef\bbl@kv@attribute{\bbl@ATR\bbl@kv@label @#3\bbl@kv@fonts}&
5879         \count@ \z@
5880         \def\bbl@elt##1##2##3{&
5881             \bbl@ifsamestring{#3,\bbl@kv@label}{##1,##2}&
5882             {\bbl@ifsamestring{\bbl@kv@fonts}{##3}&
5883              {\count@ \@ne}&
5884              {\bbl@error
5885               {Transforms cannot be re-assigned to different\\&
5886               fonts. The conflict is in '\bbl@kv@label'.\\&
5887               Apply the same fonts or use a different label}&
5888               {See the manual for further details.}}}&
5889             }&
5890         \bbl@transfont@list
5891         \ifnum\count@=\z@
5892             \bbl@exp{\global\bbl@add\bbl@transfont@list
5893              {\bbl@elt{#3}{\bbl@kv@label}{\bbl@kv@fonts}}}&
5894         \fi
5895         \bbl@ifunset{\bbl@kv@attribute}&
5896         {\global\bbl@carg\newattribute{\bbl@kv@attribute}}&
5897         {}&
5898         \global\bbl@carg\setattribute{\bbl@kv@attribute}\@ne
5899     \fi
5900 \else
5901     \edef\bbl@kv@attribute{\expandafter\bbl@stripslash\bbl@kv@attribute}&
5902 \fi
5903 \directlua{
5904     local lbr = Babel.linebreaking.replacements[#1]
5905     local u = unicode.utf8
5906     local id, attr, label
5907     if #1 == 0 or #1 == 2 then
5908         id = \the\csname bbl@id@@#3\endcsname\space
5909     else
5910         id = \the\csname l@#3\endcsname\space
5911     end
5912     \ifx\bbl@kv@attribute\relax
5913         attr = -1
5914     \else
5915         attr = luatexbase.registernumber'\bbl@kv@attribute'
5916     \fi
5917     \ifx\bbl@kv@label\relax\else    %% Same refs:
5918         label = [==[\bbl@kv@label]==]
5919     \fi
5920     %% Convert pattern:
5921     local patt = string.gsub([==[#4]==], '%s', '')
5922     if #1 == 0 or #1 == 2 then
5923         patt = string.gsub(patt, '|', ' ')
5924     end

```

```

5925     if not u.find(patt, '()', nil, true) then
5926         patt = '()' .. patt .. '()'
5927     end
5928     if #1 == 1 then
5929         patt = string.gsub(patt, '%(%)^', '^()')
5930         patt = string.gsub(patt, '%$$(%)', '()$')
5931     end
5932     patt = u.gsub(patt, '{(.)}',
5933         function (n)
5934             return '%' .. (tonumber(n) and (tonumber(n)+1) or n)
5935         end)
5936     patt = u.gsub(patt, '{(%x%x%x%x+)}',
5937         function (n)
5938             return u.gsub(u.char(tonumber(n, 16)), '(%p)', '%%1')
5939         end)
5940     lbkr[id] = lbkr[id] or {}
5941     table.insert(lbkr[id],
5942         { label=label, attr=attr, pattern=patt, replace={\babeltempb} })
5943 }&%
5944 \endgroup}
5945 \endgroup
5946 \let\bb1@transfont@list\@empty
5947 \def\bb1@settransfont{%
5948     \global\let\bb1@settransfont\relax % Execute only once
5949     \gdef\bb1@transfont{%
5950         \def\bb1@elt####1####2####3{%
5951             \bb1@ifblank{####3}%
5952                 {\count@tw@}% Do nothing if no fonts
5953             {\count@z@
5954                 \bb1@foreach{####3}{%
5955                     \def\bb1@tempd{#####1}%
5956                     \edef\bb1@tempe{\bb1@transfam/\f@series/\f@shape}%
5957                     \ifx\bb1@tempd\bb1@tempe
5958                         \count@@ne
5959                     \else\ifx\bb1@tempd\bb1@transfam
5960                         \count@@ne
5961                     \fi\fi}%
5962                 \ifcase\count@
5963                     \bb1@csarg\unsetattribute{ATR@####2@####1@####3}%
5964                 \or
5965                     \bb1@csarg\setattribute{ATR@####2@####1@####3}\@ne
5966                 \fi}}%
5967             \bb1@transfont@list}%
5968     \AddToHook{selectfont}{\bb1@transfont}% Hooks are global.
5969     \gdef\bb1@transfam{-unknown-}%
5970     \bb1@foreach\bb1@font@fams{%
5971         \AddToHook{##1family}{\def\bb1@transfam{##1}}%
5972         \bb1@ifsamestring{\@nameuse{##1default}}\familydefault
5973         {\xdef\bb1@transfam{##1}}%
5974     }}}}
5975 \DeclareRobustCommand\enablelocaletransform[1]{%
5976     \bb1@ifunset{\bb1@ATR@#1@language @}%
5977     {\bb1@error
5978         {'#1' for '\language' cannot be enabled.\%
5979         Maybe there is a typo or it's a font-dependent transform}%
5980         {See the manual for further details.}}%
5981     {\bb1@csarg\setattribute{ATR@#1@language @}\@ne}}
5982 \DeclareRobustCommand\disablelocaletransform[1]{%
5983     \bb1@ifunset{\bb1@ATR@#1@language @}%
5984     {\bb1@error
5985         {'#1' for '\language' cannot be disabled.\%
5986         Maybe there is a typo or it's a font-dependent transform}%
5987         {See the manual for further details.}}%

```

```

5988     {\bbl@csarg\unsetattribute{ATR@#1@\language @}}
5989 \def\bbl@activateposthyphen{%
5990   \let\bbl@activateposthyphen\relax
5991   \directlua{
5992     require('babel-transforms.lua')
5993     Babel.linebreaking.add_after(Babel.post_hyphenate_replace)
5994   }}
5995 \def\bbl@activateprehyphen{%
5996   \let\bbl@activateprehyphen\relax
5997   \directlua{
5998     require('babel-transforms.lua')
5999     Babel.linebreaking.add_before(Babel.pre_hyphenate_replace)
6000   }}

```

## 12.10 Bidi

As a first step, add a handler for bidi and digits (and potentially other processes) just before luaotfload is applied, which is loaded by default by  $\text{\LaTeX}$ . Just in case, consider the possibility it has not been loaded.

```

6001 \def\bbl@activate@preotf{%
6002   \let\bbl@activate@preotf\relax % only once
6003   \directlua{
6004     Babel = Babel or {}
6005     %
6006     function Babel.pre_otfload_v(head)
6007       if Babel.numbers and Babel.digits_mapped then
6008         head = Babel.numbers(head)
6009       end
6010       if Babel.bidi_enabled then
6011         head = Babel.bidi(head, false, dir)
6012       end
6013       return head
6014     end
6015     %
6016     function Babel.pre_otfload_h(head, gc, sz, pt, dir)
6017       if Babel.numbers and Babel.digits_mapped then
6018         head = Babel.numbers(head)
6019       end
6020       if Babel.bidi_enabled then
6021         head = Babel.bidi(head, false, dir)
6022       end
6023       return head
6024     end
6025     %
6026     luatexbase.add_to_callback('pre_linebreak_filter',
6027       Babel.pre_otfload_v,
6028       'Babel.pre_otfload_v',
6029     luatexbase.priority_in_callback('pre_linebreak_filter',
6030       'luaotfload.node_processor') or nil)
6031     %
6032     luatexbase.add_to_callback('hpack_filter',
6033       Babel.pre_otfload_h,
6034       'Babel.pre_otfload_h',
6035     luatexbase.priority_in_callback('hpack_filter',
6036       'luaotfload.node_processor') or nil)
6037   }}

```

The basic setup. The output is modified at a very low level to set the `\bodydir` to the `\pagedir`. Sadly, we have to deal with boxes in math with basic, so the `\bbl@mathboxdir` hack is activated every math with the package option `bidi=`.

```

6038 \ifnum\bbl@bidimode>\@ne % Excludes default=1
6039   \let\bbl@beforeforeign\leavevmode
6040   \AtEndOfPackage{\EnableBabelHook{babel-bidi}}

```

```

6041 \RequirePackage{luatexbase}
6042 \bbl@activate@preotf
6043 \directlua{
6044     require('babel-data-bidi.lua')
6045     \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
6046         require('babel-bidi-basic.lua')
6047     \or
6048         require('babel-bidi-basic-r.lua')
6049     \fi}
6050 \newattribute\bbl@attr@dir
6051 \directlua{ Babel.attr_dir = luatexbase.registernumber'bbl@attr@dir' }
6052 \bbl@exp{\output{\bodydir\pagedir\the\output}}
6053 \fi
6054 \chardef\bbl@thetextdir\z@
6055 \chardef\bbl@thepardir\z@
6056 \def\bbl@getluadir#1{%
6057     \directlua{
6058         if tex.#1dir == 'TLT' then
6059             tex.sprint('0')
6060         elseif tex.#1dir == 'TRT' then
6061             tex.sprint('1')
6062         end}}
6063 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\textdir.. 3=0 lr/1 rl
6064     \ifcase#3\relax
6065         \ifcase\bbl@getluadir{#1}\relax\else
6066             #2 TLT\relax
6067         \fi
6068     \else
6069         \ifcase\bbl@getluadir{#1}\relax
6070             #2 TRT\relax
6071         \fi
6072     \fi}
6073 % ..00PPTT, with masks 0xC (par dir) and 0x3 (text dir)
6074 \def\bbl@thedir{0}
6075 \def\bbl@textdir#1{%
6076     \bbl@setluadir{text}\textdir{#1}%
6077     \chardef\bbl@thetextdir#1\relax
6078     \edef\bbl@thedir{\the\numexpr\bbl@thepardir*4+#1}%
6079     \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*4+#1}}
6080 \def\bbl@pardir#1{% Used twice
6081     \bbl@setluadir{par}\pardir{#1}%
6082     \chardef\bbl@thepardir#1\relax}
6083 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}% Used once
6084 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}% Unused
6085 \def\bbl@dirparastext{\pardir\the\textdir\relax}% Used once

```

RTL text inside math needs special attention. It affects not only to actual math stuff, but also to ‘tabular’, which is based on a fake math.

```

6086 \ifnum\bbl@bidimode>\z@
6087     \def\bbl@insidemath{0}%
6088     \def\bbl@everymath{\def\bbl@insidemath{1}}
6089     \def\bbl@everydisplay{\def\bbl@insidemath{2}}
6090     \frozen@everymath\expandafter{%
6091         \expandafter\bbl@everymath\the\frozen@everymath}
6092     \frozen@everydisplay\expandafter{%
6093         \expandafter\bbl@everydisplay\the\frozen@everydisplay}
6094     \AtBeginDocument{
6095         \directlua{
6096             function Babel.math_box_dir(head)
6097                 if not (token.get_macro('bbl@insidemath') == '0') then
6098                     if Babel.hlist_has_bidi(head) then
6099                         local d = node.new(node.id'dir')
6100                         d.dir = '+TRT'

```



```

6101         node.insert_before(head, node.has_glyph(head), d)
6102         for item in node.traverse(head) do
6103             node.set_attribute(item,
6104                 Babel.attr_dir, token.get_macro('bbl@thedir'))
6105         end
6106     end
6107 end
6108 return head
6109 end
6110 luatexbase.add_to_callback("hpack_filter", Babel.math_box_dir,
6111     "Babel.math_box_dir", 0)
6112 }}%
6113 \fi

```

## 12.11 Layout

Unlike xetex, luatex requires only minimal changes for right-to-left layouts, particularly in monolingual documents (the engine itself reverses boxes – including column order or headings –, margins, etc.) with `bidi=basic`, without having to patch almost any macro where text direction is relevant.

`\@hangfrom` is useful in many contexts and it is redefined always with the layout option.

There are, however, a number of issues when the text direction is not the same as the box direction (as set by `\bodydir`), and when `\parbox` and `\hangindent` are involved. Fortunately, latest releases of luatex simplify a lot the solution with `\shapemode`.

With the issue #15 I realized commands are best patched, instead of redefined. With a few lines, a modification could be applied to several classes and packages. Now, `tabular` seems to work (at least in simple cases) with `array`, `tabularx`, `hhline`, `colortbl`, `longtable`, `booktabs`, etc. However, `dcolum` still fails.

```

6114 \bbl@trace{Redefinitions for bidi layout}
6115 %
6116 <<{*More package options}>> ≡
6117 \chardef\bbl@eqnpos\z@
6118 \DeclareOption{leqno}{\chardef\bbl@eqnpos\@ne}
6119 \DeclareOption{fleqn}{\chardef\bbl@eqnpos\tw@}
6120 <</More package options>>
6121 %
6122 \ifnum\bbl@bidimode>\z@
6123   \ifx\matheqdirmode\undefined\else
6124     \matheqdirmode\@ne % A lua tex primitive
6125   \fi
6126   \let\bbl@eqnudir\relax
6127   \def\bbl@eqdel{()}
6128   \def\bbl@eqnum{%
6129     {\normalfont\normalcolor
6130       \expandafter\@firstoftwo\bbl@eqdel
6131       \theequation
6132       \expandafter\@secondoftwo\bbl@eqdel}}
6133   \def\bbl@puteqno#1{\eqno\hbox{#1}}
6134   \def\bbl@putleqno#1{\leqno\hbox{#1}}
6135   \def\bbl@eqno@flip#1{%
6136     \ifdim\predisplaysize=-\maxdimen
6137       \eqno
6138       \hb@xt@.01pt{\hb@xt@\displaywidth{\hss{#1}}\hss}%
6139     \else
6140       \leqno\hbox{#1}%
6141     \fi}
6142   \def\bbl@leqno@flip#1{%
6143     \ifdim\predisplaysize=-\maxdimen
6144       \leqno
6145       \hb@xt@.01pt{\hss\hb@xt@\displaywidth{#1}\hss}%
6146     \else
6147       \eqno\hbox{#1}%
6148     \fi}

```

```

6149 \AtBeginDocument{%
6150 \ifx\bb1@noamsmath\relax\else
6151 \ifx\maketag@@@% undefined % Normal equation, eqnarray
6152 \AddToHook{env/equation/begin}{%
6153 \ifnum\bb1@thetextdir>\z@
6154 \def\bb1@mathboxdir{\def\bb1@insidemath{1}}%
6155 \let\@eqnnum\bb1@eqnum
6156 \edef\bb1@eqnodir{\noexpand\bb1@textdir{\the\bb1@thetextdir}}%
6157 \chardef\bb1@thetextdir\z@
6158 \bb1@add\normalfont{\bb1@eqnodir}%
6159 \ifcase\bb1@eqnpos
6160 \let\bb1@puteqno\bb1@eqno@flip
6161 \or
6162 \let\bb1@puteqno\bb1@leqno@flip
6163 \fi
6164 \fi}%
6165 \ifnum\bb1@eqnpos=\tw@% \else
6166 \def\endequation{\bb1@puteqno{\@eqnnum}$$\@ignoretrue}%
6167 \fi
6168 \AddToHook{env/eqnarray/begin}{%
6169 \ifnum\bb1@thetextdir>\z@
6170 \def\bb1@mathboxdir{\def\bb1@insidemath{1}}%
6171 \edef\bb1@eqnodir{\noexpand\bb1@textdir{\the\bb1@thetextdir}}%
6172 \chardef\bb1@thetextdir\z@
6173 \bb1@add\normalfont{\bb1@eqnodir}%
6174 \ifnum\bb1@eqnpos=\@ne
6175 \def\@eqnnum{%
6176 \setbox\z@\hbox{\bb1@eqnum}%
6177 \hbox to0.01pt{\hss\hbox to\displaywidth{\box\z@\hss}}}%
6178 \else
6179 \let\@eqnnum\bb1@eqnum
6180 \fi
6181 \fi}
6182 % Hack. YA luatex bug?:
6183 \expandafter\bb1@sreplace\csname] \endcsname{${$}{\eqno\kern.001pt$}}%
6184 \else % amstex
6185 \bb1@exp{% Hack to hide maybe undefined conditionals:
6186 \chardef\bb1@eqnpos=0%
6187 \<iftagsleft@>1\<else>\<if\leqn>2\<fi>\<fi>\relax}%
6188 \ifnum\bb1@eqnpos=\@ne
6189 \let\bb1@ams@lap\hbox
6190 \else
6191 \let\bb1@ams@lap\llap
6192 \fi
6193 \ExplSyntaxOn
6194 \bb1@sreplace\intertext@{\normalbaselines}%
6195 {\normalbaselines
6196 \ifx\bb1@eqnodir\relax\else\bb1@pardir\@ne\bb1@eqnodir\fi}%
6197 \ExplSyntaxOff
6198 \def\bb1@ams@tagbox#1#2{#1{\bb1@eqnodir#2}}% #1=hbox|@lap|flip
6199 \ifx\bb1@ams@lap\hbox % leqno
6200 \def\bb1@ams@flip#1{%
6201 \hbox to 0.01pt{\hss\hbox to\displaywidth{{#1}\hss}}}%
6202 \else % eqno
6203 \def\bb1@ams@flip#1{%
6204 \hbox to 0.01pt{\hbox to\displaywidth{\hss{#1}\hss}}}%
6205 \fi
6206 \def\bb1@ams@preset#1{%
6207 \def\bb1@mathboxdir{\def\bb1@insidemath{1}}%
6208 \ifnum\bb1@thetextdir>\z@
6209 \edef\bb1@eqnodir{\noexpand\bb1@textdir{\the\bb1@thetextdir}}%
6210 \bb1@sreplace\textdef@{\hbox}{\bb1@ams@tagbox\hbox}%
6211 \bb1@sreplace\maketag@@@{\hbox}{\bb1@ams@tagbox#1}%

```

```

6212     \fi}%
6213 \ifnum\bb1@eqnpos=\tw@ \else
6214     \def\bb1@ams@equation{%
6215         \def\bb1@mathboxdir{\def\bb1@insidemath{1}}%
6216         \ifnum\bb1@thetextdir>\z@
6217             \edef\bb1@eqnodir{\noexpand\bb1@textdir{\the\bb1@thetextdir}}%
6218             \chardef\bb1@thetextdir\z@
6219             \bb1@add\normalfont{\bb1@eqnodir}%
6220             \ifcase\bb1@eqnpos
6221                 \def\veqno##1##2{\bb1@eqno@flip{##1##2}}%
6222             \or
6223                 \def\veqno##1##2{\bb1@leqno@flip{##1##2}}%
6224             \fi
6225         \fi}%
6226 \AddToHook{env/equation/begin}{\bb1@ams@equation}%
6227 \AddToHook{env/equation*/begin}{\bb1@ams@equation}%
6228 \fi
6229 \AddToHook{env/cases/begin}{\bb1@ams@preset\bb1@ams@lap}%
6230 \AddToHook{env/multline/begin}{\bb1@ams@preset\hbox}%
6231 \AddToHook{env/gather/begin}{\bb1@ams@preset\bb1@ams@lap}%
6232 \AddToHook{env/gather*/begin}{\bb1@ams@preset\bb1@ams@lap}%
6233 \AddToHook{env/align/begin}{\bb1@ams@preset\bb1@ams@lap}%
6234 \AddToHook{env/align*/begin}{\bb1@ams@preset\bb1@ams@lap}%
6235 \AddToHook{env/eqnalign/begin}{\bb1@ams@preset\hbox}%
6236 % Hackish, for proper alignment. Don't ask me why it works!:
6237 \bb1@exp{% Avoid a 'visible' conditional
6238     \\\AddToHook{env/align*/end}{\<iftag@>\<else>\\tag*{\<fi>}}%
6239 \AddToHook{env/flalign/begin}{\bb1@ams@preset\hbox}%
6240 \AddToHook{env/split/before}{%
6241     \def\bb1@mathboxdir{\def\bb1@insidemath{1}}%
6242     \ifnum\bb1@thetextdir>\z@
6243         \bb1@ifsamestring\@currentenv{equation}%
6244         {\ifx\bb1@ams@lap\hbox % leqno
6245             \def\bb1@ams@flip#1{%
6246                 \hbox to 0.01pt{\hbox to\displaywidth{##1}\hss}\hss}%
6247             \else
6248                 \def\bb1@ams@flip#1{%
6249                     \hbox to 0.01pt{\hss\hbox to\displaywidth{\hss{##1}}}%
6250                 \fi}%
6251             }%
6252         \fi}%
6253 \fi\fi}
6254 \fi
6255 \def\bb1@provide@extra#1{%
6256     % == Counters: mapdigits ==
6257     % Native digits
6258     \ifx\bb1@KVP@mapdigits\@nnil\else
6259         \bb1@ifunset{bb1@dgnat\@languagename}{}%
6260         {\RequirePackage{luatexbase}%
6261         \bb1@activate@preotf
6262         \directlua{
6263             Babel = Babel or {} %%% -> presets in luababel
6264             Babel.digits_mapped = true
6265             Babel.digits = Babel.digits or {}
6266             Babel.digits[\the\localeid] =
6267                 table.pack(string.utfvalue('\bb1@c1{dgnat}'))
6268             if not Babel.numbers then
6269                 function Babel.numbers(head)
6270                     local LOCALE = Babel.attr_locale
6271                     local GLYPH = node.id'glyph'
6272                     local inmath = false
6273                     for item in node.traverse(head) do
6274                         if not inmath and item.id == GLYPH then

```

```

6275         local temp = node.get_attribute(item, LOCALE)
6276         if Babel.digits[temp] then
6277             local chr = item.char
6278             if chr > 47 and chr < 58 then
6279                 item.char = Babel.digits[temp][chr-47]
6280             end
6281         end
6282         elseif item.id == node.id'math' then
6283             inmath = (item.subtype == 0)
6284         end
6285     end
6286     return head
6287 end
6288 end
6289 }}%
6290 \fi
6291 % == transforms ==
6292 \ifx\bb1@KVP@transforms\@nnil\else
6293     \def\bb1@elt##1##2##3{%
6294         \in@{$$transforms.}{$##1}%
6295         \ifin@
6296             \def\bb1@tempa{##1}%
6297             \bb1@replace\bb1@tempa{transforms.}{}%
6298             \bb1@carg\bb1@transforms{babel\bb1@tempa}{##2}{##3}%
6299         \fi}%
6300     \csname bbl@inidata@\language\endcsname
6301     \bb1@release@transforms\relax % \relax closes the last item.
6302 \fi}
6303 % Start tabular here: WIP
6304 \def\localerestoredirs{%
6305     \ifcase\bb1@thetextdir
6306         \ifnum\textdirection=\z@\else\textdir TLT\fi
6307     \else
6308         \ifnum\textdirection=\@ne\else\textdir TRT\fi
6309     \fi
6310     \ifcase\bb1@thepardir
6311         \ifnum\pardirection=\z@\else\pardir TLT\bodydir TLT\fi
6312     \else
6313         \ifnum\pardirection=\@ne\else\pardir TRT\bodydir TRT\fi
6314     \fi}
6315 \ifx\AddToHook\@undefined\endinput\fi % if plain
6316 \IfBabelLayout{tabular}%
6317     {\chardef\bb1@tabular@mode\tw@}% All RTL
6318     {\IfBabelLayout{notabular}%
6319         {\chardef\bb1@tabular@mode\z@}%
6320         {\chardef\bb1@tabular@mode\@ne}% Mixed, with LTR cols
6321 \ifnum\bb1@tabular@mode=\@ne
6322     \let\bb1@parabefore\relax
6323     \AddToHook{para/before}{\bb1@parabefore}%
6324     \AtBeginDocument{%
6325         \bb1@replace\@tabular{$}{$}%
6326         \def\bb1@insidemath{0}%
6327         \def\bb1@parabefore{\localerestoredirs}}%
6328     \bb1@ifunset{\@tabclassz}{}%
6329     \bb1@exp{% Hide conditionals
6330         \\\bb1@sreplace\\ \@tabclassz
6331         {\<ifcase>\\ \@chnum}{\\ \localerestoredirs\<ifcase>\\ \@chnum}}}%
6332     \@ifpackageloaded{colortbl}%
6333         {\bb1@sreplace\@classz
6334             {\hbox\bgroup\bgroup}{\hbox\bgroup\bgroup\localerestoredirs}}%
6335         {\@ifpackageloaded{array}%
6336             {\bb1@exp{% Hide conditionals
6337                 \\\bb1@sreplace\\ \@classz

```

```

6338         {\<ifcase>\\@chnum}%
6339         {\bgroup\\localerestoredirs\<ifcase>\\@chnum}%
6340         \\bbl@sreplace\\@classz
6341         {\do@row@strut\<fi>}{\do@row@strut\<fi>\egroup}}}%
6342     {}}}
6343 \fi
6344 \ifx\bbl@opt@layout\@nnil\endinput\fi % if no layout

OMEGA provided a companion to \mathdir (\nextfakemath) for those cases where we did not want it
to be applied, so that the writing direction of the main text was left unchanged. \bbl@nextfake is an
attempt to emulate it, because luatex has removed it. Also, \parshape does not honour \parshape by
default, so we need to redefine \@hangfrom.

6345 \ifnum\bbl@bidimode>\z@
6346   \def\bbl@nextfake#1{% non-local changes, use always inside a group!
6347     \bbl@exp{%
6348       \def\\bbl@insidemath{0}%
6349       \mathdir\the\bodydir
6350       #1% Once entered in math, set boxes to restore values
6351       \<ifmmode>%
6352       \everyvbox{%
6353         \the\everyvbox
6354         \bodydir\the\bodydir
6355         \mathdir\the\mathdir
6356         \everyhbox{\the\everyhbox}%
6357         \everyvbox{\the\everyvbox}}%
6358       \everyhbox{%
6359         \the\everyhbox
6360         \bodydir\the\bodydir
6361         \mathdir\the\mathdir
6362         \everyhbox{\the\everyhbox}%
6363         \everyvbox{\the\everyvbox}}%
6364       \<fi>}}%
6365   \def\@hangfrom#1{%
6366     \setbox\@tempboxa\hbox{#1}%
6367     \hangindent\wd\@tempboxa
6368     \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
6369       \shapemode\@ne
6370     \fi
6371     \noindent\box\@tempboxa}
6372 \fi

6373 \IfBabelLayout{tabular}
6374 {\let\bbl@OL@tabular\@tabular
6375  \bbl@replace\@tabular{$}{\bbl@nextfake$}%
6376  \let\bbl@NL@tabular\@tabular
6377  \AtBeginDocument{%
6378    \ifx\bbl@NL@tabular\@tabular\else
6379      \bbl@replace\@tabular{$}{\bbl@nextfake$}%
6380    \let\bbl@NL@tabular\@tabular
6381    \fi}}
6382 {}

6383 \IfBabelLayout{lists}
6384 {\let\bbl@OL@list\list
6385  \bbl@sreplace\list{\parshape}{\bbl@listparshape}%
6386  \let\bbl@NL@list\list
6387  \def\bbl@listparshape#1#2#3{%
6388    \parshape #1 #2 #3 %
6389    \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
6390      \shapemode\tw@
6391    \fi}}
6392 {}

6393 \IfBabelLayout{graphics}
6394 {\let\bbl@pictresetdir\relax
6395  \def\bbl@pictsetdir#1{%

```

```

6396 \ifcase\bb1@thetextdir
6397 \let\bb1@pictresetdir\relax
6398 \else
6399 \ifcase#1\bodydir TLT % Remember this sets the inner boxes
6400 \or\textdir TLT
6401 \else\bodydir TLT \textdir TLT
6402 \fi
6403 % \(\text|par)dir required in pgf:
6404 \def\bb1@pictresetdir{\bodydir TRT\pardir TRT\textdir TRT\relax}%
6405 \fi}%
6406 \AddToHook{env/picture/begin}{\bb1@pictsetdir\tw}%
6407 \directlua{
6408 Babel.get_picture_dir = true
6409 Babel.picture_has_bidi = 0
6410 %
6411 function Babel.picture_dir (head)
6412 if not Babel.get_picture_dir then return head end
6413 if Babel.hlist_has_bidi(head) then
6414 Babel.picture_has_bidi = 1
6415 end
6416 return head
6417 end
6418 luatexbase.add_to_callback("hpack_filter", Babel.picture_dir,
6419 "Babel.picture_dir")
6420 }%
6421 \AtBeginDocument{%
6422 \def\LS@rot{%
6423 \setbox\@outputbox\ vbox{%
6424 \hbox dir TLT{\rotatebox{90}{\box\@outputbox}}}%
6425 \long\def\put(#1,#2)#3{%
6426 \@killglue
6427 % Try:
6428 \ifx\bb1@pictresetdir\relax
6429 \def\bb1@tempc{0}%
6430 \else
6431 \directlua{
6432 Babel.get_picture_dir = true
6433 Babel.picture_has_bidi = 0
6434 }%
6435 \setbox\z@\hb@xt@\z@{%
6436 \@defaultunitsset\@tempdimc{#1}\unitlength
6437 \kern\@tempdimc
6438 #3\hss}% TODO: #3 executed twice (below). That's bad.
6439 \edef\bb1@tempc{\directlua{tex.print(Babel.picture_has_bidi)}}%
6440 \fi
6441 % Do:
6442 \@defaultunitsset\@tempdimc{#2}\unitlength
6443 \raise\@tempdimc\hb@xt@\z@{%
6444 \@defaultunitsset\@tempdimc{#1}\unitlength
6445 \kern\@tempdimc
6446 {\ifnum\bb1@tempc>\z@\bb1@pictresetdir\fi#3}\hss}%
6447 \ignorespaces}%
6448 \MakeRobust\put}%
6449 \AtBeginDocument
6450 {\AddToHook{cmd/diagbox@pict/before}{\let\bb1@pictsetdir\@gobble}%
6451 \ifx\pgfpicture\undefined\else % TODO. Allow deactivate?
6452 \AddToHook{env/pgfpicture/begin}{\bb1@pictsetdir\@ne}%
6453 \bb1@add\pgfinterruptpicture{\bb1@pictresetdir}%
6454 \bb1@add\pgfsys@beginpicture{\bb1@pictsetdir\z@}%
6455 \fi
6456 \ifx\tikzpicture\undefined\else
6457 \AddToHook{env/tikzpicture/begin}{\bb1@pictsetdir\z@}%
6458 \bb1@add\tikz@atbegin@node{\bb1@pictresetdir}%

```

```

6459     \bbl@sreplace\tikz{\begingroup}{\begingroup\bbl@pictsetdir\tw@}%
6460     \fi
6461     \ifx\tcolorbox\undefined\else
6462       \def\tcb@drawing@env@begin{%
6463         \csname tcb@before@\tcb@split@state\endcsname
6464         \bbl@pictsetdir\tw@
6465         \begin{\kvtcb@graphenv}%
6466         \tcb@bbdraw%
6467         \tcb@apply@graph@patches
6468         }%
6469       \def\tcb@drawing@env@end{%
6470         \end{\kvtcb@graphenv}%
6471         \bbl@pictresetdir
6472         \csname tcb@after@\tcb@split@state\endcsname
6473         }%
6474       \fi
6475     }}
6476   {}

```

Implicitly reverses sectioning labels in bidi=basic-r, because the full stop is not in contact with L numbers any more. I think there must be a better way. Assumes bidi=basic, but there are some additional readjustments for bidi=default.

```

6477 \IfBabelLayout{counters*}%
6478   {\bbl@add\bbl@opt@layout{.counters.}%
6479     \directlua{
6480       luatexbase.add_to_callback("process_output_buffer",
6481         Babel.discard_sublr , "Babel.discard_sublr") }%
6482   }{}
6483 \IfBabelLayout{counters}%
6484   {\let\bbl@OL@@@textsuperscript\@textsuperscript
6485     \bbl@sreplace\@textsuperscript{\m@th}{\m@th\mathdir\pagedir}%
6486     \let\bbl@latinarabic=\@arabic
6487     \let\bbl@OL@@arabic\@arabic
6488     \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
6489     \ifpackagewith{babel}{bidi=default}%
6490       {\let\bbl@asciroman=\@roman
6491         \let\bbl@OL@@roman\@roman
6492         \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%
6493         \let\bbl@asciiRoman=\@Roman
6494         \let\bbl@OL@@roman\@Roman
6495         \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}%
6496         \let\bbl@OL@labelenumii\labelenumii
6497         \def\labelenumii{}\theenumii}%
6498         \let\bbl@OL@p@enumiii\p@enumiii
6499         \def\p@enumiii{\p@enumii}\theenumii{}}{}{}{}
6500   }{Footnote changes}
6501 \IfBabelLayout{footnotes}%
6502   {\let\bbl@OL@footnote\footnote
6503     \babelFootnote\footnote\language{}{}}%
6504     \babelFootnote\localfootnote\language{}{}}%
6505     \babelFootnote\mainfootnote{}{}{}
6506   {}

```

Some  $\TeX$  macros use internally the math mode for text formatting. They have very little in common and are grouped here, as a single option.

```

6507 \IfBabelLayout{extras}%
6508   {\let\bbl@OL@underline\underline
6509     \bbl@sreplace\underline{$\@@@underline}{\bbl@nextfake$\@@@underline}%
6510     \let\bbl@OL@LaTeX2e\LaTeX2e
6511     \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
6512       \if b\expandafter\@car\@series\@nil\boldmath\fi
6513       \babelsublr{%
6514         \LaTeX\kern.15em2\bbl@nextfake$_{\textstyle\varepsilon}$}}}%
6515   {}

```

6516  $\langle$ /luatex $\rangle$

## 12.12 Lua: transforms

After declaring the table containing the patterns with their replacements, we define some auxiliary functions: `str_to_nodes` converts the string returned by a function to a node list, taking the node at base as a model (font, language, etc.); `fetch_word` fetches a series of glyphs and discretionaries, which pattern is matched against (if there is a match, it is called again before trying other patterns, and this is very likely the main bottleneck).

`post_hyphenate_replace` is the callback applied after `lang.hyphenate`. This means the automatic hyphenation points are known. As empty captures return a byte position (as explained in the `luatex` manual), we must convert it to a utf8 position. With `first`, the last byte can be the leading byte in a utf8 sequence, so we just remove it and add 1 to the resulting length. With `last` we must take into account the capture position points to the next character. Here `word_head` points to the starting node of the text to be matched.

```
6517  $\langle$ *transforms $\rangle$ 
6518 Babel.linebreaking.replacements = {}
6519 Babel.linebreaking.replacements[0] = {} -- pre
6520 Babel.linebreaking.replacements[1] = {} -- post
6521 Babel.linebreaking.replacements[2] = {} -- post-line WIP
6522
6523 -- Discretionaries contain strings as nodes
6524 function Babel.str_to_nodes(fn, matches, base)
6525   local n, head, last
6526   if fn == nil then return nil end
6527   for s in string.utfvalues(fn(matches)) do
6528     if base.id == 7 then
6529       base = base.replace
6530     end
6531     n = node.copy(base)
6532     n.char = s
6533     if not head then
6534       head = n
6535     else
6536       last.next = n
6537     end
6538     last = n
6539   end
6540   return head
6541 end
6542
6543 Babel.fetch_subtext = {}
6544
6545 Babel.ignore_pre_char = function(node)
6546   return (node.lang == Babel.nohyphenation)
6547 end
6548
6549 -- Merging both functions doesn't seem feasible, because there are too
6550 -- many differences.
6551 Babel.fetch_subtext[0] = function(head)
6552   local word_string = ''
6553   local word_nodes = {}
6554   local lang
6555   local item = head
6556   local inmath = false
6557
6558   while item do
6559
6560     if item.id == 11 then
6561       inmath = (item.subtype == 0)
6562     end
6563
6564     if inmath then
```



```

6565     -- pass
6566
6567 elseif item.id == 29 then
6568     local locale = node.get_attribute(item, Babel.attr_locale)
6569
6570     if lang == locale or lang == nil then
6571         lang = lang or locale
6572         if Babel.ignore_pre_char(item) then
6573             word_string = word_string .. Babel.us_char
6574         else
6575             word_string = word_string .. unicode.utf8.char(item.char)
6576         end
6577         word_nodes[#word_nodes+1] = item
6578     else
6579         break
6580     end
6581
6582 elseif item.id == 12 and item.subtype == 13 then
6583     word_string = word_string .. ' '
6584     word_nodes[#word_nodes+1] = item
6585
6586     -- Ignore leading unrecognized nodes, too.
6587     elseif word_string ~= '' then
6588         word_string = word_string .. Babel.us_char
6589         word_nodes[#word_nodes+1] = item -- Will be ignored
6590     end
6591
6592     item = item.next
6593 end
6594
6595 -- Here and above we remove some trailing chars but not the
6596 -- corresponding nodes. But they aren't accessed.
6597 if word_string:sub(-1) == ' ' then
6598     word_string = word_string:sub(1,-2)
6599 end
6600 word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
6601 return word_string, word_nodes, item, lang
6602 end
6603
6604 Babel.fetch_subtext[1] = function(head)
6605     local word_string = ''
6606     local word_nodes = {}
6607     local lang
6608     local item = head
6609     local inmath = false
6610
6611     while item do
6612
6613         if item.id == 11 then
6614             inmath = (item.subtype == 0)
6615         end
6616
6617         if inmath then
6618             -- pass
6619
6620         elseif item.id == 29 then
6621             if item.lang == lang or lang == nil then
6622                 if (item.char ~= 124) and (item.char ~= 61) then -- not =, not |
6623                     lang = lang or item.lang
6624                     word_string = word_string .. unicode.utf8.char(item.char)
6625                     word_nodes[#word_nodes+1] = item
6626                 end
6627             else

```

```

6628         break
6629     end
6630
6631     elseif item.id == 7 and item.subtype == 2 then
6632         word_string = word_string .. '='
6633         word_nodes[#word_nodes+1] = item
6634
6635     elseif item.id == 7 and item.subtype == 3 then
6636         word_string = word_string .. '|'
6637         word_nodes[#word_nodes+1] = item
6638
6639     -- (1) Go to next word if nothing was found, and (2) implicitly
6640     -- remove leading USs.
6641     elseif word_string == '' then
6642         -- pass
6643
6644     -- This is the responsible for splitting by words.
6645     elseif (item.id == 12 and item.subtype == 13) then
6646         break
6647
6648     else
6649         word_string = word_string .. Babel.us_char
6650         word_nodes[#word_nodes+1] = item -- Will be ignored
6651     end
6652
6653     item = item.next
6654 end
6655
6656 word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
6657 return word_string, word_nodes, item, lang
6658 end
6659
6660 function Babel.pre_hyphenate_replace(head)
6661     Babel.hyphenate_replace(head, 0)
6662 end
6663
6664 function Babel.post_hyphenate_replace(head)
6665     Babel.hyphenate_replace(head, 1)
6666 end
6667
6668 Babel.us_char = string.char(31)
6669
6670 function Babel.hyphenate_replace(head, mode)
6671     local u = unicode.utf8
6672     local lbkr = Babel.linebreaking.replacements[mode]
6673     if mode == 2 then mode = 0 end -- WIP
6674
6675     local word_head = head
6676
6677     while true do -- for each subtext block
6678
6679         local w, w_nodes, nw, lang = Babel.fetch_subtext[mode](word_head)
6680
6681         if Babel.debug then
6682             print()
6683             print((mode == 0) and '@@@<' or '@@@>', w)
6684         end
6685
6686         if nw == nil and w == '' then break end
6687
6688         if not lang then goto next end
6689         if not lbkr[lang] then goto next end
6690

```

```

6691 -- For each saved (pre|post)hyphenation. TODO. Reconsider how
6692 -- loops are nested.
6693 for k=1, #lbr[lang] do
6694     local p = lbr[lang][k].pattern
6695     local r = lbr[lang][k].replace
6696     local attr = lbr[lang][k].attr or -1
6697
6698     if Babel.debug then
6699         print('*****', p, mode)
6700     end
6701
6702     -- This variable is set in some cases below to the first *byte*
6703     -- after the match, either as found by u.match (faster) or the
6704     -- computed position based on sc if w has changed.
6705     local last_match = 0
6706     local step = 0
6707
6708     -- For every match.
6709     while true do
6710         if Babel.debug then
6711             print('====')
6712         end
6713         local new -- used when inserting and removing nodes
6714
6715         local matches = { u.match(w, p, last_match) }
6716
6717         if #matches < 2 then break end
6718
6719         -- Get and remove empty captures (with ()'s, which return a
6720         -- number with the position), and keep actual captures
6721         -- (from (...)), if any, in matches.
6722         local first = table.remove(matches, 1)
6723         local last = table.remove(matches, #matches)
6724         -- Non re-fetched substrings may contain \31, which separates
6725         -- subsubstrings.
6726         if string.find(w:sub(first, last-1), Babel.us_char) then break end
6727
6728         local save_last = last -- with A()BC()D, points to D
6729
6730         -- Fix offsets, from bytes to unicode. Explained above.
6731         first = u.len(w:sub(1, first-1)) + 1
6732         last = u.len(w:sub(1, last-1)) -- now last points to C
6733
6734         -- This loop stores in a small table the nodes
6735         -- corresponding to the pattern. Used by 'data' to provide a
6736         -- predictable behavior with 'insert' (w_nodes is modified on
6737         -- the fly), and also access to 'remove'd nodes.
6738         local sc = first-1 -- Used below, too
6739         local data_nodes = {}
6740
6741         local enabled = true
6742         for q = 1, last-first+1 do
6743             data_nodes[q] = w_nodes[sc+q]
6744             if enabled
6745                 and attr > -1
6746                 and not node.has_attribute(data_nodes[q], attr)
6747             then
6748                 enabled = false
6749             end
6750         end
6751
6752         -- This loop traverses the matched substring and takes the
6753         -- corresponding action stored in the replacement list.

```

```

6754      -- sc = the position in substr nodes / string
6755      -- rc = the replacement table index
6756      local rc = 0
6757
6758      while rc < last-first+1 do -- for each replacement
6759          if Babel.debug then
6760              print('.....', rc + 1)
6761          end
6762          sc = sc + 1
6763          rc = rc + 1
6764
6765          if Babel.debug then
6766              Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6767              local ss = ''
6768              for itt in node.traverse(head) do
6769                  if itt.id == 29 then
6770                      ss = ss .. unicode.utf8.char(itt.char)
6771                  else
6772                      ss = ss .. '{' .. itt.id .. '}'
6773                  end
6774              end
6775              print('*****', ss)
6776
6777          end
6778
6779          local crep = r[rc]
6780          local item = w_nodes[sc]
6781          local item_base = item
6782          local placeholder = Babel.us_char
6783          local d
6784
6785          if crep and crep.data then
6786              item_base = data_nodes[crep.data]
6787          end
6788
6789          if crep then
6790              step = crep.step or 0
6791          end
6792
6793          if (not enabled) or (crep and next(crep) == nil) then -- = {}
6794              last_match = save_last    -- Optimization
6795              goto next
6796
6797          elseif crep == nil or crep.remove then
6798              node.remove(head, item)
6799              table.remove(w_nodes, sc)
6800              w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
6801              sc = sc - 1 -- Nothing has been inserted.
6802              last_match = utf8.offset(w, sc+1+step)
6803              goto next
6804
6805          elseif crep and crep.kashida then -- Experimental
6806              node.set_attribute(item,
6807                  Babel.attr_kashida,
6808                  crep.kashida)
6809              last_match = utf8.offset(w, sc+1+step)
6810              goto next
6811
6812          elseif crep and crep.string then
6813              local str = crep.string(matches)
6814              if str == '' then -- Gather with nil
6815                  node.remove(head, item)
6816                  table.remove(w_nodes, sc)

```

```

6817         w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
6818         sc = sc - 1 -- Nothing has been inserted.
6819     else
6820         local loop_first = true
6821         for s in string.utfvalues(str) do
6822             d = node.copy(item_base)
6823             d.char = s
6824             if loop_first then
6825                 loop_first = false
6826                 head, new = node.insert_before(head, item, d)
6827                 if sc == 1 then
6828                     word_head = head
6829                 end
6830                 w_nodes[sc] = d
6831                 w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc+1)
6832             else
6833                 sc = sc + 1
6834                 head, new = node.insert_before(head, item, d)
6835                 table.insert(w_nodes, sc, new)
6836                 w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc)
6837             end
6838             if Babel.debug then
6839                 print('.....', 'str')
6840                 Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6841             end
6842             end -- for
6843             node.remove(head, item)
6844         end -- if ''
6845         last_match = utf8.offset(w, sc+1+step)
6846         goto next
6847
6848     elseif mode == 1 and crep and (crep.pre or crep.no or crep.post) then
6849         d = node.new(7, 0) -- (disc, discretionary)
6850         d.pre = Babel.str_to_nodes(crep.pre, matches, item_base)
6851         d.post = Babel.str_to_nodes(crep.post, matches, item_base)
6852         d.replace = Babel.str_to_nodes(crep.no, matches, item_base)
6853         d.attr = item_base.attr
6854         if crep.pre == nil then -- TeXbook p96
6855             d.penalty = crep.penalty or tex.hyphenpenalty
6856         else
6857             d.penalty = crep.penalty or tex.exhyphenpenalty
6858         end
6859         placeholder = '|'
6860         head, new = node.insert_before(head, item, d)
6861
6862     elseif mode == 0 and crep and (crep.pre or crep.no or crep.post) then
6863         -- ERROR
6864
6865     elseif crep and crep.penalty then
6866         d = node.new(14, 0) -- (penalty, userpenalty)
6867         d.attr = item_base.attr
6868         d.penalty = crep.penalty
6869         head, new = node.insert_before(head, item, d)
6870
6871     elseif crep and crep.space then
6872         -- 655360 = 10 pt = 10 * 65536 sp
6873         d = node.new(12, 13) -- (glue, spaceskip)
6874         local quad = font.getfont(item_base.font).size or 655360
6875         node.setglue(d, crep.space[1] * quad,
6876                     crep.space[2] * quad,
6877                     crep.space[3] * quad)
6878         if mode == 0 then
6879             placeholder = ' '

```

```

6880         end
6881         head, new = node.insert_before(head, item, d)
6882
6883     elseif crep and crep.spacefactor then
6884         d = node.new(12, 13) -- (glue, spaceskip)
6885         local base_font = font.getfont(item_base.font)
6886         node.setglue(d,
6887             crep.spacefactor[1] * base_font.parameters['space'],
6888             crep.spacefactor[2] * base_font.parameters['space_stretch'],
6889             crep.spacefactor[3] * base_font.parameters['space_shrink'])
6890         if mode == 0 then
6891             placeholder = ' '
6892         end
6893         head, new = node.insert_before(head, item, d)
6894
6895     elseif mode == 0 and crep and crep.space then
6896         -- ERROR
6897
6898     end -- ie replacement cases
6899
6900     -- Shared by disc, space and penalty.
6901     if sc == 1 then
6902         word_head = head
6903     end
6904     if crep.insert then
6905         w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc)
6906         table.insert(w_nodes, sc, new)
6907         last = last + 1
6908     else
6909         w_nodes[sc] = d
6910         node.remove(head, item)
6911         w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc+1)
6912     end
6913
6914     last_match = utf8.offset(w, sc+1+step)
6915
6916     ::next::
6917
6918 end -- for each replacement
6919
6920 if Babel.debug then
6921     print('.....', '/')
6922     Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6923 end
6924
6925 end -- for match
6926
6927 end -- for patterns
6928
6929 ::next::
6930 word_head = nw
6931 end -- for substring
6932 return head
6933 end
6934
6935 -- This table stores capture maps, numbered consecutively
6936 Babel.capture_maps = {}
6937
6938 -- The following functions belong to the next macro
6939 function Babel.capture_func(key, cap)
6940     local ret = "[" .. cap:gsub('{{[0-9]}}', "]]..m[%1]..[" .. "]"
6941     local cnt
6942     local u = unicode.utf8

```

```

6943 ret, cnt = ret:gsub('{{([0-9])|([^\]|+)|(.-)}}', Babel.capture_func_map)
6944 if cnt == 0 then
6945     ret = u.gsub(ret, '{{(%x%x%x%x+)}}',
6946         function (n)
6947             return u.char(tonumber(n, 16))
6948         end)
6949 end
6950 ret = ret:gsub("%[%[%]]%.", '')
6951 ret = ret:gsub("%.%.%[%[%]]", '')
6952 return key .. [[=function(m) return ]] .. ret .. [[ end]]
6953 end
6954
6955 function Babel.capt_map(from, mapno)
6956     return Babel.capture_maps[mapno][from] or from
6957 end
6958
6959 -- Handle the {n|abc|ABC} syntax in captures
6960 function Babel.capture_func_map(capno, from, to)
6961     local u = unicode.utf8
6962     from = u.gsub(from, '{{(%x%x%x%x+)}}',
6963         function (n)
6964             return u.char(tonumber(n, 16))
6965         end)
6966     to = u.gsub(to, '{{(%x%x%x%x+)}}',
6967         function (n)
6968             return u.char(tonumber(n, 16))
6969         end)
6970     local froms = {}
6971     for s in string.utfcharacters(from) do
6972         table.insert(froms, s)
6973     end
6974     local cnt = 1
6975     table.insert(Babel.capture_maps, {})
6976     local mlen = table.getn(Babel.capture_maps)
6977     for s in string.utfcharacters(to) do
6978         Babel.capture_maps[mlen][froms[cnt]] = s
6979         cnt = cnt + 1
6980     end
6981     return "]]..Babel.capt_map(m[" .. capno .. "], " ..
6982         (mlen) .. ").." .. "["
6983 end
6984
6985 -- Create/Extend reversed sorted list of kashida weights:
6986 function Babel.capture_kashida(key, wt)
6987     wt = tonumber(wt)
6988     if Babel.kashida_wts then
6989         for p, q in ipairs(Babel.kashida_wts) do
6990             if wt == q then
6991                 break
6992             elseif wt > q then
6993                 table.insert(Babel.kashida_wts, p, wt)
6994                 break
6995             elseif table.getn(Babel.kashida_wts) == p then
6996                 table.insert(Babel.kashida_wts, wt)
6997             end
6998         end
6999     else
7000         Babel.kashida_wts = { wt }
7001     end
7002     return 'kashida = ' .. wt
7003 end
7004 </transforms>

```

## 12.13 Lua: Auto bidi with basic and basic-r

The file `babel-data-bidi.lua` currently only contains data. It is a large and boring file and it is not shown here (see the generated file), but here is a sample:

```
[0x25]={d='et'},
[0x26]={d='on'},
[0x27]={d='on'},
[0x28]={d='on', m=0x29},
[0x29]={d='on', m=0x28},
[0x2A]={d='on'},
[0x2B]={d='es'},
[0x2C]={d='cs'},
```

For the meaning of these codes, see the Unicode standard.

Now the `basic-r` bidi mode. One of the aims is to implement a fast and simple bidi algorithm, with a single loop. I managed to do it for R texts, with a second smaller loop for a special case. The code is still somewhat chaotic, but its behavior is essentially correct. I cannot resist copying the following text from Emacs `bidi.c` (which also attempts to implement the bidi algorithm with a single loop):

Arrrgh!! The UAX#9 algorithm is too deeply entrenched in the assumption of batch-style processing [...]. May the fleas of a thousand camels infest the armpits of those who design supposedly general-purpose algorithms by looking at their own implementations, and fail to consider other possible implementations!

Well, it took me some time to guess what the batch rules in UAX#9 actually mean (in other word, *what* they do and *why*, and not only *how*), but I think (or I hope) I've managed to understand them. In some sense, there are two bidi modes, one for numbers, and the other for text. Furthermore, setting just the direction in R text is not enough, because there are actually *two* R modes (set explicitly in Unicode with RLM and ALM). In babel the dir is set by a higher protocol based on the language/script, which in turn sets the correct dir (`<l>`, `<r>` or `<al>`).

From UAX#9: “Where available, markup should be used instead of the explicit formatting characters”. So, this simple version just ignores formatting characters. Actually, most of that annex is devoted to how to handle them.

BD14-BD16 are not implemented. Unicode (and the W3C) are making a great effort to deal with some special problematic cases in “streamed” plain text. I don't think this is the way to go – particular issues should be fixed by a high level interface taking into account the needs of the document. And here is where `luatex` excels, because everything related to bidi writing is under our control.

```
7005 <*basic-r>
7006 Babel = Babel or {}
7007
7008 Babel.bidi_enabled = true
7009
7010 require('babel-data-bidi.lua')
7011
7012 local characters = Babel.characters
7013 local ranges = Babel.ranges
7014
7015 local DIR = node.id("dir")
7016
7017 local function dir_mark(head, from, to, outer)
7018   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
7019   local d = node.new(DIR)
7020   d.dir = '+' .. dir
7021   node.insert_before(head, from, d)
7022   d = node.new(DIR)
7023   d.dir = '-' .. dir
7024   node.insert_after(head, to, d)
7025 end
7026
7027 function Babel.bidi(head, ispar)
7028   local first_n, last_n          -- first and last char with nums
7029   local last_es                  -- an auxiliary 'last' used with nums
```



```

7030 local first_d, last_d          -- first and last char in L/R block
7031 local dir, dir_real

```

Next also depends on script/lang (<al>/<r>). To be set by babel. tex.pardir is dangerous, could be (re)set but it should be changed only in vmode. There are two strong's – strong = l/al/r and strong\_lr = l/r (there must be a better way):

```

7032 local strong = ('TRT' == tex.pardir) and 'r' or 'l'
7033 local strong_lr = (strong == 'l') and 'l' or 'r'
7034 local outer = strong
7035
7036 local new_dir = false
7037 local first_dir = false
7038 local inmath = false
7039
7040 local last_lr
7041
7042 local type_n = ''
7043
7044 for item in node.traverse(head) do
7045
7046   -- three cases: glyph, dir, otherwise
7047   if item.id == node.id'glyph'
7048     or (item.id == 7 and item.subtype == 2) then
7049
7050     local itemchar
7051     if item.id == 7 and item.subtype == 2 then
7052       itemchar = item.replace.char
7053     else
7054       itemchar = item.char
7055     end
7056     local chardata = characters[itemchar]
7057     dir = chardata and chardata.d or nil
7058     if not dir then
7059       for nn, et in ipairs(ranges) do
7060         if itemchar < et[1] then
7061           break
7062         elseif itemchar <= et[2] then
7063           dir = et[3]
7064           break
7065         end
7066       end
7067     end
7068     dir = dir or 'l'
7069     if inmath then dir = ('TRT' == tex.mathdir) and 'r' or 'l' end

```

Next is based on the assumption babel sets the language AND switches the script with its dir. We treat a language block as a separate Unicode sequence. The following piece of code is executed at the first glyph after a 'dir' node. We don't know the current language until then. This is not exactly true, as the math mode may insert explicit dirs in the node list, so, for the moment there is a hack by brute force (just above).

```

7070   if new_dir then
7071     attr_dir = 0
7072     for at in node.traverse(item.attr) do
7073       if at.number == Babel.attr_dir then
7074         attr_dir = at.value & 0x3
7075       end
7076     end
7077     if attr_dir == 1 then
7078       strong = 'r'
7079     elseif attr_dir == 2 then
7080       strong = 'al'
7081     else
7082       strong = 'l'
7083     end

```

```

7084     strong_lr = (strong == 'l') and 'l' or 'r'
7085     outer = strong_lr
7086     new_dir = false
7087 end
7088
7089     if dir == 'nsm' then dir = strong end          -- W1

```

**Numbers.** The dual <al>/<r> system for R is somewhat cumbersome.

```

7090     dir_real = dir          -- We need dir_real to set strong below
7091     if dir == 'al' then dir = 'r' end -- W3

```

By W2, there are no <en> <et> <es> if strong == <al>, only <an>. Therefore, there are not <et en> nor <en et>, W5 can be ignored, and W6 applied:

```

7092     if strong == 'al' then
7093         if dir == 'en' then dir = 'an' end          -- W2
7094         if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
7095         strong_lr = 'r'                             -- W3
7096     end

```

Once finished the basic setup for glyphs, consider the two other cases: dir node and the rest.

```

7097     elseif item.id == node.id'dir' and not inmath then
7098         new_dir = true
7099         dir = nil
7100     elseif item.id == node.id'math' then
7101         inmath = (item.subtype == 0)
7102     else
7103         dir = nil          -- Not a char
7104     end

```

Numbers in R mode. A sequence of <en>, <et>, <an>, <es> and <cs> is typeset (with some rules) in L mode. We store the starting and ending points, and only when anything different is found (including nil, ie, a non-char), the textdir is set. This means you cannot insert, say, a whatsit, but this is what I would expect (with luacolor you may colorize some digits). Anyway, this behavior could be changed with a switch in the future. Note in the first branch only <an> is relevant if <al>.

```

7105     if dir == 'en' or dir == 'an' or dir == 'et' then
7106         if dir ~= 'et' then
7107             type_n = dir
7108         end
7109         first_n = first_n or item
7110         last_n = last_es or item
7111         last_es = nil
7112     elseif dir == 'es' and last_n then -- W3+W6
7113         last_es = item
7114     elseif dir == 'cs' then          -- it's right - do nothing
7115     elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
7116         if strong_lr == 'r' and type_n ~= '' then
7117             dir_mark(head, first_n, last_n, 'r')
7118         elseif strong_lr == 'l' and first_d and type_n == 'an' then
7119             dir_mark(head, first_n, last_n, 'r')
7120             dir_mark(head, first_d, last_d, outer)
7121             first_d, last_d = nil, nil
7122         elseif strong_lr == 'l' and type_n ~= '' then
7123             last_d = last_n
7124         end
7125         type_n = ''
7126         first_n, last_n = nil, nil
7127     end

```

R text in L, or L text in R. Order of dir\_ mark's are relevant: d goes outside n, and therefore it's emitted after. See dir\_mark to understand why (but is the nesting actually necessary or is a flat dir structure enough?). Only L, R (and AL) chars are taken into account – everything else, including spaces, whatsits, etc., are ignored:

```

7128     if dir == 'l' or dir == 'r' then
7129         if dir ~= outer then

```

```

7130     first_d = first_d or item
7131     last_d = item
7132     elseif first_d and dir ~= strong_lr then
7133         dir_mark(head, first_d, last_d, outer)
7134         first_d, last_d = nil, nil
7135     end
7136 end

```

**Mirroring.** Each chunk of text in a certain language is considered a “closed” sequence. If <r on r> and <l on l>, it's clearly <r> and <l>, resp'tly, but with other combinations depends on outer. From all these, we select only those resolving <on> → <r>. At the beginning (when last\_lr is nil) of an R text, they are mirrored directly.

TODO - numbers in R mode are processed. It doesn't hurt, but should not be done.

```

7137     if dir and not last_lr and dir ~= 'l' and outer == 'r' then
7138         item.char = characters[item.char] and
7139             characters[item.char].m or item.char
7140     elseif (dir or new_dir) and last_lr ~= item then
7141         local mir = outer .. strong_lr .. (dir or outer)
7142         if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
7143             for ch in node.traverse(node.next(last_lr)) do
7144                 if ch == item then break end
7145                 if ch.id == node.id'glyph' and characters[ch.char] then
7146                     ch.char = characters[ch.char].m or ch.char
7147                 end
7148             end
7149         end
7150     end

```

Save some values for the next iteration. If the current node is 'dir', open a new sequence. Since dir could be changed, strong is set with its real value (dir\_real).

```

7151     if dir == 'l' or dir == 'r' then
7152         last_lr = item
7153         strong = dir_real          -- Don't search back - best save now
7154         strong_lr = (strong == 'l') and 'l' or 'r'
7155     elseif new_dir then
7156         last_lr = nil
7157     end
7158 end

```

Mirror the last chars if they are no directed. And make sure any open block is closed, too.

```

7159     if last_lr and outer == 'r' then
7160         for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
7161             if characters[ch.char] then
7162                 ch.char = characters[ch.char].m or ch.char
7163             end
7164         end
7165     end
7166     if first_n then
7167         dir_mark(head, first_n, last_n, outer)
7168     end
7169     if first_d then
7170         dir_mark(head, first_d, last_d, outer)
7171     end

```

In boxes, the dir node could be added before the original head, so the actual head is the previous node.

```

7172     return node.prev(head) or head
7173 end
7174 </basic-r>

```

And here the Lua code for bidi=basic:

```

7175 <*basic>
7176 Babel = Babel or {}
7177

```

```

7178 -- eg, Babel.fontmap[1][<prefontid>]=<dirfontid>
7179
7180 Babel.fontmap = Babel.fontmap or {}
7181 Babel.fontmap[0] = {}      -- l
7182 Babel.fontmap[1] = {}      -- r
7183 Babel.fontmap[2] = {}      -- al/an
7184
7185 Babel.bidi_enabled = true
7186 Babel.mirroring_enabled = true
7187
7188 require('babel-data-bidi.lua')
7189
7190 local characters = Babel.characters
7191 local ranges = Babel.ranges
7192
7193 local DIR = node.id('dir')
7194 local GLYPH = node.id('glyph')
7195
7196 local function insert_implicit(head, state, outer)
7197   local new_state = state
7198   if state.sim and state.eim and state.sim ~= state.eim then
7199     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
7200     local d = node.new(DIR)
7201     d.dir = '+' .. dir
7202     node.insert_before(head, state.sim, d)
7203     local d = node.new(DIR)
7204     d.dir = '-' .. dir
7205     node.insert_after(head, state.eim, d)
7206   end
7207   new_state.sim, new_state.eim = nil, nil
7208   return head, new_state
7209 end
7210
7211 local function insert_numeric(head, state)
7212   local new
7213   local new_state = state
7214   if state.san and state.ean and state.san ~= state.ean then
7215     local d = node.new(DIR)
7216     d.dir = '+TLT'
7217     _, new = node.insert_before(head, state.san, d)
7218     if state.san == state.sim then state.sim = new end
7219     local d = node.new(DIR)
7220     d.dir = '-TLT'
7221     _, new = node.insert_after(head, state.ean, d)
7222     if state.ean == state.eim then state.eim = new end
7223   end
7224   new_state.san, new_state.ean = nil, nil
7225   return head, new_state
7226 end
7227
7228 -- TODO - \hbox with an explicit dir can lead to wrong results
7229 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>. A small attempt
7230 -- was s made to improve the situation, but the problem is the 3-dir
7231 -- model in babel/Unicode and the 2-dir model in LuaTeX don't fit
7232 -- well.
7233
7234 function Babel.bidi(head, ispar, hdir)
7235   local d -- d is used mainly for computations in a loop
7236   local prev_d = ''
7237   local new_d = false
7238
7239   local nodes = {}
7240   local outer_first = nil

```

```

7241 local inmath = false
7242
7243 local glue_d = nil
7244 local glue_i = nil
7245
7246 local has_en = false
7247 local first_et = nil
7248
7249 local has_hyperlink = false
7250
7251 local ATDIR = Babel.attr_dir
7252
7253 local save_outer
7254 local temp = node.get_attribute(head, ATDIR)
7255 if temp then
7256     temp = temp & 0x3
7257     save_outer = (temp == 0 and 'l') or
7258                 (temp == 1 and 'r') or
7259                 (temp == 2 and 'al')
7260 elseif ispar then -- Or error? Shouldn't happen
7261     save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
7262 else -- Or error? Shouldn't happen
7263     save_outer = ('TRT' == hdir) and 'r' or 'l'
7264 end
7265 -- when the callback is called, we are just _after_ the box,
7266 -- and the textdir is that of the surrounding text
7267 -- if not ispar and hdir ~= tex.textdir then
7268 --     save_outer = ('TRT' == hdir) and 'r' or 'l'
7269 -- end
7270 local outer = save_outer
7271 local last = outer
7272 -- 'al' is only taken into account in the first, current loop
7273 if save_outer == 'al' then save_outer = 'r' end
7274
7275 local fontmap = Babel.fontmap
7276
7277 for item in node.traverse(head) do
7278
7279     -- In what follows, #node is the last (previous) node, because the
7280     -- current one is not added until we start processing the neutrals.
7281
7282     -- three cases: glyph, dir, otherwise
7283     if item.id == GLYPH
7284         or (item.id == 7 and item.subtype == 2) then
7285
7286         local d_font = nil
7287         local item_r
7288         if item.id == 7 and item.subtype == 2 then
7289             item_r = item.replace -- automatic discs have just 1 glyph
7290         else
7291             item_r = item
7292         end
7293         local chardata = characters[item_r.char]
7294         d = chardata and chardata.d or nil
7295         if not d or d == 'nsm' then
7296             for nn, et in ipairs(ranges) do
7297                 if item_r.char < et[1] then
7298                     break
7299                 elseif item_r.char <= et[2] then
7300                     if not d then d = et[3]
7301                     elseif d == 'nsm' then d_font = et[3]
7302                     end
7303                     break

```

```

7304         end
7305     end
7306 end
7307 d = d or 'l'
7308
7309 -- A short 'pause' in bidi for mapfont
7310 d_font = d_font or d
7311 d_font = (d_font == 'l' and 0) or
7312           (d_font == 'nsm' and 0) or
7313           (d_font == 'r' and 1) or
7314           (d_font == 'al' and 2) or
7315           (d_font == 'an' and 2) or nil
7316 if d_font and fontmap and fontmap[d_font][item_r.font] then
7317     item_r.font = fontmap[d_font][item_r.font]
7318 end
7319
7320 if new_d then
7321     table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
7322     if inmath then
7323         attr_d = 0
7324     else
7325         attr_d = node.get_attribute(item, ATDIR)
7326         attr_d = attr_d & 0x3
7327     end
7328     if attr_d == 1 then
7329         outer_first = 'r'
7330         last = 'r'
7331     elseif attr_d == 2 then
7332         outer_first = 'r'
7333         last = 'al'
7334     else
7335         outer_first = 'l'
7336         last = 'l'
7337     end
7338     outer = last
7339     has_en = false
7340     first_et = nil
7341     new_d = false
7342 end
7343
7344 if glue_d then
7345     if (d == 'l' and 'l' or 'r') ~= glue_d then
7346         table.insert(nodes, {glue_i, 'on', nil})
7347     end
7348     glue_d = nil
7349     glue_i = nil
7350 end
7351
7352 elseif item.id == DIR then
7353     d = nil
7354
7355     if head ~= item then new_d = true end
7356
7357 elseif item.id == node.id'glue' and item.subtype == 13 then
7358     glue_d = d
7359     glue_i = item
7360     d = nil
7361
7362 elseif item.id == node.id'math' then
7363     inmath = (item.subtype == 0)
7364
7365 elseif item.id == 8 and item.subtype == 19 then
7366     has_hyperlink = true

```

```

7367
7368     else
7369         d = nil
7370     end
7371
7372     -- AL <= EN/ET/ES      -- W2 + W3 + W6
7373     if last == 'al' and d == 'en' then
7374         d = 'an'          -- W3
7375     elseif last == 'al' and (d == 'et' or d == 'es') then
7376         d = 'on'          -- W6
7377     end
7378
7379     -- EN + CS/ES + EN      -- W4
7380     if d == 'en' and #nodes >= 2 then
7381         if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
7382             and nodes[#nodes-1][2] == 'en' then
7383             nodes[#nodes][2] = 'en'
7384         end
7385     end
7386
7387     -- AN + CS + AN          -- W4 too, because uax9 mixes both cases
7388     if d == 'an' and #nodes >= 2 then
7389         if (nodes[#nodes][2] == 'cs')
7390             and nodes[#nodes-1][2] == 'an' then
7391             nodes[#nodes][2] = 'an'
7392         end
7393     end
7394
7395     -- ET/EN                  -- W5 + W7->l / W6->on
7396     if d == 'et' then
7397         first_et = first_et or (#nodes + 1)
7398     elseif d == 'en' then
7399         has_en = true
7400         first_et = first_et or (#nodes + 1)
7401     elseif first_et then      -- d may be nil here !
7402         if has_en then
7403             if last == 'l' then
7404                 temp = 'l'    -- W7
7405             else
7406                 temp = 'en'   -- W5
7407             end
7408         else
7409             temp = 'on'      -- W6
7410         end
7411         for e = first_et, #nodes do
7412             if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
7413         end
7414         first_et = nil
7415         has_en = false
7416     end
7417
7418     -- Force mathdir in math if ON (currently works as expected only
7419     -- with 'l')
7420     if inmath and d == 'on' then
7421         d = ('TRT' == tex.mathdir) and 'r' or 'l'
7422     end
7423
7424     if d then
7425         if d == 'al' then
7426             d = 'r'
7427             last = 'al'
7428         elseif d == 'l' or d == 'r' then
7429             last = d

```

```

7430     end
7431     prev_d = d
7432     table.insert(nodes, {item, d, outer_first})
7433 end
7434
7435 outer_first = nil
7436
7437 end
7438
7439 -- TODO -- repeated here in case EN/ET is the last node. Find a
7440 -- better way of doing things:
7441 if first_et then      -- dir may be nil here !
7442     if has_en then
7443         if last == 'l' then
7444             temp = 'l'      -- W7
7445         else
7446             temp = 'en'     -- W5
7447         end
7448     else
7449         temp = 'on'         -- W6
7450     end
7451     for e = first_et, #nodes do
7452         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
7453     end
7454 end
7455
7456 -- dummy node, to close things
7457 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
7458
7459 ----- NEUTRAL -----
7460
7461 outer = save_outer
7462 last = outer
7463
7464 local first_on = nil
7465
7466 for q = 1, #nodes do
7467     local item
7468
7469     local outer_first = nodes[q][3]
7470     outer = outer_first or outer
7471     last = outer_first or last
7472
7473     local d = nodes[q][2]
7474     if d == 'an' or d == 'en' then d = 'r' end
7475     if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
7476
7477     if d == 'on' then
7478         first_on = first_on or q
7479     elseif first_on then
7480         if last == d then
7481             temp = d
7482         else
7483             temp = outer
7484         end
7485         for r = first_on, q - 1 do
7486             nodes[r][2] = temp
7487             item = nodes[r][1]      -- MIRRORING
7488             if Babel.mirroring_enabled and item.id == GLYPH
7489                 and temp == 'r' and characters[item.char] then
7490                 local font_mode = ''
7491                 if item.font > 0 and font.fonts[item.font].properties then
7492                     font_mode = font.fonts[item.font].properties.mode

```



```

7493         end
7494         if font_mode ~= 'harf' and font_mode ~= 'plug' then
7495             item.char = characters[item.char].m or item.char
7496         end
7497     end
7498 end
7499 first_on = nil
7500 end
7501
7502 if d == 'r' or d == 'l' then last = d end
7503 end
7504
7505 ----- IMPLICIT, REORDER -----
7506
7507 outer = save_outer
7508 last = outer
7509
7510 local state = {}
7511 state.has_r = false
7512
7513 for q = 1, #nodes do
7514     local item = nodes[q][1]
7515
7516     outer = nodes[q][3] or outer
7517
7518     local d = nodes[q][2]
7519
7520     if d == 'nsm' then d = last end -- W1
7521     if d == 'en' then d = 'an' end
7522     local isdir = (d == 'r' or d == 'l')
7523
7524     if outer == 'l' and d == 'an' then
7525         state.san = state.san or item
7526         state.ean = item
7527     elseif state.san then
7528         head, state = insert_numeric(head, state)
7529     end
7530
7531     if outer == 'l' then
7532         if d == 'an' or d == 'r' then -- im -> implicit
7533             if d == 'r' then state.has_r = true end
7534             state.sim = state.sim or item
7535             state.eim = item
7536         elseif d == 'l' and state.sim and state.has_r then
7537             head, state = insert_implicit(head, state, outer)
7538         elseif d == 'l' then
7539             state.sim, state.eim, state.has_r = nil, nil, false
7540         end
7541     else
7542         if d == 'an' or d == 'l' then
7543             if nodes[q][3] then -- nil except after an explicit dir
7544                 state.sim = item -- so we move sim 'inside' the group
7545             else
7546                 state.sim = state.sim or item
7547             end
7548             state.eim = item
7549         elseif d == 'r' and state.sim then
7550             head, state = insert_implicit(head, state, outer)
7551         elseif d == 'r' then
7552             state.sim, state.eim = nil, nil
7553         end
7554     end
7555 end

```

```

7556
7557   if isdir then
7558       last = d           -- Don't search back - best save now
7559   elseif d == 'on' and state.san then
7560       state.san = state.san or item
7561       state.ean = item
7562   end
7563
7564 end
7565
7566 head = node.prev(head) or head
7567
7568 ----- FIX HYPERLINKS -----
7569
7570 if has_hyperlink then
7571     local flag, linking = 0, 0
7572     for item in node.traverse(head) do
7573         if item.id == DIR then
7574             if item.dir == '+TRT' or item.dir == '+TLT' then
7575                 flag = flag + 1
7576             elseif item.dir == '-TRT' or item.dir == '-TLT' then
7577                 flag = flag - 1
7578             end
7579             elseif item.id == 8 and item.subtype == 19 then
7580                 linking = flag
7581             elseif item.id == 8 and item.subtype == 20 then
7582                 if linking > 0 then
7583                     if item.prev.id == DIR and
7584                         (item.prev.dir == '-TRT' or item.prev.dir == '-TLT') then
7585                         d = node.new(DIR)
7586                         d.dir = item.prev.dir
7587                         node.remove(head, item.prev)
7588                         node.insert_after(head, item, d)
7589                     end
7590                 end
7591                 linking = 0
7592             end
7593         end
7594     end
7595
7596 return head
7597 end
7598 </basic>

```

## 13 Data for CJK

It is a boring file and it is not shown here (see the generated file), but here is a sample:

```

[0x0021]={c='ex'},
[0x0024]={c='pr'},
[0x0025]={c='po'},
[0x0028]={c='op'},
[0x0029]={c='cp'},
[0x002B]={c='pr'},

```

For the meaning of these codes, see the Unicode standard.

## 14 The ‘nil’ language

This ‘language’ does nothing, except setting the hyphenation patterns to nohyphenation. For this language currently no special definitions are needed or available.

The macro `\LdfInit` takes care of preventing that this file is loaded more than once, checking the category code of the `@` sign, etc.

```
7599 < *nil>
7600 \ProvidesLanguage{nil}[<<date>>] <<version>> Nil language]
7601 \LdfInit{nil}{datenil}
```

When this file is read as an option, i.e. by the `\usepackage` command, `nil` could be an ‘unknown’ language in which case we have to make it known.

```
7602 \ifx\l@nil\undefined
7603   \newlanguage\l@nil
7604   \@namedef{bbl@hyphendata@the\l@nil}{\{}}% Remove warning
7605   \let\bbl@elt\relax
7606   \edef\bbl@languages{% Add it to the list of languages
7607     \bbl@languages\bbl@elt{nil}{\the\l@nil}\{}}
7608 \fi
```

This macro is used to store the values of the hyphenation parameters `\lefthyphenmin` and `\righthyphenmin`.

```
7609 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}
```

The next step consists of defining commands to switch to (and from) the ‘nil’ language.

```
\captionnil
\datenil
7610 \let\captionnil\empty
7611 \let\datenil\empty
```

There is no locale file for this pseudo-language, so the corresponding fields are defined here.

```
7612 \def\bbl@inidata@nil{%
7613   \bbl@elt{identification}{tag.ini}{und}%
7614   \bbl@elt{identification}{load.level}{0}%
7615   \bbl@elt{identification}{charset}{utf8}%
7616   \bbl@elt{identification}{version}{1.0}%
7617   \bbl@elt{identification}{date}{2022-05-16}%
7618   \bbl@elt{identification}{name.local}{nil}%
7619   \bbl@elt{identification}{name.english}{nil}%
7620   \bbl@elt{identification}{name.babel}{nil}%
7621   \bbl@elt{identification}{tag.bcp47}{und}%
7622   \bbl@elt{identification}{language.tag.bcp47}{und}%
7623   \bbl@elt{identification}{tag.opentype}{dflt}%
7624   \bbl@elt{identification}{script.name}{Latin}%
7625   \bbl@elt{identification}{script.tag.bcp47}{Latn}%
7626   \bbl@elt{identification}{script.tag.opentype}{DFLT}%
7627   \bbl@elt{identification}{level}{1}%
7628   \bbl@elt{identification}{encodings}{}%
7629   \bbl@elt{identification}{derivate}{no}}
7630 \@namedef{bbl@tbc@nil}{und}
7631 \@namedef{bbl@lbc@nil}{und}
7632 \@namedef{bbl@lotf@nil}{dflt}
7633 \@namedef{bbl@elname@nil}{nil}
7634 \@namedef{bbl@lname@nil}{nil}
7635 \@namedef{bbl@esname@nil}{Latin}
7636 \@namedef{bbl@sname@nil}{Latin}
7637 \@namedef{bbl@sbc@nil}{Latn}
7638 \@namedef{bbl@sotf@nil}{Latn}
```

The macro `\ldf@finish` takes care of looking for a configuration file, setting the main language to be switched on at `\begin{document}` and resetting the category code of `@` to its original value.

```
7639 \ldf@finish{nil}
7640 </nil>
```

## 15 Calendars

The code for specific calendars are placed in the specific files, loaded when requested by an ini file in the identification section with `require.calendars`.

Start with function to compute the Julian day. It's based on the little library `calendar.js`, by John Walker, in the public domain.

```
7641 <<Compute Julian day>> ≡
7642 \def\bbl@fpmo#1#2{(#1-#2*floor(#1/#2))}
7643 \def\bbl@cs@gregleap#1{%
7644   (\bbl@fpmo{#1}{4} == 0) &&
7645   (!((\bbl@fpmo{#1}{100} == 0) && (\bbl@fpmo{#1}{400} != 0)))}
7646 \def\bbl@cs@jd#1#2#3{% year, month, day
7647   \fp_eval:n{ 1721424.5 + (365 * (#1 - 1)) +
7648     floor((#1 - 1) / 4) + (-floor((#1 - 1) / 100)) +
7649     floor((#1 - 1) / 400) + floor(((367 * #2) - 362) / 12) +
7650     ((#2 <= 2) ? 0 : (\bbl@cs@gregleap{#1} ? -1 : -2)) + #3 }
7651 <</Compute Julian day>>
```

### 15.1 Islamic

The code for the Civil calendar is based on it, too.

```
7652 <ca-islamic>
7653 \ExplSyntaxOn
7654 <<Compute Julian day>>
7655 % == islamic (default)
7656 % Not yet implemented
7657 \def\bbl@ca@islamic#1-#2-#3\@@#4#5#6{}
```

The Civil calendar:

```
7658 \def\bbl@cs@isltojd#1#2#3{ % year, month, day
7659   ((#3 + ceil(29.5 * (#2 - 1)) +
7660     (#1 - 1) * 354 + floor((3 + (11 * #1)) / 30) +
7661     1948439.5) - 1) }
7662 \@namedef{bbl@ca@islamic-civil+}{\bbl@ca@islamicvl@x{+2}}
7663 \@namedef{bbl@ca@islamic-civil+}{\bbl@ca@islamicvl@x{+1}}
7664 \@namedef{bbl@ca@islamic-civil}{\bbl@ca@islamicvl@x{}}
7665 \@namedef{bbl@ca@islamic-civil-}{\bbl@ca@islamicvl@x{-1}}
7666 \@namedef{bbl@ca@islamic-civil--}{\bbl@ca@islamicvl@x{-2}}
7667 \def\bbl@ca@islamicvl@x#1#2-#3-#4\@@#5#6#7{%
7668   \edef\bbl@tempa{%
7669     \fp_eval:n{ floor(\bbl@cs@jd{#2}{#3}{#4})+0.5 #1 }%
7670     \edef#5{%
7671       \fp_eval:n{ floor(((30*(\bbl@tempa-1948439.5)) + 10646)/10631) }}%
7672     \edef#6{\fp_eval:n{
7673       min(12,ceil((\bbl@tempa-(29+\bbl@cs@isltojd{#5}{1}{1}))/29.5)+1) }}%
7674     \edef#7{\fp_eval:n{ \bbl@tempa - \bbl@cs@isltojd{#5}{#6}{1} + 1 }}}
```

The Umm al-Qura calendar, used mainly in Saudi Arabia, is based on moment-hijri, by Abdullah Alsigar (license MIT).

Since the main aim is to provide a suitable \today, and maybe some close dates, data just covers Hijri ~1435/~1460 (Gregorian ~2014/~2038).

```
7675 \def\bbl@cs@umalqura@data{56660, 56690,56719,56749,56778,56808,%
7676 56837,56867,56897,56926,56956,56985,57015,57044,57074,57103,%
7677 57133,57162,57192,57221,57251,57280,57310,57340,57369,57399,%
7678 57429,57458,57487,57517,57546,57576,57605,57634,57664,57694,%
7679 57723,57753,57783,57813,57842,57871,57901,57930,57959,57989,%
7680 58018,58048,58077,58107,58137,58167,58196,58226,58255,58285,%
7681 58314,58343,58373,58402,58432,58461,58491,58521,58551,58580,%
7682 58610,58639,58669,58698,58727,58757,58786,58816,58845,58875,%
7683 58905,58934,58964,58994,59023,59053,59082,59111,59141,59170,%
7684 59200,59229,59259,59288,59318,59348,59377,59407,59436,59466,%
7685 59495,59525,59554,59584,59613,59643,59672,59702,59731,59761,%
7686 59791,59820,59850,59879,59909,59939,59968,59997,60027,60056,%
```

```

7687 60086,60115,60145,60174,60204,60234,60264,60293,60323,60352,%
7688 60381,60411,60440,60469,60499,60528,60558,60588,60618,60648,%
7689 60677,60707,60736,60765,60795,60824,60853,60883,60912,60942,%
7690 60972,61002,61031,61061,61090,61120,61149,61179,61208,61237,%
7691 61267,61296,61326,61356,61385,61415,61445,61474,61504,61533,%
7692 61563,61592,61621,61651,61680,61710,61739,61769,61799,61828,%
7693 61858,61888,61917,61947,61976,62006,62035,62064,62094,62123,%
7694 62153,62182,62212,62242,62271,62301,62331,62360,62390,62419,%
7695 62448,62478,62507,62537,62566,62596,62625,62655,62685,62715,%
7696 62744,62774,62803,62832,62862,62891,62921,62950,62980,63009,%
7697 63039,63069,63099,63128,63157,63187,63216,63246,63275,63305,%
7698 63334,63363,63393,63423,63453,63482,63512,63541,63571,63600,%
7699 63630,63659,63689,63718,63747,63777,63807,63836,63866,63895,%
7700 63925,63955,63984,64014,64043,64073,64102,64131,64161,64190,%
7701 64220,64249,64279,64309,64339,64368,64398,64427,64457,64486,%
7702 64515,64545,64574,64603,64633,64663,64692,64722,64752,64782,%
7703 64811,64841,64870,64899,64929,64958,64987,65017,65047,65076,%
7704 65106,65136,65166,65195,65225,65254,65283,65313,65342,65371,%
7705 65401,65431,65460,65490,65520}
7706 \@namedef{bbl@ca@islamic-umalqura+}{\bbl@ca@islamcuqr@x{+1}}
7707 \@namedef{bbl@ca@islamic-umalqura}{\bbl@ca@islamcuqr@x{}}
7708 \@namedef{bbl@ca@islamic-umalqura-}{\bbl@ca@islamcuqr@x{-1}}
7709 \def\bbl@ca@islamcuqr@x#1#2-#3-#4\@#5#6#7{%
7710   \ifnum#2>2014 \ifnum#2<2038
7711     \bbl@afterfi\expandafter\@gobble
7712   \fi\fi
7713   {\bbl@error{Year~out-of-range}{The~allowed~range-is~2014-2038}}}%
7714 \edef\bbl@tempd{\fp_eval:n{ % (Julian) day
7715   \bbl@cs@jd{#2}{#3}{#4} + 0.5 - 2400000 #1}}}%
7716 \count@\@ne
7717 \bbl@foreach\bbl@cs@umalqura@data{%
7718   \advance\count@\@ne
7719   \ifnum##1>\bbl@tempd\else
7720     \edef\bbl@tempe{\the\count@}%
7721     \edef\bbl@tempb{##1}%
7722   \fi}%
7723 \edef\bbl@templ{\fp_eval:n{ \bbl@tempe + 16260 + 949 }}% month-lunar
7724 \edef\bbl@tempa{\fp_eval:n{ floor((\bbl@templ - 1) / 12) }}% annus
7725 \edef#5{\fp_eval:n{ \bbl@tempa + 1 }}%
7726 \edef#6{\fp_eval:n{ \bbl@templ - (12 * \bbl@tempa) }}%
7727 \edef#7{\fp_eval:n{ \bbl@tempd - \bbl@tempb + 1 }}%
7728 \ExplSyntaxOff
7729 \bbl@add\bbl@precalendar{%
7730   \bbl@replace\bbl@ld@calendar{-civil}}}%
7731   \bbl@replace\bbl@ld@calendar{-umalqura}}}%
7732   \bbl@replace\bbl@ld@calendar{+}}}%
7733   \bbl@replace\bbl@ld@calendar{-}}}%
7734 \</ca-islamic>

```

## 16 Hebrew

This is basically the set of macros written by Michail Rozman in 1991, with corrections and adaptations by Rama Porrat, Misha, Dan Haran and Boris Lavva. This must be eventually replaced by computations with l3fp. An explanation of what's going on can be found in hebcal.sty

```

7735 \<ca-hebrew>
7736 \newcount\bbl@cntcommon
7737 \def\bbl@remainder#1#2#3{%
7738   #3=#1\relax
7739   \divide #3 by #2\relax
7740   \multiply #3 by -#2\relax
7741   \advance #3 by #1\relax}%
7742 \newif\ifbbl@divisible

```

```

7743 \def\bbl@checkifdivisible#1#2{%
7744   {\countdef\tmp=0
7745     \bbl@remainder{#1}{#2}{\tmp}%
7746     \ifnum \tmp=0
7747       \global\bbl@divisibletrue
7748     \else
7749       \global\bbl@divisiblefalse
7750     \fi}}
7751 \newif\ifbbl@gregleap
7752 \def\bbl@ifgregleap#1{%
7753   \bbl@checkifdivisible{#1}{4}%
7754   \ifbbl@divisible
7755     \bbl@checkifdivisible{#1}{100}%
7756     \ifbbl@divisible
7757       \bbl@checkifdivisible{#1}{400}%
7758       \ifbbl@divisible
7759         \bbl@gregleaptrue
7760       \else
7761         \bbl@gregleapfalse
7762       \fi
7763     \else
7764       \bbl@gregleaptrue
7765     \fi
7766   \else
7767     \bbl@gregleapfalse
7768   \fi
7769   \ifbbl@gregleap}
7770 \def\bbl@gregdayspriormonths#1#2#3{%
7771   {#3=\ifcase #1 0 \or 0 \or 31 \or 59 \or 90 \or 120 \or 151 \or
7772     181 \or 212 \or 243 \or 273 \or 304 \or 334 \fi
7773   \bbl@ifgregleap{#2}%
7774   \ifnum #1 > 2
7775     \advance #3 by 1
7776   \fi
7777   \fi
7778   \global\bbl@cntcommon=#3}%
7779   #3=\bbl@cntcommon}
7780 \def\bbl@gregdaysprioryears#1#2{%
7781   {\countdef\tmpc=4
7782     \countdef\tmpb=2
7783     \tmpb=#1\relax
7784     \advance \tmpb by -1
7785     \tmpc=\tmpb
7786     \multiply \tmpc by 365
7787     #2=\tmpc
7788     \tmpc=\tmpb
7789     \divide \tmpc by 4
7790     \advance #2 by \tmpc
7791     \tmpc=\tmpb
7792     \divide \tmpc by 100
7793     \advance #2 by -\tmpc
7794     \tmpc=\tmpb
7795     \divide \tmpc by 400
7796     \advance #2 by \tmpc
7797     \global\bbl@cntcommon=#2\relax}%
7798   #2=\bbl@cntcommon}
7799 \def\bbl@absfromgreg#1#2#3#4{%
7800   {\countdef\tmpd=0
7801     #4=#1\relax
7802     \bbl@gregdayspriormonths{#2}{#3}{\tmpd}%
7803     \advance #4 by \tmpd
7804     \bbl@gregdaysprioryears{#3}{\tmpd}%
7805     \advance #4 by \tmpd

```

```

7806 \global\bbl@cntcommon=#4\relax}%
7807 #4=\bbl@cntcommon}
7808 \newif\ifbbl@hebrleap
7809 \def\bbl@checkleaphebrewyear#1{%
7810 {\countdef\tmpa=0
7811 \countdef\tmpb=1
7812 \tmpa=#1\relax
7813 \multiply \tmpa by 7
7814 \advance \tmpa by 1
7815 \bbl@remainder{\tmpa}{19}{\tmpb}%
7816 \ifnum \tmpb < 7
7817 \global\bbl@hebrleaptrue
7818 \else
7819 \global\bbl@hebrleapfalse
7820 \fi}}
7821 \def\bbl@hebreleapsedmonths#1#2{%
7822 {\countdef\tmpa=0
7823 \countdef\tmpb=1
7824 \countdef\tmpc=2
7825 \tmpa=#1\relax
7826 \advance \tmpa by -1
7827 #2=\tmpa
7828 \divide #2 by 19
7829 \multiply #2 by 235
7830 \bbl@remainder{\tmpa}{19}{\tmpb}% \tmpa=years%19-years this cycle
7831 \tmpc=\tmpb
7832 \multiply \tmpb by 12
7833 \advance #2 by \tmpb
7834 \multiply \tmpc by 7
7835 \advance \tmpc by 1
7836 \divide \tmpc by 19
7837 \advance #2 by \tmpc
7838 \global\bbl@cntcommon=#2}%
7839 #2=\bbl@cntcommon}
7840 \def\bbl@hebreleapseddays#1#2{%
7841 {\countdef\tmpa=0
7842 \countdef\tmpb=1
7843 \countdef\tmpc=2
7844 \bbl@hebreleapsedmonths{#1}{#2}%
7845 \tmpa=#2\relax
7846 \multiply \tmpa by 13753
7847 \advance \tmpa by 5604
7848 \bbl@remainder{\tmpa}{25920}{\tmpc}% \tmpc == ConjunctionParts
7849 \divide \tmpa by 25920
7850 \multiply #2 by 29
7851 \advance #2 by 1
7852 \advance #2 by \tmpa
7853 \bbl@remainder{#2}{7}{\tmpa}%
7854 \ifnum \tmpc < 19440
7855 \ifnum \tmpc < 9924
7856 \else
7857 \ifnum \tmpa=2
7858 \bbl@checkleaphebrewyear{#1}% of a common year
7859 \ifbbl@hebrleap
7860 \else
7861 \advance #2 by 1
7862 \fi
7863 \fi
7864 \fi
7865 \ifnum \tmpc < 16789
7866 \else
7867 \ifnum \tmpa=1
7868 \advance #1 by -1

```

```

7869         \bbl@checkleaphebyear{#1}% at the end of leap year
7870         \ifbbl@hebrleap
7871             \advance #2 by 1
7872         \fi
7873     \fi
7874 \fi
7875 \else
7876     \advance #2 by 1
7877 \fi
7878 \bbl@remainder{#2}{7}{\tmpa}%
7879 \ifnum \tmpa=0
7880     \advance #2 by 1
7881 \else
7882     \ifnum \tmpa=3
7883         \advance #2 by 1
7884     \else
7885         \ifnum \tmpa=5
7886             \advance #2 by 1
7887         \fi
7888     \fi
7889 \fi
7890 \global\bbl@cntcommon=#2\relax}%
7891 #2=\bbl@cntcommon}
7892 \def\bbl@daysinhebyear#1#2{%
7893     {\countdef\tmpe=12
7894     \bbl@hebreleapseddays{#1}{\tmpe}%
7895     \advance #1 by 1
7896     \bbl@hebreleapseddays{#1}{#2}%
7897     \advance #2 by -\tmpe
7898     \global\bbl@cntcommon=#2}%
7899 #2=\bbl@cntcommon}
7900 \def\bbl@hebrdayspriormonths#1#2#3{%
7901     {\countdef\tmpf= 14
7902     #3=\ifcase #1\relax
7903         0 \or
7904         0 \or
7905         30 \or
7906         59 \or
7907         89 \or
7908         118 \or
7909         148 \or
7910         148 \or
7911         177 \or
7912         207 \or
7913         236 \or
7914         266 \or
7915         295 \or
7916         325 \or
7917         400
7918     \fi
7919     \bbl@checkleaphebyear{#2}%
7920     \ifbbl@hebrleap
7921         \ifnum #1 > 6
7922             \advance #3 by 30
7923         \fi
7924     \fi
7925     \bbl@daysinhebyear{#2}{\tmpf}%
7926     \ifnum #1 > 3
7927         \ifnum \tmpf=353
7928             \advance #3 by -1
7929         \fi
7930         \ifnum \tmpf=383
7931             \advance #3 by -1

```



```

7932     \fi
7933 \fi
7934 \ifnum #1 > 2
7935     \ifnum \tmpf=355
7936         \advance #3 by 1
7937     \fi
7938     \ifnum \tmpf=385
7939         \advance #3 by 1
7940     \fi
7941 \fi
7942 \global\bbl@cntcommon=#3\relax}%
7943 #3=\bbl@cntcommon}
7944 \def\bbl@absfromhebr#1#2#3#4{%
7945     {#4=#1\relax
7946     \bbl@hebrdayspriormonths{#2}{#3}{#1}%
7947     \advance #4 by #1\relax
7948     \bbl@hebreleapseddays{#3}{#1}%
7949     \advance #4 by #1\relax
7950     \advance #4 by -1373429
7951     \global\bbl@cntcommon=#4\relax}%
7952 #4=\bbl@cntcommon}
7953 \def\bbl@hebrfromgreg#1#2#3#4#5#6{%
7954     {\countdef\tmpx= 17
7955     \countdef\tmpy= 18
7956     \countdef\tmpz= 19
7957     #6=#3\relax
7958     \global\advance #6 by 3761
7959     \bbl@absfromgreg{#1}{#2}{#3}{#4}%
7960     \tmpz=1 \tmpy=1
7961     \bbl@absfromhebr{\tmpz}{\tmpy}{#6}{\tmpx}%
7962     \ifnum \tmpx > #4\relax
7963         \global\advance #6 by -1
7964         \bbl@absfromhebr{\tmpz}{\tmpy}{#6}{\tmpx}%
7965     \fi
7966     \advance #4 by -\tmpx
7967     \advance #4 by 1
7968     #5=#4\relax
7969     \divide #5 by 30
7970     \loop
7971         \bbl@hebrdayspriormonths{#5}{#6}{\tmpx}%
7972         \ifnum \tmpx < #4\relax
7973             \advance #5 by 1
7974             \tmpy=\tmpx
7975         \repeat
7976     \global\advance #5 by -1
7977     \global\advance #4 by -\tmpy}}
7978 \newcount\bbl@hebrday \newcount\bbl@hebrmonth \newcount\bbl@hebyear
7979 \newcount\bbl@gregday \newcount\bbl@gregmonth \newcount\bbl@gregyear
7980 \def\bbl@ca@hebrew#1-#2-#3@@#4#5#6{%
7981     \bbl@gregday=#3\relax \bbl@gregmonth=#2\relax \bbl@gregyear=#1\relax
7982     \bbl@hebrfromgreg
7983     {\bbl@gregday}{\bbl@gregmonth}{\bbl@gregyear}%
7984     {\bbl@hebrday}{\bbl@hebrmonth}{\bbl@hebyear}%
7985     \edef#4{\the\bbl@hebyear}%
7986     \edef#5{\the\bbl@hebrmonth}%
7987     \edef#6{\the\bbl@hebrday}}
7988 \</ca-hebrew>

```

## 17 Persian

There is an algorithm written in TeX by Jabri, Abolhassani, Pournader and Esfahbod, created for the first versions of the FarsiTeX system (no longer available), but the original license is GPL, so its use

with LPPL is problematic. The code here follows loosely that by John Walker, which is free and accurate, but sadly very complex, so the relevant data for the years 2013-2050 have been pre-calculated and stored. Actually, all we need is the first day (either March 20 or March 21).

```

7989 <*ca-persian>
7990 \ExplSyntaxOn
7991 <<Compute Julian day>>
7992 \def\bbl@cs@firstjal@xx{2012,2016,2020,2024,2028,2029,% March 20
7993 2032,2033,2036,2037,2040,2041,2044,2045,2048,2049}
7994 \def\bbl@ca@persian#1-#2-#3\@#4#5#6{%
7995   \edef\bbl@tempa{#1}% 20XX-03-\bbl@tempe = 1 farvardin:
7996   \ifnum\bbl@tempa>2012 \ifnum\bbl@tempa<2051
7997     \bbl@afterfi\expandafter\@gobble
7998   \fi\fi
7999   {\bbl@error{Year~out~of~range}{The~allowed~range~is~2013-2050}}}%
8000 \bbl@xin@{\bbl@tempa}{\bbl@cs@firstjal@xx}%
8001 \ifin@def\bbl@tempe{20}\else\def\bbl@tempe{21}\fi
8002 \edef\bbl@tempc{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{#2}{#3}+.5}}% current
8003 \edef\bbl@tempb{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{03}{\bbl@tempe}+.5}}% begin
8004 \ifnum\bbl@tempc<\bbl@tempb
8005   \edef\bbl@tempa{\fp_eval:n{\bbl@tempa-1}}% go back 1 year and redo
8006   \bbl@xin@{\bbl@tempa}{\bbl@cs@firstjal@xx}%
8007   \ifin@def\bbl@tempe{20}\else\def\bbl@tempe{21}\fi
8008   \edef\bbl@tempb{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{03}{\bbl@tempe}+.5}}%
8009   \fi
8010   \edef#4{\fp_eval:n{\bbl@tempa-621}}% set Jalali year
8011   \edef#6{\fp_eval:n{\bbl@tempc-\bbl@tempb+1}}% days from 1 farvardin
8012   \edef#5{\fp_eval:n{% set Jalali month
8013     (#6 <= 186) ? ceil(#6 / 31) : ceil((#6 - 6) / 30)}}
8014   \edef#6{\fp_eval:n{% set Jalali day
8015     (#6 - ((#5 <= 7) ? ((#5 - 1) * 31) : (((#5 - 1) * 30) + 6))}}}%
8016 \ExplSyntaxOff
8017 </ca-persian>

```

## 18 Coptic and Ethiopic

Adapted from jquery.calendars.package-1.1.4, written by Keith Wood, 2010. Dual license: GPL and MIT. The only difference is the epoch.

```

8018 <*ca-coptic>
8019 \ExplSyntaxOn
8020 <<Compute Julian day>>
8021 \def\bbl@ca@coptic#1-#2-#3\@#4#5#6{%
8022   \edef\bbl@tempd{\fp_eval:n{floor(\bbl@cs@jd{#1}{#2}{#3}) + 0.5}}%
8023   \edef\bbl@tempc{\fp_eval:n{\bbl@tempd - 1825029.5}}%
8024   \edef#4{\fp_eval:n{%
8025     floor((\bbl@tempc - floor((\bbl@tempc+366) / 1461)) / 365) + 1}}%
8026   \edef\bbl@tempc{\fp_eval:n{%
8027     \bbl@tempd - (#4-1) * 365 - floor(#4/4) - 1825029.5}}%
8028   \edef#5{\fp_eval:n{floor(\bbl@tempc / 30) + 1}}%
8029   \edef#6{\fp_eval:n{\bbl@tempc - (#5 - 1) * 30 + 1}}%
8030 \ExplSyntaxOff
8031 </ca-coptic>
8032 <*ca-ethiopic>
8033 \ExplSyntaxOn
8034 <<Compute Julian day>>
8035 \def\bbl@ca@ethiopic#1-#2-#3\@#4#5#6{%
8036   \edef\bbl@tempd{\fp_eval:n{floor(\bbl@cs@jd{#1}{#2}{#3}) + 0.5}}%
8037   \edef\bbl@tempc{\fp_eval:n{\bbl@tempd - 1724220.5}}%
8038   \edef#4{\fp_eval:n{%
8039     floor((\bbl@tempc - floor((\bbl@tempc+366) / 1461)) / 365) + 1}}%
8040   \edef\bbl@tempc{\fp_eval:n{%
8041     \bbl@tempd - (#4-1) * 365 - floor(#4/4) - 1724220.5}}%

```

```

8042 \edef#5{\fp_eval:n{floor(\bbl@tempc / 30) + 1}}%
8043 \edef#6{\fp_eval:n{\bbl@tempc - (#5 - 1) * 30 + 1}}%
8044 \ExplSyntaxOff
8045 \</ca-ethiopic>

```

## 19 Buddhist

That's very simple.

```

8046 \<ca-buddhist>
8047 \def\bbl@ca@buddhist#1-#2-#3\@#4#5#6{%
8048 \edef#4{\number\numexpr#1+543\relax}%
8049 \edef#5{#2}%
8050 \edef#6{#3}}
8051 \</ca-buddhist>

```

## 20 Support for Plain T<sub>E</sub>X (plain.def)

### 20.1 Not renaming hyphen.tex

As Don Knuth has declared that the filename `hyphen.tex` may only be used to designate *his* version of the american English hyphenation patterns, a new solution has to be found in order to be able to load hyphenation patterns for other languages in a plain-based T<sub>E</sub>X-format. When asked he responded:

That file name is “sacred”, and if anybody changes it they will cause severe upward/downward compatibility headaches.

People can have a file `locallyhyphen.tex` or whatever they like, but they mustn't diddle with `hyphen.tex` (or `plain.tex` except to preload additional fonts).

The files `bplain.tex` and `blplain.tex` can be used as replacement wrappers around `plain.tex` and `lplain.tex` to achieve the desired effect, based on the `babel` package. If you load each of them with `iniTEX`, you will get a file called either `bplain.fmt` or `blplain.fmt`, which you can use as replacements for `plain.fmt` and `lplain.fmt`.

As these files are going to be read as the first thing `iniTEX` sees, we need to set some category codes just to be able to change the definition of `\input`.

```

8052 \<bplain | blplain>
8053 \catcode`\{=1 % left brace is begin-group character
8054 \catcode`\}=2 % right brace is end-group character
8055 \catcode`\#=6 % hash mark is macro parameter character

```

If a file called `hyphen.cfg` can be found, we make sure that *it* will be read instead of the file `hyphen.tex`. We do this by first saving the original meaning of `\input` (and I use a one letter control sequence for that so as not to waste multi-letter control sequence on this in the format).

```

8056 \openin 0 hyphen.cfg
8057 \ifeof0
8058 \else
8059 \let\a\input

```

Then `\input` is defined to forget about its argument and load `hyphen.cfg` instead. Once that's done the original meaning of `\input` can be restored and the definition of `\a` can be forgotten.

```

8060 \def\input #1 {%
8061 \let\input\a
8062 \a hyphen.cfg
8063 \let\a\undefined
8064 }
8065 \fi
8066 \<bplain | blplain>

```

Now that we have made sure that `hyphen.cfg` will be loaded at the right moment it is time to load `plain.tex`.

```

8067 \<bplain>\a plain.tex
8068 \<blplain>\a lplain.tex

```

Finally we change the contents of `\fmtname` to indicate that this is *not* the plain format, but a format based on plain with the babel package preloaded.

```
8069 \bplain\def\fmtname{babel-plain}
8070 \bplain\def\fmtname{babel-lplain}
```

When you are using a different format, based on plain.tex you can make a copy of blplain.tex, rename it and replace plain.tex with the name of your format file.

## 20.2 Emulating some $\text{\LaTeX}$ features

The file babel.def expects some definitions made in the  $\text{\LaTeX} 2_{\epsilon}$  style file. So, in Plain we must provide at least some predefined values as well some tools to set them (even if not all options are available). There are no package options, and therefore an alternative mechanism is provided. For the moment, only `\babeloptionstrings` and `\babeloptionmath` are provided, which can be defined before loading babel. `\BabelModifiers` can be set too (but not sure it works).

```
8071 \langle *Emulate LaTeX \rangle \equiv
8072 \def\@empty{}
8073 \def\loadlocalcfg#1{%
8074   \openin0#1.cfg
8075   \ifeof0
8076     \closein0
8077   \else
8078     \closein0
8079     {\immediate\write16{*****}%
8080      \immediate\write16{* Local config file #1.cfg used}%
8081      \immediate\write16{*}%
8082     }
8083     \input #1.cfg\relax
8084   \fi
8085   \@endofldf}
```

## 20.3 General tools

A number of  $\text{\LaTeX}$  macro's that are needed later on.

```
8086 \long\def\@firstofone#1{#1}
8087 \long\def\@firstoftwo#1#2{#1}
8088 \long\def\@secondoftwo#1#2{#2}
8089 \def\@nnil{\nil}
8090 \def\@gobbletwo#1#2{}
8091 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
8092 \def\@star@or@long#1{%
8093   \@ifstar
8094   {\let\@ngrel@x\relax#1}%
8095   {\let\@ngrel@x\long#1}}
8096 \let\@ngrel@x\relax
8097 \def\@car#1#2\@nil{#1}
8098 \def\@cdr#1#2\@nil{#2}
8099 \let\@typeset@protect\relax
8100 \let\protected@edef\edef
8101 \long\def\@gobble#1{}
8102 \edef\@backslashchar{\expandafter\@gobble\string\}
8103 \def\strip@prefix#1>{}
8104 \def\g@addto@macro#1#2{{%
8105   \toks@\expandafter{#1#2}%
8106   \xdef#1{\the\toks@}}}
8107 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
8108 \def\@nameuse#1{\csname #1\endcsname}
8109 \def\@ifundefined#1{%
8110   \expandafter\ifx\csname#1\endcsname\relax
8111     \expandafter\@firstoftwo
8112   \else
8113     \expandafter\@secondoftwo
```

```

8114 \fi}
8115 \def\@expandtwoargs#1#2#3{%
8116 \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
8117 \def\zap@space#1 #2{%
8118 #1%
8119 \ifx#2\@empty\else\expandafter\zap@space\fi
8120 #2}
8121 \let\bbl@trace\@gobble
8122 \def\bbl@error#1#2{%
8123 \begingroup
8124 \newlinechar=`^^J
8125 \def\{^^J(babel) }%
8126 \errhelp{#2}\errmessage{\#1}%
8127 \endgroup}
8128 \def\bbl@warning#1{%
8129 \begingroup
8130 \newlinechar=`^^J
8131 \def\{^^J(babel) }%
8132 \message{\#1}%
8133 \endgroup}
8134 \let\bbl@infowarn\bbl@warning
8135 \def\bbl@info#1{%
8136 \begingroup
8137 \newlinechar=`^^J
8138 \def\{^^J}%
8139 \wlog{#1}%
8140 \endgroup}

```

$\text{\LaTeX 2}\epsilon$  has the command `\@onlypreamble` which adds commands to a list of commands that are no longer needed after `\begin{document}`.

```

8141 \ifx\@preamblecmds\undefined
8142 \def\@preamblecmds{}
8143 \fi
8144 \def\@onlypreamble#1{%
8145 \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
8146 \@preamblecmds\do#1}}
8147 \@onlypreamble\@onlypreamble

```

Mimick  $\text{\LaTeX}$ 's `\AtBeginDocument`; for this to work the user needs to add `\begin{document}` to his file.

```

8148 \def\begin{document}{%
8149 \@begin{document}hook
8150 \global\let\@begin{document}hook\undefined
8151 \def\do##1{\global\let##1\undefined}%
8152 \@preamblecmds
8153 \global\let\do\noexpand}

8154 \ifx\@begin{document}hook\undefined
8155 \def\@begin{document}hook{}
8156 \fi
8157 \@onlypreamble\@begin{document}hook
8158 \def\AtBeginDocument{\g@addto@macro\@begin{document}hook}

```

We also have to mimick  $\text{\LaTeX}$ 's `\AtEndOfPackage`. Our replacement macro is much simpler; it stores its argument in `\@endofldf`.

```

8159 \def\AtEndOfPackage#1{\g@addto@macro\@endofldf{#1}}
8160 \@onlypreamble\AtEndOfPackage
8161 \def\@endofldf{}
8162 \@onlypreamble\@endofldf
8163 \let\bbl@afterlang\@empty
8164 \chardef\bbl@opt@hyphenmap\z@

```

$\text{\LaTeX}$  needs to be able to switch off writing to its auxiliary files; plain doesn't have them by default. There is a trick to hide some conditional commands from the outer `\ifx`. The same trick is applied below.

```

8165 \catcode`\&=\z@
8166 \ifx&\if@files\undefined
8167   \expandafter\let\csname if@files\expandafter\endcsname
8168     \csname iffalse\endcsname
8169 \fi
8170 \catcode`\&=4

```

Mimick L<sup>A</sup>T<sub>E</sub>X's commands to define control sequences.

```

8171 \def\newcommand{\@star@or@long\new@command}
8172 \def\new@command#1{%
8173   \@testopt{\@newcommand#1}0}
8174 \def\@newcommand#1[#2]{%
8175   \@ifnextchar [{\@xargdef#1[#2]}%
8176     {\@argdef#1[#2]}}
8177 \long\def\@argdef#1[#2]#3{%
8178   \@yargdef#1\@ne{#2}{#3}}
8179 \long\def\@xargdef#1[#2][#3]#4{%
8180   \expandafter\def\expandafter#1\expandafter{%
8181     \expandafter\@protected@testopt\expandafter #1%
8182     \csname\string#1\expandafter\endcsname{#3}}%
8183   \expandafter\@yargdef \csname\string#1\endcsname
8184   \tw@{#2}{#4}}
8185 \long\def\@yargdef#1#2#3{%
8186   \@tempcnta#3\relax
8187   \advance \@tempcnta \@ne
8188   \let\@hash@\relax
8189   \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
8190   \@tempcntb #2%
8191   \@whilenum\@tempcntb <\@tempcnta
8192   \do{%
8193     \edef\reserved@a{\reserved@a\@hash@\the\@tempcntb}%
8194     \advance\@tempcntb \@ne}%
8195   \let\@hash@##%
8196   \l@ngrel@x\expandafter\def\expandafter#1\reserved@a}
8197 \def\providecommand{\@star@or@long\provide@command}
8198 \def\provide@command#1{%
8199   \begingroup
8200     \escapechar\m@ne\xdef\@gtempa{\string#1}%
8201   \endgroup
8202   \expandafter\@ifundefined\@gtempa
8203     {\def\reserved@a{\new@command#1}}%
8204     {\let\reserved@a\relax
8205     \def\reserved@a{\new@command\reserved@a}}%
8206   \reserved@a}%
8207 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
8208 \def\declare@robustcommand#1{%
8209   \edef\reserved@a{\string#1}%
8210   \def\reserved@b{#1}%
8211   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
8212   \edef#1{%
8213     \ifx\reserved@a\reserved@b
8214       \noexpand\x@protect
8215       \noexpand#1%
8216     \fi
8217     \noexpand\protect
8218     \expandafter\noexpand\csname
8219       \expandafter\@gobble\string#1 \endcsname
8220   }%
8221   \expandafter\new@command\csname
8222     \expandafter\@gobble\string#1 \endcsname
8223 }
8224 \def\x@protect#1{%
8225   \ifx\protect\@typeset@protect\else

```

```

8226 \x@protect#1%
8227 \fi
8228 }
8229 \catcode\&=\z@ % Trick to hide conditionals
8230 \def\x@protect#1&fi#2#3{&fi\protect#1}

```

The following little macro `\in@` is taken from `latex.ltx`; it checks whether its first argument is part of its second argument. It uses the boolean `\in@`; allocating a new boolean inside conditionally executed code is not possible, hence the construct with the temporary definition of `\bbl@tempa`.

```

8231 \def\bbl@tempa{\csname newif\endcsname&fin@}
8232 \catcode\&=4
8233 \ifx\in@\@undefined
8234 \def\in@#1#2{%
8235 \def\in@@##1##2##3\in@@{%
8236 \ifx\in@@##2\in@false\else\in@true\fi}%
8237 \in@@##2#1\in@\in@@}
8238 \else
8239 \let\bbl@tempa\@empty
8240 \fi
8241 \bbl@tempa

```

$\TeX$  has a macro to check whether a certain package was loaded with specific options. The command has two extra arguments which are code to be executed in either the true or false case. This is used to detect whether the document needs one of the accents to be activated (activegrave and activeacute). For plain  $\TeX$  we assume that the user wants them to be active by default. Therefore the only thing we do is execute the third argument (the code for the true case).

```

8242 \def\@ifpackagewith#1#2#3#4{#3}

```

The  $\TeX$  macro `\@ifl@aded` checks whether a file was loaded. This functionality is not needed for plain  $\TeX$  but we need the macro to be defined as a no-op.

```

8243 \def\@ifl@aded#1#2#3#4{}

```

For the following code we need to make sure that the commands `\newcommand` and `\providecommand` exist with some sensible definition. They are not fully equivalent to their  $\TeX 2_{\epsilon}$  versions; just enough to make things work in plain  $\TeX$  environments.

```

8244 \ifx\@tempcnta\@undefined
8245 \csname newcount\endcsname\@tempcnta\relax
8246 \fi
8247 \ifx\@tempcntb\@undefined
8248 \csname newcount\endcsname\@tempcntb\relax
8249 \fi

```

To prevent wasting two counters in  $\TeX$  (because counters with the same name are allocated later by it) we reset the counter that holds the next free counter (`\count10`).

```

8250 \ifx\bye\@undefined
8251 \advance\count10 by -2\relax
8252 \fi
8253 \ifx\@ifnextchar\@undefined
8254 \def\@ifnextchar#1#2#3{%
8255 \let\reserved@d=#1%
8256 \def\reserved@a{#2}\def\reserved@b{#3}%
8257 \futurelet\@let@token\@ifnch}
8258 \def\@ifnch{%
8259 \ifx\@let@token\sptoken
8260 \let\reserved@c\@ifnch
8261 \else
8262 \ifx\@let@token\reserved@d
8263 \let\reserved@c\reserved@a
8264 \else
8265 \let\reserved@c\reserved@b
8266 \fi
8267 \fi
8268 \reserved@c}
8269 \def\:\let\@sptoken= } \: % this makes \@sptoken a space token

```

```

8270 \def\{\@xifnch} \expandafter\def\{\futurelet\@let@token\@ifnch}
8271 \fi
8272 \def\@testopt#1#2{%
8273   \@ifnextchar[{\#1}{\#1[#2]}}
8274 \def\@protected@testopt#1{%
8275   \ifx\protect\@typeset@protect
8276     \expandafter\@testopt
8277   \else
8278     \@x@protect#1%
8279   \fi}
8280 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
8281   #2\relax}\fi}
8282 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
8283   \else\expandafter\@gobble\fi{#1}}

```

## 20.4 Encoding related macros

Code from `ltoutenc.dtx`, adapted for use in the plain  $\TeX$  environment.

```

8284 \def\DeclareTextCommand{%
8285   \@dec@text@cmd\providecommand
8286 }
8287 \def\ProvideTextCommand{%
8288   \@dec@text@cmd\providecommand
8289 }
8290 \def\DeclareTextSymbol#1#2#3{%
8291   \@dec@text@cmd\chardef#1{#2}#3\relax
8292 }
8293 \def\@dec@text@cmd#1#2#3{%
8294   \expandafter\def\expandafter#2%
8295     \expandafter{%
8296       \csname#3-cmd\expandafter\endcsname
8297       \expandafter#2%
8298       \csname#3\string#2\endcsname
8299     }%
8300 %   \let\@ifdefinable\@rc@ifdefinable
8301   \expandafter#1\csname#3\string#2\endcsname
8302 }
8303 \def\@current@cmd#1{%
8304   \ifx\protect\@typeset@protect\else
8305     \noexpand#1\expandafter\@gobble
8306   \fi
8307 }
8308 \def\@changed@cmd#1#2{%
8309   \ifx\protect\@typeset@protect
8310     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
8311       \expandafter\ifx\csname ?\string#1\endcsname\relax
8312         \expandafter\def\csname ?\string#1\endcsname{%
8313           \@changed@x@err{#1}%
8314         }%
8315       \fi
8316     \global\expandafter\let
8317       \csname\cf@encoding\string#1\expandafter\endcsname
8318       \csname ?\string#1\endcsname
8319   \fi
8320   \csname\cf@encoding\string#1%
8321     \expandafter\endcsname
8322   \else
8323     \noexpand#1%
8324   \fi
8325 }
8326 \def\@changed@x@err#1{%
8327   \errhelp{Your command will be ignored, type <return> to proceed}%
8328   \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}

```



```

8329 \def\DeclareTextCommandDefault#1{%
8330   \DeclareTextCommand#1?%
8331 }
8332 \def\ProvideTextCommandDefault#1{%
8333   \ProvideTextCommand#1?%
8334 }
8335 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
8336 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
8337 \def\DeclareTextAccent#1#2#3{%
8338   \DeclareTextCommand#1{#2}[1]{\accent#3 #1}
8339 }
8340 \def\DeclareTextCompositeCommand#1#2#3#4{%
8341   \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
8342   \edef\reserved@b{\string##1}%
8343   \edef\reserved@c{%
8344     \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
8345   \ifx\reserved@b\reserved@c
8346     \expandafter\expandafter\expandafter\ifx
8347       \expandafter\@car\reserved@a\relax\relax\@nil
8348       \@text@composite
8349   \else
8350     \edef\reserved@b##1{%
8351       \def\expandafter\noexpand
8352         \csname#2\string#1\endcsname####1{%
8353         \noexpand\@text@composite
8354         \expandafter\noexpand\csname#2\string#1\endcsname
8355         ####1\noexpand\@empty\noexpand\@text@composite
8356         {##1}%
8357       }%
8358     }%
8359     \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
8360   \fi
8361   \expandafter\def\csname\expandafter\string\csname
8362     #2\endcsname\string#1-\string#3\endcsname{#4}
8363 \else
8364   \errhelp{Your command will be ignored, type <return> to proceed}%
8365   \errmessage{\string\DeclareTextCompositeCommand\space used on
8366     inappropriate command \protect#1}
8367 \fi
8368 }
8369 \def\@text@composite#1#2#3\@text@composite{%
8370   \expandafter\@text@composite@x
8371     \csname\string#1-\string#2\endcsname
8372 }
8373 \def\@text@composite@x#1#2{%
8374   \ifx#1\relax
8375     #2%
8376   \else
8377     #1%
8378   \fi
8379 }
8380 %
8381 \def\@strip@args#1:#2-#3\@strip@args{#2}
8382 \def\DeclareTextComposite#1#2#3#4{%
8383   \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
8384   \bgroup
8385     \lccode`\@=#4%
8386     \lowercase{%
8387       \egroup
8388       \reserved@a @%
8389     }%
8390 }
8391 %

```

```

8392 \def\UseTextSymbol#1#2{#2}
8393 \def\UseTextAccent#1#2#3{}
8394 \def\@use@text@encoding#1{}
8395 \def\DeclareTextSymbolDefault#1#2{%
8396   \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
8397 }
8398 \def\DeclareTextAccentDefault#1#2{%
8399   \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
8400 }
8401 \def\cf@encoding{OT1}

```

Currently we only use the  $\text{\LaTeX} 2_{\epsilon}$  method for accents for those that are known to be made active in *some* language definition file.

```

8402 \DeclareTextAccent{"}{OT1}{127}
8403 \DeclareTextAccent{'}{OT1}{19}
8404 \DeclareTextAccent{^}{OT1}{94}
8405 \DeclareTextAccent{\`}{OT1}{18}
8406 \DeclareTextAccent{\~}{OT1}{126}

```

The following control sequences are used in `babel.def` but are not defined for `PLAIN  $\text{\TeX}$` .

```

8407 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
8408 \DeclareTextSymbol{\textquotedblright}{OT1}{`\"}
8409 \DeclareTextSymbol{\textquoteleft}{OT1}{``}
8410 \DeclareTextSymbol{\textquoteright}{OT1}{`'}
8411 \DeclareTextSymbol{\i}{OT1}{16}
8412 \DeclareTextSymbol{\ss}{OT1}{25}

```

For a couple of languages we need the  $\text{\LaTeX}$ -control sequence `\scriptsize` to be available. Because plain  $\text{\TeX}$  doesn't have such a sophisticated font mechanism as  $\text{\LaTeX}$  has, we just `\let` it to `\sevenrm`.

```

8413 \ifx\scriptsize\@undefined
8414   \let\scriptsize\sevenrm
8415 \fi

```

And a few more “dummy” definitions.

```

8416 \def\language{english}%
8417 \let\bbl@opt@shorthands\@nnil
8418 \def\bbl@ifshorthand#1#2#3{#2}%
8419 \let\bbl@language@opts\@empty
8420 \ifx\babeloptionstrings\@undefined
8421   \let\bbl@opt@strings\@nnil
8422 \else
8423   \let\bbl@opt@strings\babeloptionstrings
8424 \fi
8425 \def\BabelStringsDefault{generic}
8426 \def\bbl@tempa{normal}
8427 \ifx\babeloptionmath\bbl@tempa
8428   \def\bbl@mathnormal{\noexpand\textormath}
8429 \fi
8430 \def\AfterBabelLanguage#1#2{}
8431 \ifx\BabelModifiers\@undefined\let\BabelModifiers\relax\fi
8432 \let\bbl@afterlang\relax
8433 \def\bbl@opt@safe{BR}
8434 \ifx\@uclclist\@undefined\let\@uclclist\@empty\fi
8435 \ifx\bbl@trace\@undefined\def\bbl@trace#1{}\fi
8436 \expandafter\newif\csname ifbbl@single\endcsname
8437 \chardef\bbl@bidimode\z@
8438 <</Emulate LaTeX>>

```

A proxy file:

```

8439 <*\plain>
8440 \input babel.def
8441 </\plain>

```

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