

# 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, T<sub>E</sub>XLive, 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.

## 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  $\text{\LaTeX}$ , the preamble of the document:

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

would tell  $\text{\LaTeX}$  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.

**NOTE** 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}
```

**WARNING** 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 x<sub>etex</sub> and l<sub>uatex</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.

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:



```

\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 tree-letter word is a valid name for a language (eg, yi). See section 1.22 for further details.

## 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 L<sup>A</sup>T<sub>E</sub>X (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}.

```

- 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.

<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.

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

## 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.

**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 to 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 `bidi` 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  $\text{\TeX}$  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}`).

**NOTE** Actually, there may be another advantage in the ‘short’ syntax `\text{<tag>}`, namely, it is not affected by `\MakeUppercase` (while `\foreignlanguage` is).

**\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,  $\text{\TeX}$  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,  $\text{\TeX}$  of `\dag`). With `ini` files (see below), captions are ensured by default.

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

## 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 discretionary 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 only work on 'known' shorthand characters.

**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).

**\useshortands** `*{\langle char \rangle}`

The command `\useshortands` 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 `\useshortands*{\langle char \rangle}` 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 `\useshortands`. This restriction will be lifted in a future release.

**\defineshortand** `[\langle language \rangle, \langle language \rangle, ...]{\langle shorthand \rangle}{\langle code \rangle}`

The command `\defineshortand` 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 `\languageshortands{\langle lang \rangle}` to the corresponding `\extras{\langle lang \rangle}`, 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 dictionaries (languages do not define shorthands consistently, and “-”, “\”, “=” have different meanings). You can start with, say:

```
\useshortands*{"}
\defineshortand{"*}{\babelhyphen{soft}}
\defineshortand{"-}{\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:

```
\defineshortand[*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.

**\languageshortands** `{\langle language \rangle}`

The command `\languageshortands` 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{\languageshortands{ngerman}}
```

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

<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.

**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]{\{\language shorthands{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** " ^ =  
**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`  $\{\langle character \rangle\}\{\langle true \rangle\}\{\langle false \rangle\}$

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

`\aliasshorthand`  $\{\langle original \rangle\}\{\langle alias \rangle\}$

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

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

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

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.

- safe=** `none | ref | bib`  
Some  $\TeX$  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  $\epsilon\TeX$  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 spoilt 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>
- strings=** `generic` | `unicode` | `encoded` | *<label>* | *<font encoding>*  
Selects the encoding of strings in languages supporting this feature. Predefined labels are `generic` (for traditional T<sub>E</sub>X, LICR and ASCII strings), `unicode` (for engines like xetex and luatex) and `encoded` (for special cases requiring mixed encodings). Other allowed values are font encoding codes (T1, T2A, LGR, L7X...), but only in languages supporting them. Be aware with encoded captions are protected, but they work in `\MakeUpper case` and the like (this feature misuses some internal L<sup>A</sup>T<sub>E</sub>X tools, so use it only as a last resort).
- 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`;
  - 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>

<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.

<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.

**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  $\text{\TeX}$ , 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.

## 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  $\text{\TeX}$  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{სამზარეულო და სუფრის ტრადიციები}

ქართული ტრადიციული სამზარეულო 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 luatex also applies here. Some quick patterns can help, with something similar to:

```
\babelprovide[import, hyphenrules=+]{lao}
\babelpatterns[lao]{lṇ lṃ lṂ lṁ 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 shorts 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 hyphenations 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>	bem	Bemba
agq	Aghem	bez	Bena
ak	Akan	bg	Bulgarian <sup>ul</sup>
am	Amharic <sup>ul</sup>	bm	Bambara
ar	Arabic <sup>ul</sup>	bn	Bangla <sup>ul</sup>
ar-DZ	Arabic <sup>ul</sup>	bo	Tibetan <sup>u</sup>
ar-MA	Arabic <sup>ul</sup>	brx	Bodo
ar-SY	Arabic <sup>ul</sup>	bs-Cyrl	Bosnian
as	Assamese	bs-Latn	Bosnian <sup>ul</sup>
asa	Asu	bs	Bosnian <sup>ul</sup>
ast	Asturian <sup>ul</sup>	ca	Catalan <sup>ul</sup>
az-Cyrl	Azerbaijani	ce	Chechen
az-Latn	Azerbaijani	cgg	Chiga
az	Azerbaijani <sup>ul</sup>	chr	Cherokee
bas	Basaa	ckb	Central Kurdish
be	Belarusian <sup>ul</sup>	cop	Coptic

cs	Czech <sup>ul</sup>	hsb	Upper Sorbian <sup>ul</sup>
cu	Church Slavic	hu	Hungarian <sup>ul</sup>
cu-Cyrs	Church Slavic	hy	Armenian <sup>u</sup>
cu-Glag	Church Slavic	ia	Interlingua <sup>ul</sup>
cy	Welsh <sup>ul</sup>	id	Indonesian <sup>ul</sup>
da	Danish <sup>ul</sup>	ig	Igbo
dav	Taita	ii	Sichuan Yi
de-AT	German <sup>ul</sup>	is	Icelandic <sup>ul</sup>
de-CH	German <sup>ul</sup>	it	Italian <sup>ul</sup>
de	German <sup>ul</sup>	ja	Japanese
dje	Zarma	jgo	Ngomba
dsb	Lower Sorbian <sup>ul</sup>	jmc	Machame
dua	Duala	ka	Georgian <sup>ul</sup>
dyo	Jola-Fonyi	kab	Kabyle
dz	Dzongkha	kam	Kamba
ebu	Embu	kde	Makonde
ee	Ewe	kea	Kabuverdianu
el	Greek <sup>ul</sup>	khq	Koyra Chiini
el-polyton	Polytonic Greek <sup>ul</sup>	ki	Kikuyu
en-AU	English <sup>ul</sup>	kk	Kazakh
en-CA	English <sup>ul</sup>	kkj	Kako
en-GB	English <sup>ul</sup>	kl	Kalaallisut
en-NZ	English <sup>ul</sup>	kln	Kalenjin
en-US	English <sup>ul</sup>	km	Khmer
en	English <sup>ul</sup>	kn	Kannada <sup>ul</sup>
eo	Esperanto <sup>ul</sup>	ko	Korean
es-MX	Spanish <sup>ul</sup>	kok	Konkani
es	Spanish <sup>ul</sup>	ks	Kashmiri
et	Estonian <sup>ul</sup>	ksb	Shambala
eu	Basque <sup>ul</sup>	ksf	Bafia
ewo	Ewondo	ksh	Colognian
fa	Persian <sup>ul</sup>	kw	Cornish
ff	Fulah	ky	Kyrgyz
fi	Finnish <sup>ul</sup>	lag	Langi
fil	Filipino	lb	Luxembourgish
fo	Faroese	lg	Ganda
fr	French <sup>ul</sup>	lkt	Lakota
fr-BE	French <sup>ul</sup>	ln	Lingala
fr-CA	French <sup>ul</sup>	lo	Lao <sup>ul</sup>
fr-CH	French <sup>ul</sup>	lrc	Northern Luri
fr-LU	French <sup>ul</sup>	lt	Lithuanian <sup>ul</sup>
fur	Friulian <sup>ul</sup>	lu	Luba-Katanga
fy	Western Frisian	luo	Luo
ga	Irish <sup>ul</sup>	luy	Luyia
gd	Scottish Gaelic <sup>ul</sup>	lv	Latvian <sup>ul</sup>
gl	Galician <sup>ul</sup>	mas	Masai
grc	Ancient Greek <sup>ul</sup>	mer	Meru
gsw	Swiss German	mfe	Morisyen
gu	Gujarati	mg	Malagasy
guz	Gusii	mgh	Makhuwa-Meetto
gv	Manx	mgo	Meta'
ha-GH	Hausa	mk	Macedonian <sup>ul</sup>
ha-NE	Hausa <sup>l</sup>	ml	Malayalam <sup>ul</sup>
ha	Hausa	mn	Mongolian
haw	Hawaiian	mr	Marathi <sup>ul</sup>
he	Hebrew <sup>ul</sup>	ms-BN	Malay <sup>l</sup>
hi	Hindi <sup>u</sup>	ms-SG	Malay <sup>l</sup>
hr	Croatian <sup>ul</sup>	ms	Malay <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>
nus	Nuer	sr	Serbian <sup>ul</sup>
nyn	Nyankole	sv	Swedish <sup>ul</sup>
om	Oromo	sw	Swahili
or	Odia	ta	Tamil <sup>u</sup>
os	Ossetic	te	Telugu <sup>ul</sup>
pa-Arab	Punjabi	teo	Teso
pa-Guru	Punjabi	th	Thai <sup>ul</sup>
pa	Punjabi	ti	Tigrinya
pl	Polish <sup>ul</sup>	tk	Turkmen <sup>ul</sup>
pms	Piedmontese <sup>ul</sup>	to	Tongan
ps	Pashto	tr	Turkish <sup>ul</sup>
pt-BR	Portuguese <sup>ul</sup>	twq	Tasawaq
pt-PT	Portuguese <sup>ul</sup>	tzm	Central Atlas Tamazight
pt	Portuguese <sup>ul</sup>	ug	Uyghur
qu	Quechua	uk	Ukrainian <sup>ul</sup>
rm	Romansh <sup>ul</sup>	ur	Urdu <sup>ul</sup>
rn	Rundi	uz-Arab	Uzbek
ro	Romanian <sup>ul</sup>	uz-Cyrl	Uzbek
rof	Rombo	uz-Latn	Uzbek
ru	Russian <sup>ul</sup>	uz	Uzbek
rw	Kinyarwanda	vai-Latn	Vai
rwk	Rwa	vai-Vaii	Vai
sa-Beng	Sanskrit	vai	Vai
sa-Deva	Sanskrit	vi	Vietnamese <sup>ul</sup>
sa-Gujr	Sanskrit	vun	Vunjo
sa-Knda	Sanskrit	wae	Walser
sa-Mlym	Sanskrit	xog	Soga
sa-Telu	Sanskrit	yav	Yangben
sa	Sanskrit	yi	Yiddish
sah	Sakha	yo	Yoruba
saq	Samburu	yue	Cantonese
sbp	Sangu	zgh	Standard Moroccan Tamazight
se	Northern Sami <sup>ul</sup>		
seh	Sena	zh-Hans-HK	Chinese
ses	Koyraboro Senni	zh-Hans-MO	Chinese
sg	Sango	zh-Hans-SG	Chinese
shi-Latn	Tachelhit	zh-Hans	Chinese
shi-Tfng	Tachelhit	zh-Hant-HK	Chinese
shi	Tachelhit	zh-Hant-MO	Chinese
si	Sinhala	zh-Hant	Chinese
sk	Slovak <sup>ul</sup>	zh	Chinese
sl	Slovenian <sup>ul</sup>	zu	Zulu

In some contexts (currently \babel font) an ini file may be loaded by its name. Here is the list of the names currently supported. With these languages, \babel font 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`.

---

aghem	chinese-hans-mo
akan	chinese-hans-sg
albanian	chinese-hans
american	chinese-hant-hk
amharic	chinese-hant-mo
ancientgreek	chinese-hant
arabic	chinese-simplified-hongkongsarchina
arabic-algeria	chinese-simplified-macausarchina
arabic-DZ	chinese-simplified-singapore
arabic-morocco	chinese-simplified
arabic-MA	chinese-traditional-hongkongsarchina
arabic-syria	chinese-traditional-macausarchina
arabic-SY	chinese-traditional
armenian	chinese
assamese	churchslavic
asturian	churchslavic-cyrs
asu	churchslavic-oldcyrillic <sup>12</sup>
australian	churchsslavic-glag
austrian	churchsslavic-glagolitic
azerbaijani-cyrillic	cognian
azerbaijani-cyrl	cornish
azerbaijani-latin	croatian
azerbaijani-latn	czech
azerbaijani	danish
bafia	duala
bambara	dutch
basaa	dzongkha
basque	embu
belarusian	english-au
bemba	english-australia
bena	english-ca
bengali	english-canada
bodo	english-gb
bosnian-cyrillic	english-newzealand
bosnian-cyrl	english-nz
bosnian-latin	english-unitedkingdom
bosnian-latn	english-unitedstates
bosnian	english-us
brazilian	english
breton	esperanto
british	estonian
bulgarian	ewe
burmese	ewondo
canadian	faroeese
cantonese	filipino
catalan	finnish
centralatlastamazight	french-be
centralkurdish	french-belgium
chechen	french-ca
cherokee	french-canada
chiga	french-ch
chinese-hans-hk	french-lu

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

french-luxembourg	lowersorbian
french-switzerland	lsorbian
french	lubakatanga
friulian	luo
fulah	luxembourgish
galician	luyia
ganda	macedonian
georgian	machame
german-at	makhuwameetto
german-austria	makonde
german-ch	malagasy
german-switzerland	malay-bn
german	malay-brunei
greek	malay-sg
gujarati	malay-singapore
gusii	malay
hausa-gh	malayalam
hausa-ghana	maltese
hausa-ne	manx
hausa-niger	marathi
hausa	masai
hawaiian	mazanderani
hebrew	meru
hindi	meta
hungarian	mexican
icelandic	mongolian
igbo	morisyen
inarisami	mundang
indonesian	nama
interlingua	nepali
irish	newzealand
italian	ngiemboon
japanese	ngomba
jolafonyi	norsk
kabuverdianu	northernluri
kabyle	northernsami
kako	northndebele
kalaallisut	norwegianbokmal
kalenjin	norwegiannynorsk
kamba	nswissgerman
kannada	nuer
kashmiri	nyankole
kazakh	nynorsk
khmer	occitan
kikuyu	oriya
kinyarwanda	oromo
konkani	ossetic
korean	pashto
koyraborosenni	persian
koyrachiini	piedmontese
kwasio	polish
kyrgyz	polytonicgreek
lakota	portuguese-br
langi	portuguese-brazil
lao	portuguese-portugal
latvian	portuguese-pt
lingala	portuguese
lithuanian	punjabi-arab



punjabi-arabic	soga
punjabi-gurmukhi	somali
punjabi-guru	spanish-mexico
punjabi	spanish-mx
quechua	spanish
romanian	standardmoroccantamazight
romansh	swahili
rombo	swedish
rundi	swissgerman
russian	tachelhit-latin
rwa	tachelhit-latn
sakha	tachelhit-tfng
samburu	tachelhit-tifinagh
samin	tachelhit
sango	taita
sangu	tamil
sanskrit-beng	tasawaq
sanskrit-bengali	telugu
sanskrit-deva	teso
sanskrit-devanagari	thai
sanskrit-gujarati	tibetan
sanskrit-gujr	tigrinya
sanskrit-kannada	tongan
sanskrit-knda	turkish
sanskrit-malayalam	turkmen
sanskrit-mlym	ukenglish
sanskrit-telu	ukrainian
sanskrit-telugu	uppersorbian
sanskrit	urdu
scottishgaelic	usenglish
sena	usorbian
serbian-cyrillic-bosniaherzegovina	uyghur
serbian-cyrillic-kosovo	uzbek-arab
serbian-cyrillic-montenegro	uzbek-arabic
serbian-cyrillic	uzbek-cyrillic
serbian-cyrl-ba	uzbek-cyrl
serbian-cyrl-me	uzbek-latin
serbian-cyrl-xk	uzbek-latn
serbian-cyrl	uzbek
serbian-latin-bosniaherzegovina	vai-latin
serbian-latin-kosovo	vai-latn
serbian-latin-montenegro	vai-vai
serbian-latin	vai-vaii
serbian-latn-ba	vai
serbian-latn-me	vietnam
serbian-latn-xk	vietnamese
serbian-latn	vunjo
serbian	walser
shambala	welsh
shona	westernfrisian
sichuanyi	yangben
sinhala	yiddish
slovak	yoruba
slovene	zarma
slovenian	zulu afrikaans

---

### 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 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}{עִבְרִית} 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}
```

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

`\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 fontspec Warning: ‘Language ‘LANG’ not available for font ‘FONT’ with script ‘SCRIPT’ ‘Default’ language used instead’.*

**This is *not* an error.** This warning is shown by `fontspec`, not by `babel`. It can be irrelevant for English, but not for many other languages, including Urdu and Turkish. This is a useful and harmless warning, and if everything is fine with your document the best thing you can do is just to ignore it altogether.

**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 your 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`  $\{\langle language-name \rangle\}\{\langle caption-name \rangle\}\{\langle string \rangle\}$

**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. 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 can be written:

```
\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 activates a line breking mode that allows spaces to be stretched to arbitrary amounts.

**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.polutonic]{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=**  $\langle script-name \rangle$

**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=**  $\langle language-name \rangle$

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

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

**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`). This option is not compatible with `mapfont`. Characters can be added or modified with `\babelcharproperty`.

**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.

**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=** kashida | elongated | unhyphenated

**New 3.59** There are currently three options, mainly 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](#).

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

**mapfont=** direction

Assigns the font for the writing direction of this language (only with `bidi=basic`). Whenever possible, instead of this option use `onchar`, based on the script, which usually makes more sense. More precisely, what `mapfont=direction` means is, ‘when a character has the same direction as the script for the “provided” language, then change its font to that set for this language’. There are 3 directions, following the bidi Unicode algorithm, namely, Arabic-like, Hebrew-like and left to right. So, there should be at most 3 directives of this kind.

**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  $\TeX$  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.

`\localenumeral`  $\{\langle style \rangle\}\{\langle number \rangle\}$   
`\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 available styles in each language, see the list below):

- `\localenumeral{\langle style \rangle}\{\langle number \rangle\}`, like `\localenumeral{abjad}{15}`
- `\localecounter{\langle style \rangle}\{\langle counter \rangle\}`, 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`  
**Bengali** `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, syllable, 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=..>*]{*<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).

Even with a certain calendar there may be variants. In Kurmanji the default variant prints something like *30. Çileyä Pêşîn 2019*, but with variant=izafa it prints *31'ê Çileyä Pêşînê 2019*.

## 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 T<sub>E</sub>X 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 `classicalatin` 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 `\getlanguageproperty*`, 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 store 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.

**\BabelEnsureInfo** ini files are loaded with `\babelprovide` and also when languages are selected if there is a `\babelfont` or they have not been explicitly declared. To ensure the ini files are loaded (and therefore the corresponding data) even if these two conditions are not met, write `\BabelEnsureInfo` in the preamble.

## 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 T<sub>E</sub>X 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 T<sub>E</sub>X 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 T<sub>E</sub>X, - 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 L<sup>A</sup>T<sub>E</sub>X: (1) the character used is that set for the current font, while in L<sup>A</sup>T<sub>E</sub>X it is hardwired to - (a typical value); (2) the hyphen to be used in fonts with a negative `\hyphenchar` is -, like in L<sup>A</sup>T<sub>E</sub>X, 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** To set hyphenation exceptions in the preamble before any language is explicitly set with a selector, use `\babelhyphenation` instead of `\hyphenation`. In the preamble the hyphenation rules are not always fully set up and an error can be raised.

```
\begin{hyphenrules} {\langle language \rangle} ... \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 [\langle language \rangle, \langle language \rangle, ...] {\langle patterns \rangle}
```

**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

<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.

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:

```
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. (More to follow in future releases.)

Arabic	<code>transliteration.dad</code>	Applies the transliteration system devised by Yannis Haralambous for dad (simple and $\TeX$ -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: <code>!?:;</code> .

Hungarian	<code>digraphs.hyphen</code>	Hyphenates the long digraphs <i>ccs</i> , <i>ddz</i> , <i>ggy</i> , <i>lly</i> , <i>nnny</i> , <i>ssz</i> , <i>tty</i> and <i>zzs</i> as <i>cs-cs</i> , <i>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, Oriya, Tamil, Telugu.
Latin	<code>digraphs.ligatures</code>	Replaces the groups <i>ae</i> , <i>AE</i> , <i>oe</i> , <i>OE</i> with <i>æ</i> , <i>Æ</i> , <i>œ</i> , <i>Œ</i> .
Latin	<code>letters.noj</code>	Replaces <i>j</i> , <i>J</i> with <i>i</i> , <i>I</i> .
Latin	<code>letters.uv</code>	Replaces <i>v</i> , <i>U</i> with <i>u</i> , <i>V</i> .
Sanskrit	<code>transliteration.iast</code>	The IAST system to romanize Devanagari. <sup>16</sup>
Serbian	<code>transliteration.gajica</code>	(Note <i>serbian</i> with <i>ini</i> files refers to the Cyrillic script, which is here the target.) The standard system devised by Ljudevit Gaj.
Arabic, Persian	<code>kashida.plain</code>	Experimental. A very simple and basic transform for ‘plain’ Arabic fonts, which attempts to distribute the <i>tatwil</i> 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* → *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 ([*ı*]), the replacement could be {1|*ı*ı|*ı*ı}, which maps *ı* to *ı*, and *ı* to *ı*, so that the diaeresis is removed.

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

**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 `\babel font`. 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.

## 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 `\getlanguageproperty`. 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` `{\text}`

<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.

**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  $\backslash TeX$  and  $\backslash LaTeX$  so that they are correctly typeset even with LGR or X2 (the complete list is stored in  $\backslash BabelNonASCII$ , 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  $\backslash TeX$  and  $\backslash LaTeX$  are not redefined); otherwise,  $\backslash ensureascii$  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  $\backslash BabelNonText$ , 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:

```
\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 (الاجريقي) بـ
    Arabia أو Aravia (بالاغريقية Αραβία), 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 فصحى العصر \textit{fuṣḥā l-‘aṣr} (MSA) and
    فصحى 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 `\textthe` must be defined to select the main language):

```
\newcommand\refrange[2]{\babelsublr{\textthe{\ref{#1}}-\textthe{\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 dot-separated list (eg, `layout=counters.contents.sectioning`). 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{<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.<sup>19</sup>

**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 `\LaTeX2e` **New 3.19** .

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

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

<sup>19</sup>Next on the roadmap are counters and numeral systems in general. Expect some minor readjustments.

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

Digits in pdf<sub>tex</sub> must be marked up explicitly (unlike luat<sub>ex</sub> with `bidi=basic` or `bidi=basic-r` and, usually, xet<sub>ex</sub>). This command is provided to set `{\lr-text}` 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 `rl` 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`** `{\section-name}`

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`** `{\cmd}{\local-language}{\before}{\after}`

**New 3.17** Something like:

```
\BabelFootnote{\parsfootnote}{\language\language}{\{}}{\{}}
```

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

```
\footnote{(\foreignlanguage{\language\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\language}{\{}}{\}%  
\BabelFootnote{\localfootnote}{\language\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 `\useshortands*` 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 T<sub>E</sub>X parameters (#1, #2, #3), with the meaning given:

**adddialect** (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.

**Afrikaans** afrikaans

**Azerbaijani** azerbaijani

**Basque** basque

**Breton** breton

**Bulgarian** bulgarian



**Catalan** catalan  
**Croatian** croatian  
**Czech** czech  
**Danish** danish  
**Dutch** dutch  
**English** english, USenglish, american, UKenglish, british, canadian, australian, newzealand  
**Esperanto** esperanto  
**Estonian** estonian  
**Finnish** finnish  
**French** french, francais, canadien, acadian  
**Galician** galician  
**German** austrian, german, germanb, ngerman, naustrian  
**Greek** greek, polutonikogreek  
**Hebrew** hebrew  
**Icelandic** icelandic  
**Indonesian** indonesian (bahasa, indon, bahasai)  
**Interlingua** interlingua  
**Irish Gaelic** irish  
**Italian** italian  
**Latin** latin  
**Lower Sorbian** lowersorbian  
**Malay** malay, melayu (bahasam)  
**North Sami** samin  
**Norwegian** norsk, nynorsk  
**Polish** polish  
**Portuguese** portuguese, brazilian (portuges, brazil)<sup>20</sup>  
**Romanian** romanian  
**Russian** russian  
**Scottish Gaelic** scottish  
**Spanish** spanish  
**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 *⟨file⟩*, which creates *⟨file⟩.tex*; you can then typeset the latter with  $\LaTeX$ .

---

<sup>20</sup>The two last name comes from the times when they had to be shortened to 8 characters



## 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).

`\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 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}{l} % or al, r, en, an, on, et, cs
\babelcharproperty{`}{\linebreak}{cl} % or id, op, cl, ns, ex, in, hy
```

**New 3.39** Another property is locale, which adds characters to the list used by onchar in \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

`\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 (and only for luatex), with values on or off: bidi.text, bidi.mirroring, bidi.mapdigits, layout.lists, layout.tabular, linebreak.sea, linebreak.cjk, justify.arabic. 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`), L<sup>A</sup>T<sub>E</sub>X 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 T<sub>E</sub>X only takes into account the values when the paragraph is hyphenated, i.e., when it has been finished.<sup>21</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 T<sub>E</sub>X, not of babel. Alternatively, you may use `\usesorthands` to activate ' and `\definesorthand`, 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 T<sub>E</sub>X enter in an infinite loop in some rare cases. (Another issue in the 'to do' list, although there is a partial solution.)

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.

**mkpatter** 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>22</sup> But that is the easy part, because they don't require modifying the L<sup>A</sup>T<sub>E</sub>X 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.<sup>o</sup>" may be referred to as either "ítem 3.<sup>o</sup>" or "3.<sup>er</sup> ítem", and so on.

<sup>21</sup>This explains why L<sup>A</sup>T<sub>E</sub>X 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.

<sup>22</sup>See for example POSIX, ISO 14652 and the Unicode Common Locale Data Repository (CLDR). Those systems, however, have limited application to T<sub>E</sub>X because their aim is just to display information and not fine typesetting.

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{ autoload.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`

T<sub>E</sub>X and most engines based on it (pdfT<sub>E</sub>X, xetex,  $\epsilon$ -T<sub>E</sub>X, the main exception being luatex) require hyphenation patterns to be preloaded when a format is created (eg, L<sup>A</sup>T<sub>E</sub>X, XeL<sup>A</sup>T<sub>E</sub>X, pdfL<sup>A</sup>T<sub>E</sub>X). 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>23</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>24</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>25</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<sup>A</sup>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
```

<sup>23</sup>This feature was added to 3.9o, but it was buggy. Both 3.9o and 3.9p are deprecated.

<sup>24</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>25</sup>This is because different operating systems sometimes use very different file-naming conventions.

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>26</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.

### 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 L<sup>A</sup>T<sub>E</sub>X 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 `\<lang>hyphenmins`, `\captions<lang>`, `\date<lang>`, `\extras<lang>` and `\noextras<lang>` (the last two may be left empty); where `<lang>` is either the name of the language definition file or the name of the L<sup>A</sup>T<sub>E</sub>X 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<lang>` but not `\captions<lang>` does not raise an error but can lead to unexpected results.
- When a language definition file is loaded, it can define `\l@<lang>` to be a dialect of `\language0` when `\l@<lang>` 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 `/`).

---

<sup>26</sup>This is not a new feature, but in former versions it didn't work correctly.

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<lang>` except for `umlauthigh` and friends, `\bbl@deactivate`, `\bbl@(non)frenchspacing`, and language-specific macros. Use always, if possible, `\bbl@save` and `\bbl@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<lang>`.
- 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>27</sup>
- Please, for “private” internal macros do not use the `\bbl@` 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.

---

<sup>27</sup>But not removed, for backward compatibility.

## 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 T<sub>E</sub>X 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 T<sub>E</sub>X 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 `\lefthyphenmin` and `\righthyphenmin` directly in `\extras<lang>` has no effect.)

**\providehyphenmins** The macro `\providehyphenmins` should be used in the language definition files to set `\lefthyphenmin` and `\righthyphenmin`. 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 *not* set them).

**\captions<lang>** The macro `\captions<lang>` defines the macros that hold the texts to replace the original hard-wired texts.

**\date<lang>** The macro `\date<lang>` defines `\today`.

**\extras<lang>** The macro `\extras<lang>` 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.

**\noextras<lang>** Because we want to let the user switch between languages, but we do not know what state T<sub>E</sub>X might be in after the execution of `\extras<lang>`, a macro that brings T<sub>E</sub>X into a predefined state is needed. It will be no surprise that the name of this macro is `\noextras<lang>`.

**\bbl@declare@ttribute** 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.

**\main@language** To postpone the activation of the definitions needed for a language until the beginning of a document, all language definition files should use `\main@language` instead of `\selectlanguage`. This will just store the name of the language, and the proper language will be activated at the start of the document.

**\ProvidesLanguage** The macro `\ProvidesLanguage` should be used to identify the language definition files. Its syntax is similar to the syntax of the L<sup>A</sup>T<sub>E</sub>X command `\ProvidesPackage`.

**\LdfInit** The macro `\LdfInit` 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 @-sign, preventing the `.ldf` file from being processed twice, etc.

**\ldf@quit** The macro `\ldf@quit` does work needed if a `.ldf` file was processed earlier. This includes resetting the category code of the @-sign, preparing the language to be activated at `\begin{document}` time, and ending the input stream.

**\ldf@finish** The macro `\ldf@finish` does work needed at the end of each `.ldf` file. This includes resetting the category code of the @-sign, loading a local configuration file, and preparing the language to be activated at `\begin{document}` time.

**\loadlocalcfg** After processing a language definition file, L<sup>A</sup>T<sub>E</sub>X can be instructed to load a local configuration file. This file can, for instance, be used to add strings to `\captions<lang>` to support local document classes. The user will be informed that this configuration file has been loaded. This macro is called by `\ldf@finish`.

**\substitutefontfamily** (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 .fd file will instruct  $\TeX$  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>

\bbl@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
```



<code>\savebox{\myeye}{\eye}%</code>	And direct usage
<code>\newsavebox{\myeye}</code>	
<code>\newcommand\myanchor{\anchor}%</code>	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.

<code>\initiate@active@char</code>	The internal macro <code>\initiate@active@char</code> 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.
<code>\bbl@activate</code> <code>\bbl@deactivate</code>	The command <code>\bbl@activate</code> is used to change the way an active character expands. <code>\bbl@activate</code> ‘switches on’ the active behavior of the character. <code>\bbl@deactivate</code> lets the active character expand to its former (mostly) non-active self.
<code>\declare@shorthand</code>	The macro <code>\declare@shorthand</code> 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. <code>~</code> or <code>"a</code> ; and the code to be executed when the shorthand is encountered. (It does <i>not</i> raise an error if the shorthand character has not been “initiated”.)
<code>\bbl@add@special</code> <code>\bbl@remove@special</code>	The $\TeX$ book states: “Plain $\TeX$ includes a macro called <code>\dospecials</code> that is essentially a set macro, representing the set of all characters that have a special category code.” [4, p. 380] 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 <code>\dospecial</code> . $\TeX$ adds another macro called <code>\@sanitize</code> representing the same character set, but without the curly braces. The macros <code>\bbl@add@special⟨char⟩</code> and <code>\bbl@remove@special⟨char⟩</code> add and remove the character <code>⟨char⟩</code> to these two sets.

### 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>28</sup>.

<code>\babel@save</code>	To save the current meaning of any control sequence, the macro <code>\babel@save</code> is provided. It takes one argument, <code>⟨cname⟩</code> , the control sequence for which the meaning has to be saved.
<code>\babel@savevariable</code>	A second macro is provided to save the current value of a variable. In this context, anything that is allowed after the <code>\the</code> primitive is considered to be a variable. The macro takes one argument, the <code>⟨variable⟩</code> . The effect of the preceding macros is to append a piece of code to the current definition of <code>\originalTeX</code> . When <code>\originalTeX</code> 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

<code>\addto</code>	The macro <code>\addto{⟨control sequence⟩}{⟨<math>\TeX</math> code⟩}</code> can be used to extend the definition of a macro. The macro need not be defined (ie, it can be undefined or <code>\relax</code> ). This macro can, for instance, be used in adding instructions to a macro like <code>\extrasenglish</code> . 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 <code>etoolbox</code> , by Philipp Lehman, consider using the tools provided by this package instead of <code>\addto</code> .
---------------------	--

### 3.7 Macros common to a number of languages

<code>\bbl@allowhyphens</code>	In several languages compound words are used. This means that when $\TeX$ has to
--------------------------------	--

<sup>28</sup>This mechanism was introduced by Bernd Raichle.



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`  
`\bbl@nonfrenchspacing` The commands `\bbl@frenchspacing` and `\bbl@nonfrenchspacing` can be used to properly switch French spacing on and off.

### 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 consist is 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`  $\{\langle language-list \rangle\}\{\langle category \rangle\}[\langle selector \rangle]$

The  $\langle language-list \rangle$  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 `\category` is either captions, date or extras. You must stick to these three categories, even if no error is raised when using other name.<sup>29</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}

\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 `\category``\language` are overridden, which means the old way to define strings still works and used by default (to be precise, is first set

<sup>29</sup>In future releases further categories may be added.

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 `\date<language>` exists).

**\StartBabelCommands** `*{\<language-list>}{\<category>}{\<selector>}`

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>30</sup>

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

**\AfterBabelCommands** `{\<code>}`

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

**\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 `\@uclclist` (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=`I\relax
 \uccode`ı=`I\relax}
{\lccode`I=`i\relax
 \lccode`I=`ı\relax}

\StartBabelCommands{turkish}{}
```

<sup>30</sup>This replaces in 3.9g a short-lived `\UseStrings` which has been removed because it did not work.

```

\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** `{\langle to-lower-macros \rangle}`

**New 3.9g** Case mapping serves in T<sub>E</sub>X 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 T<sub>E</sub>X primitive (`\lccode`), babel sets them separately. There are three helper macros to be used inside `\SetHyphenMap`:

- `\BabelLower{\langle uccode \rangle}{\langle lccode \rangle}` 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{\langle uccode-from \rangle}{\langle uccode-to \rangle}{\langle step \rangle}{\langle lccode-from \rangle}` loops though the given uppercase codes, using the step, and assigns them the `lccode`, which is also increased (MM stands for *many-to-many*).
- `\BabelLowerMO{\langle uccode-from \rangle}{\langle uccode-to \rangle}{\langle step \rangle}{\langle lccode \rangle}` loops though 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}{\lccode"11F}{2}{\lccode"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** `{\langle selectors \rangle}{\langle true \rangle}{\langle false \rangle}`

**New 3.67** Sometimes a different setup is desired depending on the selector used. Values allowed in `\langle selectors \rangle` 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  $\LaTeX$  package, which sets options and loads language styles.

**plain.def** defines some  $\LaTeX$  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 an 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=3.75.2743>>
```

```
2 <<date=2022/05/20>>
```

**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  $\LaTeX$  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@csarg#1#2{\expandafter#1\csname bbl@#2\endcsname}%
12 \def\bbl@cs#1{\csname bbl@#1\endcsname}
13 \def\bbl@c1#1{\csname bbl@#1\@languagename\endcsname}
14 \def\bbl@loop#1#2#3{\bbl@loop#1#3#2,\@nnil,}
15 \def\bbl@loopx#1#2{\expandafter\bbl@loop\expandafter#1\expandafter{#2}}
16 \def\bbl@loop#1#2#3,{%
17   \ifx\@nnil#3\relax\else
18     \def#1#3#2\bbl@afterfi\bbl@loop#1#2}%
19   \fi}
20 \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.

```

21 \def\bbl@add@list#1#2{%
22   \edef#1{%
23     \bbl@ifunset{\bbl@stripslash#1}%
24     }%
25     {\ifx#1\@empty\else#1,\fi}%
26     #2}}

```

`\bbl@afterelse` `\bbl@afterfi` Because the code that is used in the handling of active characters may need to look ahead, we take extra care to ‘throw’ it over the `\else` and `\fi` parts of an `\if`-statement<sup>31</sup>. These macros will break if another `\if... \fi` statement appears in one of the arguments and it is not enclosed in braces.

```

27 \long\def\bbl@afterelse#1\else#2\fi{\fi#1}
28 \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.

```

29 \def\bbl@exp#1{%
30   \begingroup
31     \let\ \noexpand
32     \let\<\bbl@exp@en
33     \let\[\bbl@exp@ue
34     \edef\bbl@exp@aux{\endgroup#1}%
35     \bbl@exp@aux}
36 \def\bbl@exp@en#1>{\expandafter\noexpand\csname#1\endcsname}%
37 \def\bbl@exp@ue#1]{%
38   \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.

```

39 \def\bbl@tempa#1{%
40   \long\def\bbl@trim##1##2{%
41     \futurelet\bbl@trim@a\bbl@trim@c##2\@nil\@nil#1\@nil\relax{##1}}%
42   \def\bbl@trim@c{%

```

<sup>31</sup>This code is based on code presented in TUGboat vol. 12, no2, June 1991 in “An expansion Power Lemma” by Sonja Maus.

```

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

```

52 \begingroup
53 \gdef\bbl@ifunset#1{%
54 \expandafter\ifx\csname#1\endcsname\relax
55 \expandafter\@firstoftwo
56 \else
57 \expandafter\@secondoftwo
58 \fi}
59 \bbl@ifunset{ifcsname}% TODO. A better test?
60 {}%
61 {\gdef\bbl@ifunset#1{%
62 \ifcsname#1\endcsname
63 \expandafter\ifx\csname#1\endcsname\relax
64 \bbl@afterelse\expandafter\@firstoftwo
65 \else
66 \bbl@afterfi\expandafter\@secondoftwo
67 \fi
68 \else
69 \expandafter\@firstoftwo
70 \fi}}
71 \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,

```

72 \def\bbl@ifblank#1{%
73 \bbl@ifblank@i#1\@nil\@nil\@secondoftwo\@firstoftwo\@nil}
74 \long\def\bbl@ifblank@i#1#2\@nil#3#4#5\@nil{#4}
75 \def\bbl@ifset#1#2#3{%
76 \bbl@ifunset{#1}{#3}{\bbl@exp{\bbl@ifblank{#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).

```

77 \def\bbl@forkv#1#2{%
78 \def\bbl@kvcmd##1##2##3{#2}%
79 \bbl@kvnext#1,\@nil,}
80 \def\bbl@kvnext#1,{%
81 \ifx\@nil#1\relax\else
82 \bbl@ifblank{#1}{\bbl@forkv@eq#1=\@empty=\@nil{#1}}%
83 \expandafter\bbl@kvnext
84 \fi}
85 \def\bbl@forkv@eq#1=#2=#3\@nil#4{%
86 \bbl@trim@def\bbl@forkv@a{#1}%
87 \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).

```

88 \def\bbl@vforeach#1#2{%
89 \def\bbl@forcmd##1{#2}%
90 \bbl@fornext#1,\@nil,}
91 \def\bbl@fornext#1,{%

```

```

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

```

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

```

97 \def\bbl@replace#1#2#3{% in #1 -> repl #2 by #3
98   \toks@{}%
99   \def\bbl@replace@aux##1#2##2#2{%
100     \ifx\bbl@nil##2%
101       \toks@\expandafter{\the\toks@##1}%
102     \else
103       \toks@\expandafter{\the\toks@##1#3}%
104       \bbl@afterfi
105       \bbl@replace@aux##2#2%
106     \fi}%
107   \expandafter\bbl@replace@aux#1#2\bbl@nil#2%
108   \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 `\relax` 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 `\bbl@TG@@date`, and also fails if there are macros with spaces, because they are retokenized). It may change! (or even merged with `\bbl@replace`; I'm not sure ckecking the replacement is really necessary or just paranoia).

```

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

```

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

```

136 \def\bbl@ifsamestring#1#2{%
137   \begingroup
138   \protected@edef\bbl@tempb{#1}%
139   \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
140   \protected@edef\bbl@tempc{#2}%
141   \edef\bbl@tempc{\expandafter\strip@prefix\meaning\bbl@tempc}%

```



```

142 \ifx\bbl@tempb\bbl@tempc
143 \aftergroup\@firstoftwo
144 \else
145 \aftergroup\@secondoftwo
146 \fi
147 \endgroup}
148 \chardef\bbl@engine=%
149 \ifx\directlua\@undefined
150 \ifx\XeTeXinputencoding\@undefined
151 \z@
152 \else
153 \tw@
154 \fi
155 \else
156 \@ne
157 \fi

```

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

```

158 \def\bbl@bsphack{%
159 \ifhmode
160 \hskip\z@skip
161 \def\bbl@esphack{\loop\ifdim\lastskip>\z@\unskip\repeat\unskip}%
162 \else
163 \let\bbl@esphack\@empty
164 \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.

```

165 \def\bbl@cased{%
166 \ifx\oe\OE
167 \expandafter\in@\expandafter
168 {\expandafter\OE\expandafter}\expandafter{\oe}%
169 \ifin@
170 \bbl@afterelse\expandafter\MakeUppercase
171 \else
172 \bbl@afterfi\expandafter\MakeLowercase
173 \fi
174 \else
175 \expandafter\@firstofone
176 \fi}

```

An alternative to \IfFormatAtLeastTF for old versions. Temporary.

```

177 \ifx\IfFormatAtLeastTF\@undefined
178 \def\bbl@ifformatlater{\@ifl@t@r\fmtversion}
179 \else
180 \let\bbl@ifformatlater\IfFormatAtLeastTF
181 \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).

```

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

```

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

```
193 <<*Make sure ProvidesFile is defined>> ≡
194 \ifx\ProvidesFile\@undefined
195   \def\ProvidesFile#1[#2 #3 #4]{%
196     \wlog{File: #1 #4 #3 <#2>}%
197     \let\ProvidesFile\@undefined}
198 \fi
199 <</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.

```
200 <<*Define core switching macros>> ≡
201 \ifx\language\@undefined
202   \csname newcount\endcsname\language
203 \fi
204 <</Define core switching macros>>
```

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

`\addlanguage` This macro was introduced for  $\TeX < 2$ . Preserved for compatibility.

```
205 <<*Define core switching macros>> ≡
206 \countdef\last@language=19
207 \def\addlanguage{\csname newlanguage\endcsname}
208 <</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 ( $\LaTeX$ , `babel.sty`)

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

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

```
212 \@ifpackagewith{babel}{debug}
213   {\providecommand\bbl@trace[1]{\message{^^J[ #1 ]}}%
214     \let\bbl@debug\@firstofone
215     \ifx\directlua\@undefined\else
216       \directlua{ Babel = Babel or {}
217         Babel.debug = true }%
218       \input{babel-debug.tex}%
219     \fi}
220   {\providecommand\bbl@trace[1]{}%
221     \let\bbl@debug\@gobble
222     \ifx\directlua\@undefined\else
223       \directlua{ Babel = Babel or {}
224         Babel.debug = false }%
225     \fi}
226 \def\bbl@error#1#2{%
227   \begingroup
```

```

228 \def\{\MessageBreak}%
229 \PackageError{babel}{#1}{#2}%
230 \endgroup}
231 \def\bbl@warning#1{%
232 \begingroup
233 \def\{\MessageBreak}%
234 \PackageWarning{babel}{#1}%
235 \endgroup}
236 \def\bbl@infowarn#1{%
237 \begingroup
238 \def\{\MessageBreak}%
239 \GenericWarning
240 {(babel) \@spaces\@spaces\@spaces}%
241 {Package babel Info: #1}%
242 \endgroup}
243 \def\bbl@info#1{%
244 \begingroup
245 \def\{\MessageBreak}%
246 \PackageInfo{babel}{#1}%
247 \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.

```

248 <<Basic macros>>
249 \ifpackagewith{babel}{silent}
250 {\let\bbl@info@gobble
251 \let\bbl@infowarn@gobble
252 \let\bbl@warning@gobble}
253 {}
254 %
255 \def\AfterBabelLanguage#1{%
256 \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.

```

257 \ifx\bbl@languages\undefined\else
258 \begingroup
259 \catcode\^^I=12
260 \ifpackagewith{babel}{showlanguages}{%
261 \begingroup
262 \def\bbl@elt#1#2#3#4{\wlog{#2^^I#1^^I#3^^I#4}}%
263 \wlog{<*languages>}%
264 \bbl@languages
265 \wlog{</languages>}%
266 \endgroup}{%
267 \endgroup
268 \def\bbl@elt#1#2#3#4{%
269 \ifnum#2=\z@
270 \gdef\bbl@nulllanguage{#1}%
271 \def\bbl@elt##1##2##3##4{%
272 \fi}%
273 \bbl@languages
274 \fi%

```

## 6.3 base

The first 'real' option to be processed is base, which sets 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.

```

275 \bbl@trace{Defining option 'base'}
276 \ifpackagewith{babel}{base}{%
277   \let\bbl@onlyswitch\@empty
278   \let\bbl@provide@locale\relax
279   \input babel.def
280   \let\bbl@onlyswitch\@undefined
281   \ifx\directlua\@undefined
282     \DeclareOption*{\bbl@patterns{\CurrentOption}}%
283   \else
284     \input luababel.def
285     \DeclareOption*{\bbl@patterns@lua{\CurrentOption}}%
286   \fi
287   \DeclareOption{base}{}%
288   \DeclareOption{showlanguages}{}%
289   \ProcessOptions
290   \global\expandafter\let\csname opt@babel.sty\endcsname\relax
291   \global\expandafter\let\csname ver@babel.sty\endcsname\relax
292   \global\let\@ifl@ter@\@ifl@ter
293   \def\@ifl@ter#1#2#3#4#5{\global\let\@ifl@ter\@ifl@ter@}%
294   \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.

```

295 \bbl@trace{key=value and another general options}
296 \bbl@csarg\let\tempa\expandafter\csname opt@babel.sty\endcsname
297 \def\bbl@tempb#1.#2{% Remove trailing dot
298   #1\ifx\@empty#2\else,\bbl@afterfi\bbl@tempb#2\fi}%
299 \def\bbl@tempd#1.#2\@nnil{% TODO. Refactor lists?
300   \ifx\@empty#2%
301     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
302   \else
303     \in@{,provide=}{, #1}%
304     \ifin@
305       \edef\bbl@tempc{%
306         \ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.\bbl@tempb#2}%
307     \else
308       \in@{=}{#1}%
309       \ifin@
310         \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.#2}%
311       \else
312         \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
313       \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}%
314     \fi
315   \fi
316 \fi}
317 \let\bbl@tempc\@empty
318 \bbl@foreach\bbl@tempa{\bbl@tempd#1.\@empty\@nnil}
319 \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.

```

320 \DeclareOption{KeepShorthandsActive}{}
321 \DeclareOption{activeacute}{}
322 \DeclareOption{activegrave}{}
323 \DeclareOption{debug}{}
324 \DeclareOption{noconfigs}{}
325 \DeclareOption{showlanguages}{}
326 \DeclareOption{silent}{}

```

```

327% \DeclareOption{mono}{}
328 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
329 \chardef\bbl@iniflag\z@
330 \DeclareOption{provide=*}{\chardef\bbl@iniflag@ne} % main -> +1
331 \DeclareOption{provide+=*}{\chardef\bbl@iniflag@tw@} % add = 2
332 \DeclareOption{provide*=*}{\chardef\bbl@iniflag@thr@@} % add + main
333 % A separate option
334 \let\bbl@autoload@options\@empty
335 \DeclareOption{provide=@*}{\def\bbl@autoload@options{import}}
336 % Don't use. Experimental. TODO.
337 \newif\ifbbl@single
338 \DeclareOption{selectors=off}{\bbl@singletrue}
339 <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.

```

340 \let\bbl@opt@shorthands\@nnil
341 \let\bbl@opt@config\@nnil
342 \let\bbl@opt@main\@nnil
343 \let\bbl@opt@headfoot\@nnil
344 \let\bbl@opt@layout\@nnil
345 \let\bbl@opt@provide\@nnil

```

The following tool is defined temporarily to store the values of options.

```

346 \def\bbl@tempa#1=#2\bbl@tempa{%
347   \bbl@csarg\ifx{opt@#1}\@nnil
348     \bbl@csarg\edef{opt@#1}{#2}%
349   \else
350     \bbl@error
351     {Bad option '#1=#2'. Either you have misspelled the\\%
352     key or there is a previous setting of '#1'. Valid\\%
353     keys are, among others, 'shorthands', 'main', 'bidi',\\%
354     'strings', 'config', 'headfoot', 'safe', 'math'.}%
355     {See the manual for further details.}
356   \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.

```

357 \let\bbl@language@opts\@empty
358 \DeclareOption*{%
359   \bbl@xin@{\string=}{\CurrentOption}%
360   \ifin@
361     \expandafter\bbl@tempa\CurrentOption\bbl@tempa
362   \else
363     \bbl@add@list\bbl@language@opts{\CurrentOption}%
364   \fi}

```

Now we finish the first pass (and start over).

```

365 \ProcessOptions*
366 \ifx\bbl@opt@provide\@nnil
367   \let\bbl@opt@provide\@empty % %%% MOVE above
368 \else
369   \chardef\bbl@iniflag@ne
370   \bbl@exp{\bbl@forkv{\@nameuse{@raw@opt@babel.sty}}}{%
371     \in@{,provide,}{, #1,}%
372     \ifin@
373       \def\bbl@opt@provide{#2}%
374       \bbl@replace\bbl@opt@provide{;}{,}%
375     \fi}
376 \fi
377 %

```

## 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=...

```
378 \bbl@trace{Conditional loading of shorthands}
379 \def\bbl@sh@string#1{%
380   \ifx#1\@empty\else
381     \ifx#1t\string~%
382     \else\ifx#1c\string,%
383     \else\string#1%
384     \fi\fi
385     \expandafter\bbl@sh@string
386   \fi}
387 \ifx\bbl@opt@shorthands\@nnil
388   \def\bbl@ifshorthand#1#2#3{#2}%
389 \else\ifx\bbl@opt@shorthands\@empty
390   \def\bbl@ifshorthand#1#2#3{#3}%
391 \else
```

The following macro tests if a shorthand is one of the allowed ones.

```
392   \def\bbl@ifshorthand#1{%
393     \bbl@xin@{\string#1}{\bbl@opt@shorthands}%
394     \ifin@
395       \expandafter\@firstoftwo
396     \else
397       \expandafter\@secondoftwo
398     \fi}
```

We make sure all chars in the string are ‘other’, with the help of an auxiliary macro defined above (which also zaps spaces).

```
399   \edef\bbl@opt@shorthands{%
400     \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.

```
401   \bbl@ifshorthand{'}%
402     {\PassOptionsToPackage{activeacute}{babel}}{}
403   \bbl@ifshorthand{`}%
404     {\PassOptionsToPackage{activegrave}{babel}}{}
405 \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.

```
406 \ifx\bbl@opt@headfoot\@nnil\else
407   \g@addto@macro\@resetactivechars{%
408     \set@typeset@protect
409     \expandafter\select@language@x\expandafter{\bbl@opt@headfoot}%
410     \let\protect\noexpand}
411 \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 set.

```
412 \ifx\bbl@opt@safe\@undefined
413   \def\bbl@opt@safe{BR}
414 \fi
```

For layout an auxiliary macro is provided, available for packages and language styles. Optimization: if there is no layout, just do nothing.

```
415 \bbl@trace{Defining IfBabelLayout}
416 \ifx\bbl@opt@layout\@nnil
417   \newcommand\IfBabelLayout[3]{#3}%
418 \else
```

```

419 \newcommand\IfBabelLayout[1]{%
420   \@expandtwoargs\in@{.#1.}{.\bbl@opt@layout.}%
421   \ifin@
422     \expandafter\@firstoftwo
423   \else
424     \expandafter\@secondoftwo
425   \fi}
426 \fi
427 \endpackage
428 \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*.

```

429 \ifx\ldf@quit\undefined\else
430 \endinput\fi % Same line!
431 \langle\langle Make sure ProvidesFile is defined \rangle\rangle
432 \ProvidesFile{babel.def}[\langle date \rangle] [\langle version \rangle] Babel common definitions]
433 \ifx\AtBeginDocument\undefined % TODO. change test.
434   \langle\langle Emulate LaTeX \rangle\rangle
435 \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.

```

436 \endcore
437 \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.

```

438 \def\bbl@version{\langle version \rangle}
439 \def\bbl@date{\langle date \rangle}
440 \langle\langle Define core switching macros \rangle\rangle

```

`\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.

```

441 \def\adddialect#1#2{%
442   \global\chardef#1#2\relax
443   \bbl@usehooks{adddialect}{\{#1\}\{#2\}}%
444   \begingroup
445     \count@#1\relax
446     \def\bbl@elt##1##2##3##4{%
447       \ifnum\count@=##2\relax
448         \edef\bbl@tempa{\expandafter\@gobbletwo\string#1}%
449         \bbl@info{Hyphen rules for '\expandafter\@gobble\bbl@tempa'
450           set to \expandafter\string\csname l@##1\endcsname\%
451           (\string\language\the\count@). Reported}%
452         \def\bbl@elt####1####2####3####4{%
453           \fi}%
454       \bbl@cs{languages}%
455     \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.

```

456 \def\bbl@fixname#1{%
457   \begingroup
458     \def\bbl@tempe{l@}%
459     \edef\bbl@tempd{\noexpand\ifundefined{\noexpand\bbl@tempe#1}}%
460     \bbl@tempd
461       {\lowercase\expandafter{\bbl@tempd}%
462        {\uppercase\expandafter{\bbl@tempd}%
463         \@empty
464          {\edef\bbl@tempd{\def\noexpand#1{#1}}%
465           {\uppercase\expandafter{\bbl@tempd}}}%
466          {\edef\bbl@tempd{\def\noexpand#1{#1}}%
467           {\lowercase\expandafter{\bbl@tempd}}}%
468         \@empty
469         \edef\bbl@tempd{\endgroup\def\noexpand#1{#1}}}%
470     \bbl@tempd
471     \bbl@exp{\bbl@usehooks{language}{\language}{#1}}}
472 \def\bbl@iflanguage#1{%
473   \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`.

```

474 \def\bbl@bcpcase#1#2#3#4\@#5{%
475   \ifx\@empty#3%
476     \uppercase{\def#5{#1#2}}%
477   \else
478     \uppercase{\def#5{#1}}%
479     \lowercase{\edef#5{#5#2#3#4}}%
480   \fi}
481 \def\bbl@bcpllookup#1-#2-#3-#4\@{%
482   \let\bbl@bcp\relax
483   \lowercase{\def\bbl@tempa{#1}}%
484   \ifx\@empty#2%
485     \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
486   \else\ifx\@empty#3%
487     \bbl@bcpcase#2\@empty\@empty\@{\bbl@tempb}
488     \IfFileExists{babel-\bbl@tempa-\bbl@tempb.ini}%
489     {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb}}%
490     {}%
491   \ifx\bbl@bcp\relax
492     \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
493   \fi
494   \else
495     \bbl@bcpcase#2\@empty\@empty\@{\bbl@tempb}
496     \bbl@bcpcase#3\@empty\@empty\@{\bbl@tempc}
497     \IfFileExists{babel-\bbl@tempa-\bbl@tempb-\bbl@tempc.ini}%
498     {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb-\bbl@tempc}}%
499     {}%
500   \ifx\bbl@bcp\relax
501     \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
502     {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}%
503     {}%
504   \fi
505   \ifx\bbl@bcp\relax
506     \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
507     {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}%
508     {}%
509   \fi
510   \ifx\bbl@bcp\relax

```



```

511 \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
512 \fi
513 \fi\fi}
514 \let\bbl@initload\relax
515 \def\bbl@provide@locale{%
516 \ifx\babelprovide\undefined
517 \bbl@error{For a language to be defined on the fly 'base'\\%
518 is not enough, and the whole package must be\\%
519 loaded. Either delete the 'base' option or\\%
520 request the languages explicitly}%
521 {See the manual for further details.}%
522 \fi
523 % TODO. Option to search if loaded, with \LocaleForEach
524 \let\bbl@auxname\language % Still necessary. TODO
525 \bbl@ifunset{bbl@bcp@map@\language}{}% Move uplevel??
526 {\edef\language{\@nameuse{bbl@bcp@map@\language}}}%
527 \ifbbl@bcpallowed
528 \expandafter\ifx\csname date\language\endcsname\relax
529 \expandafter
530 \bbl@bcplookup\language-\@empty-\@empty-\@empty\@@
531 \ifx\bbl@bcp\relax\else % Returned by \bbl@bcplookup
532 \edef\language{\bbl@bcp@prefix\bbl@bcp}%
533 \edef\localename{\bbl@bcp@prefix\bbl@bcp}%
534 \expandafter\ifx\csname date\language\endcsname\relax
535 \let\bbl@initload\bbl@bcp
536 \bbl@exp{\bbl@babelprovide[\bbl@autoload@bcptoptions]{\language}}%
537 \let\bbl@initload\relax
538 \fi
539 \bbl@csarg\xdef{bcp@map@\bbl@bcp}{\localename}%
540 \fi
541 \fi
542 \fi
543 \expandafter\ifx\csname date\language\endcsname\relax
544 \IfFileExists{babel-\language.tex}%
545 {\bbl@exp{\bbl@babelprovide[\bbl@autoload@options]{\language}}}%
546 {}%
547 \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.

```

548 \def\iflanguage#1{%
549 \bbl@iflanguage{#1}{%
550 \ifnum\csname l@#1\endcsname=\language
551 \expandafter\@firstoftwo
552 \else
553 \expandafter\@secondoftwo
554 \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.

```

555 \let\bbl@select@type\z@
556 \def\selectlanguage{%
557 \noexpand\protect
558 \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`.

```

559 \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.

```
560 \let\string\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 TeX'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.

```
561 \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`

```
562 \def\bbl@push@language{%
563   \ifx\language\undefined\else
564     \ifx\currentgrouplevel\undefined
565       \xdef\bbl@language@stack{\language+\bbl@language@stack}%
566     \else
567       \ifnum\currentgrouplevel=\z@
568         \xdef\bbl@language@stack{\language+}%
569       \else
570         \xdef\bbl@language@stack{\language+\bbl@language@stack}%
571       \fi
572     \fi
573 }
```

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`.

```
574 \def\bbl@pop@lang#1+#2\@@{%
575   \edef\language{#1}%
576   \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).

```
577 \let\bbl@ifrestoring\@secondoftwo
578 \def\bbl@pop@language{%
579   \expandafter\bbl@pop@lang\bbl@language@stack\@@
580   \let\bbl@ifrestoring\@firstoftwo
581   \expandafter\bbl@set@language\expandafter{\language}%
582   \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).

```

583 \chardef\localeid\z@
584 \def\bbl@id@last{0} % No real need for a new counter
585 \def\bbl@id@assign{%
586   \bbl@ifunset\bbl@id@@\language\name}%
587   {\count@\bbl@id@last\relax
588    \advance\count@\@ne
589    \bbl@csarg\chardef{id@@\language\name}\count@
590    \edef\bbl@id@last{\the\count@}%
591    \ifcase\bbl@engine\or
592      \directlua{
593        Babel = Babel or {}
594        Babel.locale_props = Babel.locale_props or {}
595        Babel.locale_props[\bbl@id@last] = {}
596        Babel.locale_props[\bbl@id@last].name = '\language'
597      }%
598    \fi}%
599  }%
600  \chardef\localeid\bbl@cl{id@}}

```

The unprotected part of \selectlanguage.

```

601 \expandafter\def\csname selectlanguage \endcsname#1{%
602   \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\tw@\fi
603   \bbl@push@language
604   \aftergroup\bbl@pop@language
605   \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 `luatex`, is to avoid the `\write` altogether when not needed).

```

606 \def\BabelContentsFiles{toc,lof,lot}
607 \def\bbl@set@language#1{% from selectlanguage, pop@
608   % The old buggy way. Preserved for compatibility.
609   \edef\language{%
610     \ifnum\escapechar=\expandafter`\string#1\@empty
611     \else\string#1\@empty\fi}%
612   \ifcat\relax\noexpand#1%
613     \expandafter\ifx\csname date\language\endcsname\relax
614       \edef\language{#1}%
615       \let\localename\language
616     \else
617       \bbl@info{Using '\string\language' instead of 'language' is\\%
618         deprecated. If what you want is to use a\\%
619         macro containing the actual locale, make\\%
620         sure it does not not match any language.\\%
621         Reported}%
622       \ifx\scantokens\@undefined
623         \def\localename{??}%
624       \else
625         \scantokens\expandafter{\expandafter
626           \def\expandafter\localename\expandafter{\language}}%
627       \fi
628     \fi
629   \else
630     \def\localename{#1}% This one has the correct catcodes

```

```

631 \fi
632 \select@language{\language}%
633 % write to auxs
634 \expandafter\ifx\csname date\language\endcsname\relax\else
635   \if@filesw
636     \ifx\babel@aux\@gobbletwo\else % Set if single in the first, redundant
637       \bbl@savelastskip
638       \protected@write\auxout{}\string\babel@aux{\bbl@auxname}{}}%
639       \bbl@restorelastskip
640     \fi
641     \bbl@usehooks{write}}}%
642   \fi
643 \fi}
644 %
645 \let\bbl@restorelastskip\relax
646 \let\bbl@savelastskip\relax
647 %
648 \newif\ifbbl@bcpallowed
649 \bbl@bcpallowedfalse
650 \def\select@language#1{% from set@, babel@aux
651   \ifx\bbl@selectorname\@empty
652     \def\bbl@selectorname{select}%
653   % set hmap
654   \fi
655   \ifnum\bbl@hymapsel=\@ccclv\chardef\bbl@hymapsel4\relax\fi
656   % set name
657   \edef\language{#1}%
658   \bbl@fixname\language
659   % TODO. name@map must be here?
660   \bbl@provide@locale
661   \bbl@iflanguage\language{%
662     \expandafter\ifx\csname date\language\endcsname\relax
663       \bbl@error
664       {Unknown language '\language'. Either you have\\%
665        misspelled its name, it has not been installed,\\%
666        or you requested it in a previous run. Fix its name,\\%
667        install it or just rerun the file, respectively. In\\%
668        some cases, you may need to remove the aux file}%
669       {You may proceed, but expect wrong results}%
670     \else
671       % set type
672       \let\bbl@select@type\z@
673       \expandafter\bbl@switch\expandafter{\language}%
674     \fi}}
675 \def\babel@aux#1#2{%
676   \select@language{#1}%
677   \bbl@foreach\BabelContentsFiles{% \relax -> don't assume vertical mode
678     \@writefile{##1}{\babel@toc{#1}{#2}\relax}}}% TODO - plain?
679 \def\babel@toc#1#2{%
680   \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.

```

681 \newif\ifbbl@usedategroup
682 \def\bbl@switch#1{% from select@, foreign@
683 % make sure there is info for the language if so requested
684 \bbl@ensureinfo{#1}%
685 % restore
686 \originalTeX
687 \expandafter\def\expandafter\originalTeX\expandafter{%
688 \csname noextras#1\endcsname
689 \let\originalTeX\@empty
690 \babel@beginsave}%
691 \bbl@usehooks{afterreset}{}%
692 \languageshorthands{none}%
693 % set the locale id
694 \bbl@id@assign
695 % switch captions, date
696 % No text is supposed to be added here, so we remove any
697 % spurious spaces.
698 \bbl@bspack
699 \ifcase\bbl@select@type
700 \csname captions#1\endcsname\relax
701 \csname date#1\endcsname\relax
702 \else
703 \bbl@xin@{,captions,}{, \bbl@select@opts,}%
704 \ifin@
705 \csname captions#1\endcsname\relax
706 \fi
707 \bbl@xin@{,date,}{, \bbl@select@opts,}%
708 \ifin@ % if \foreign... within \<lang>date
709 \csname date#1\endcsname\relax
710 \fi
711 \fi
712 \bbl@espack
713 % switch extras
714 \bbl@usehooks{beforeextras}{}%
715 \csname extras#1\endcsname\relax
716 \bbl@usehooks{afterextras}{}%
717 % > babel-ensure
718 % > babel-sh-<short>
719 % > babel-bidi
720 % > babel-fontspec
721 % hyphenation - case mapping
722 \ifcase\bbl@opt@hyphenmap\or
723 \def\BabelLower##1##2{\lccode##1=##2\relax}%
724 \ifnum\bbl@hymapsel>4\else
725 \csname\language @bbl@hyphenmap\endcsname
726 \fi
727 \chardef\bbl@opt@hyphenmap\z@
728 \else
729 \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
730 \csname\language @bbl@hyphenmap\endcsname
731 \fi
732 \fi
733 \let\bbl@hymapsel\@cclv
734 % hyphenation - select rules
735 \ifnum\csname l@\language\endcsname=\l@unhyphenated
736 \edef\bbl@tempa{u}%
737 \else
738 \edef\bbl@tempa{\bbl@c1{\lnbrk}}}%
739 \fi
740 % linebreaking - handle u, e, k (v in the future)
741 \bbl@xin@{/u}{/\bbl@tempa}%
742 \ifin@ \else \bbl@xin@{/e}{/\bbl@tempa} \fi % elongated forms
743 \ifin@ \else \bbl@xin@{/k}{/\bbl@tempa} \fi % only kashida

```

```

744 \ifin@else\bbl@xin@{/v}{/\bbl@tempa}\fi % variable font
745 \ifin@
746 % unhyphenated/kashida/elongated = allow stretching
747 \language\l@unhyphenated
748 \babel@savevariable\emergencystretch
749 \emergencystretch\maxdimen
750 \babel@savevariable\hbadness
751 \hbadness\@M
752 \else
753 % other = select patterns
754 \bbl@patterns{#1}%
755 \fi
756 % hyphenation - mins
757 \babel@savevariable\lefthyphenmin
758 \babel@savevariable\righthyphenmin
759 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
760 \set@hyphenmins\tw@\thr@@\relax
761 \else
762 \expandafter\expandafter\expandafter\set@hyphenmins
763 \csname #1hyphenmins\endcsname\relax
764 \fi
765 \let\bbl@selectorname\@empty}

```

**otherlanguage** 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.

```

766 \long\def\otherlanguage#1{%
767 \def\bbl@selectorname{other}%
768 \ifnum\bbl@hymapsel=\@ccclv\let\bbl@hymapsel\thr@@\fi
769 \csname selectlanguage \endcsname{#1}%
770 \ignorespaces}

```

The `\endotherlanguage` part of the environment tries to hide itself when it is called in horizontal mode.

```

771 \long\def\endotherlanguage{%
772 \global\@ignoretrue\ignorespaces}

```

**otherlanguage\*** 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`.

```

773 \expandafter\def\csname otherlanguage*\endcsname{%
774 \ifnextchar[\bbl@otherlanguage@s{\bbl@otherlanguage@s[]}}
775 \def\bbl@otherlanguage@s[#1]#2{%
776 \def\bbl@selectorname{other*}%
777 \ifnum\bbl@hymapsel=\@ccclv\chardef\bbl@hymapsel4\relax\fi
778 \def\bbl@select@opts{#1}%
779 \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”.

```

780 \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.

```

781 \providecommand\bbl@beforeforeign{}
782 \edef\foreignlanguage{%
783   \noexpand\protect
784   \expandafter\noexpand\csname foreignlanguage \endcsname}
785 \expandafter\def\csname foreignlanguage \endcsname{%
786   \@ifstar\bbl@foreign@s\bbl@foreign@x}
787 \providecommand\bbl@foreign@x[3][{}]{%
788   \begingroup
789     \def\bbl@selectorname{foreign}%
790     \def\bbl@select@opts{#1}%
791     \let\BabelText\@firstofone
792     \bbl@beforeforeign
793     \foreign@language{#2}%
794     \bbl@usehooks{foreign}{}%
795     \BabelText{#3}% Now in horizontal mode!
796   \endgroup}
797 \def\bbl@foreign@s#1#2{% TODO - \shapemode, \setpar, ?\@par
798   \begingroup
799     {\par}%
800     \def\bbl@selectorname{foreign*}%
801     \let\bbl@select@opts\empty
802     \let\BabelText\@firstofone
803     \foreign@language{#1}%
804     \bbl@usehooks{foreign*}{}%
805     \bbl@dirparastext
806     \BabelText{#2}% Still in vertical mode!
807     {\par}%
808   \endgroup}

```

`\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`.

```

809 \def\foreign@language#1{%
810   % set name
811   \edef\language#1}%
812   \ifbbl@usedategroup
813     \bbl@add\bbl@select@opts{,date,}%
814     \bbl@usedategroupfalse
815   \fi
816   \bbl@fixname\language#1
817   % TODO. name@map here?
818   \bbl@provide@locale
819   \bbl@iflanguage\language#1
820     \expandafter\ifx\csname date\language#1\endcsname\relax
821       \bbl@warning % TODO - why a warning, not an error?
822         {Unknown language '#1'. Either you have\\%
823           misspelled its name, it has not been installed,\\%
824           or you requested it in a previous run. Fix its name,\\%
825           install it or just rerun the file, respectively. In\\%
826           some cases, you may need to remove the aux file.\\%
827           I'll proceed, but expect wrong results.\\%

```

```

828         Reported}%
829     \fi
830     % set type
831     \let\bbl@select@type\@ne
832     \expandafter\bbl@switch\expandafter{\language}%

```

The following macro executes conditionally some code based on the selector being used.

```

833 \def\IfBabelSelectorTF#1{%
834   \bbl@xin@{\bbl@select@name,}{,\zap@space#1 \@empty,}%
835   \ifin@
836     \expandafter\@firstoftwo
837   \else
838     \expandafter\@secondoftwo
839   \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.

```

840 \let\bbl@hyphlist\@empty
841 \let\bbl@hyphenation@ \relax
842 \let\bbl@pttnlist\@empty
843 \let\bbl@patterns@ \relax
844 \let\bbl@hymapsel=\cclv
845 \def\bbl@patterns#1{%
846   \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
847     \csname l@#1\endcsname
848     \edef\bbl@tempa{#1}%
849   \else
850     \csname l@#1:\f@encoding\endcsname
851     \edef\bbl@tempa{#1:\f@encoding}%
852   \fi
853   \@expandtwoargs\bbl@usehooks{patterns}{#1}{\bbl@tempa}%
854   % > luatex
855   \@ifundefined{bbl@hyphenation@}{% Can be \relax!
856     \begingroup
857       \bbl@xin@{\number\language,}{,\bbl@hyphlist}%
858     \ifin@ \else
859       \@expandtwoargs\bbl@usehooks{hyphenation}{#1}{\bbl@tempa}%
860       \hyphenation{%
861         \bbl@hyphenation@
862         \@ifundefined{bbl@hyphenation@#1}%
863         \@empty
864         {\space\csname bbl@hyphenation@#1\endcsname}}%
865       \xdef\bbl@hyphlist{\bbl@hyphlist\number\language,}%
866     \fi
867   \endgroup}}

```

**hyphenrules** 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, `\lccode's` and font encodings are not set at all, so in most cases you should use `otherlanguage*`.

```

868 \def\hyphenrules#1{%
869   \edef\bbl@tempf{#1}%
870   \bbl@fixname\bbl@tempf
871   \bbl@iflanguage\bbl@tempf{%
872     \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
873     \ifx\languageshortands\@undefined \else
874       \languageshortands{none}%

```



```

875 \fi
876 \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
877 \set@hyphenmins\tw@\thr@@\relax
878 \else
879 \expandafter\expandafter\expandafter\set@hyphenmins
880 \csname\bbl@tempf hyphenmins\endcsname\relax
881 \fi}}
882 \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{lang}hyphenmins` is already defined this command has no effect.

```

883 \def\providehyphenmins#1#2{%
884 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
885 \namedef{#1hyphenmins}{#2}%
886 \fi}

```

`\set@hyphenmins` This macro sets the values of `\lefthyphenmin` and `\righthyphenmin`. It expects two values as its argument.

```

887 \def\set@hyphenmins#1#2{%
888 \lefthyphenmin#1\relax
889 \righthyphenmin#2\relax}

```

`\ProvidesLanguage` The identification code for each file is something that was introduced in  $\text{\LaTeX 2}_{\epsilon}$ . 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.

```

890 \ifx\ProvidesFile\undefined
891 \def\ProvidesLanguage#1[#2 #3 #4]{%
892 \wlog{Language: #1 #4 #3 <#2>}%
893 }
894 \else
895 \def\ProvidesLanguage#1{%
896 \begingroup
897 \catcode\ 10 %
898 \@makeother\/%
899 \@ifnextchar[%]
900 {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}}
901 \def\@provideslanguage#1[#2]{%
902 \wlog{Language: #1 #2}%
903 \expandafter\xdef\csname ver@#1.ldf\endcsname{#2}%
904 \endgroup}
905 \fi

```

`\originalTeX` The macro `\originalTeX` should be known to  $\text{\TeX}$  at this moment. As it has to be expandable we `\let` it to `\@empty` instead of `\relax`.

```

906 \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.

```

907 \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’:

```

908 \providecommand\setlocale{%
909 \bbl@error
910 {Not yet available}%
911 {Find an armchair, sit down and wait}}
912 \let\uselocale\setlocale
913 \let\locale\setlocale
914 \let\selectlocale\setlocale
915 \let\textlocale\setlocale
916 \let\textlanguage\setlocale
917 \let\languagegettext\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  $\text{\LaTeX 2\epsilon}$ , 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.

```

918 \edef\bbl@nulllanguage{\string\language=0}
919 \def\bbl@nocaption{\protect\bbl@nocaption@i}
920 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
921   \global\@namedef{#2}{\textbf{?#1?}}%
922   \@nameuse{#2}%
923   \edef\bbl@tempa{#1}%
924   \bbl@sreplace\bbl@tempa{name}{}}%
925   \bbl@warning{% TODO.
926     \@backslashchar#1 not set for '\language'. Please,\\%
927     define it after the language has been loaded\\%
928     (typically in the preamble) with:\\%
929     \string\setlocalecaption{\language}{\bbl@tempa}{..}\\%
930     Reported}}
931 \def\bbl@tentative{\protect\bbl@tentative@i}
932 \def\bbl@tentative@i#1{%
933   \bbl@warning{%
934     Some functions for '#1' are tentative.\\%
935     They might not work as expected and their behavior\\%
936     could change in the future.\\%
937     Reported}}
938 \def\@nolanerr#1{%
939   \bbl@error
940   {You haven't defined the language '#1' yet.\\%
941     Perhaps you misspelled it or your installation\\%
942     is not complete}%
943   {Your command will be ignored, type <return> to proceed}}
944 \def\@nopatterns#1{%
945   \bbl@warning
946   {No hyphenation patterns were preloaded for\\%
947     the language '#1' into the format.\\%
948     Please, configure your TeX system to add them and\\%
949     rebuild the format. Now I will use the patterns\\%
950     preloaded for \bbl@nulllanguage\space instead}}
951 \let\bbl@usehooks\gobbletwo
952 \ifx\bbl@onlyswitch\empty\endinput\fi
953 % Here ended switch.def

```

Here ended the now discarded switch.def. Here also (currently) ends the base option.

```

954 \ifx\directlua\@undefined\else
955   \ifx\bbl@luapatterns\@undefined
956     \input luababel.def
957   \fi
958 \fi
959 <<Basic macros>>
960 \bbl@trace{Compatibility with language.def}
961 \ifx\bbl@languages\@undefined
962   \ifx\directlua\@undefined
963     \openin1 = language.def % TODO. Remove hardcoded number
964     \ifeof1
965       \closein1
966       \message{I couldn't find the file language.def}

```

```

967 \else
968 \closein1
969 \begingroup
970 \def\addlanguage#1#2#3#4#5{%
971 \expandafter\ifx\csname lang@#1\endcsname\relax\else
972 \global\expandafter\let\csname l@#1\expandafter\endcsname
973 \csname lang@#1\endcsname
974 \fi}%
975 \def\uselanguage#1{%
976 \input language.def
977 \endgroup
978 \fi
979 \fi
980 \chardef\l@english\z@
981 \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.

```

982 \def\addto#1#2{%
983 \ifx#1\undefined
984 \def#1{#2}%
985 \else
986 \ifx#1\relax
987 \def#1{#2}%
988 \else
989 {\toks@\expandafter{#1#2}%
990 \xdef#1{\the\toks@}}%
991 \fi
992 \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. `TODO`. Always used with additional expansions. Move them here? Move the macro to basic?

```

993 \def\bbl@withactive#1#2{%
994 \begingroup
995 \lccode`~=#2\relax
996 \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`.

```

997 \def\bbl@redefine#1{%
998 \edef\bbl@tempa{\bbl@stripslash#1}%
999 \expandafter\let\csname org@\bbl@tempa\endcsname#1%
1000 \expandafter\def\csname\bbl@tempa\endcsname{
1001 \@onlypreamble\bbl@redefine

```

`\bbl@redefine@long` This version of `\babel@redefine` can be used to redefine `\long` commands such as `\ifthenelse`.

```

1002 \def\bbl@redefine@long#1{%
1003 \edef\bbl@tempa{\bbl@stripslash#1}%
1004 \expandafter\let\csname org@\bbl@tempa\endcsname#1%
1005 \expandafter\long\expandafter\def\csname\bbl@tempa\endcsname{
1006 \@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_`.

```

1007 \def\bbl@redefineroobust#1{%

```

```

1008 \edef\bbl@tempa{\bbl@stripslash#1}%
1009 \bbl@ifunset{\bbl@tempa\space}%
1010 {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
1011 \bbl@exp{\def\#1{\\protect\<\bbl@tempa\space>}}}%
1012 {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}}%
1013 \@namedef{\bbl@tempa\space}%
1014 \@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.

```

1015 \bbl@trace{Hooks}
1016 \newcommand\AddBabelHook[3][{}]{%
1017 \bbl@ifunset{\bbl@hk@#2}{\EnableBabelHook{#2}}}%
1018 \def\bbl@tempa##1,#3=##2,##3\@empty{\def\bbl@tempb{##2}}%
1019 \expandafter\bbl@tempa\bbl@evargs,#3=,\@empty
1020 \bbl@ifunset{\bbl@ev@#2@#3@#1}%
1021 {\bbl@csarg\bbl@add{ev@#3@#1}{\bbl@elth{#2}}}%
1022 {\bbl@csarg\let{ev@#2@#3@#1}\relax}%
1023 \bbl@csarg\newcommand{ev@#2@#3@#1}[\bbl@tempb]}
1024 \newcommand\EnableBabelHook[1]{\bbl@csarg\let{hk@#1}\@firstofone}
1025 \newcommand\DisableBabelHook[1]{\bbl@csarg\let{hk@#1}\@gobble}
1026 \def\bbl@usehooks#1#2{%
1027 \ifx\UseHook\undefined\else\UseHook{babel/*/#1}\fi
1028 \def\bbl@elth##1{%
1029 \bbl@cs{hk@##1}{\bbl@cs{ev@##1@#1@#2}}}%
1030 \bbl@cs{ev@#1@}%
1031 \ifx\language\undefined\else % Test required for Plain (?)
1032 \ifx\UseHook\undefined\else\UseHook{babel/\language/#1}\fi
1033 \def\bbl@elth##1{%
1034 \bbl@cs{hk@##1}{\bbl@cl{ev@##1@#1@#2}}}%
1035 \bbl@cl{ev@#1}%
1036 \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).

```

1037 \def\bbl@evargs{,% <- don't delete this comma
1038 everylanguage=1,loadkernel=1,loadpatterns=1,loadexceptions=1,%
1039 adddialect=2,patterns=2,defaultcommands=0,encodedcommands=2,write=0,%
1040 beforeextras=0,afterextras=0,stopcommands=0,stringprocess=0,%
1041 hyphenation=2,initiateactive=3,afterreset=0,foreign=0,foreign*=0,%
1042 beforestart=0,language=2}
1043 \ifx\NewHook\undefined\else
1044 \def\bbl@tempa#1=#2\@{\NewHook{babel/#1}}
1045 \bbl@foreach\bbl@evargs{\bbl@tempa#1\@}
1046 \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.

```

1047 \bbl@trace{Defining babelensure}
1048 \newcommand\babelensure[2][{}]{% TODO - revise test files
1049 \AddBabelHook{babel-ensure}{afterextras}{%
1050 \ifcase\bbl@select@type

```

```

1051     \bbl@cl{e}%
1052     \fi}%
1053 \begingroup
1054     \let\bbl@ens@include\@empty
1055     \let\bbl@ens@exclude\@empty
1056     \def\bbl@ens@fontenc{\relax}%
1057     \def\bbl@tempb##1{%
1058         \ifx\@empty##1\else\noexpand##1\expandafter\bbl@tempb\fi}%
1059     \edef\bbl@tempa{\bbl@tempb##1\@empty}%
1060     \def\bbl@tempb##1=##2\@@{\@namedef\bbl@ens@##1}{##2}}%
1061     \bbl@foreach\bbl@tempa{\bbl@tempb##1\@@}%
1062     \def\bbl@tempc{\bbl@ensure}%
1063     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1064         \expandafter{\bbl@ens@include}}%
1065     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1066         \expandafter{\bbl@ens@exclude}}%
1067     \toks@\expandafter{\bbl@tempc}%
1068     \bbl@exp{%
1069 \endgroup
1070 \def\<bbl@e@#2>{\the\toks@{\bbl@ens@fontenc}}}%
1071 \def\bbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
1072 \def\bbl@tempb##1{% elt for (excluding) \bbl@captionslist list
1073     \ifx##1\@undefined % 3.32 - Don't assume the macro exists
1074         \edef##1{\noexpand\bbl@nocaption
1075             {\bbl@stripslash##1}{\language\name\bbl@stripslash##1}}%
1076         \fi
1077         \ifx##1\@empty\else
1078             \in@{##1}{#2}%
1079             \ifin@
1080                 \bbl@ifunset{\bbl@ensure@\language\name}%
1081                 {\bbl@exp{%
1082                     \\DeclareRobustCommand\<bbl@ensure@\language\name>[1]{%
1083                         \\foreignlanguage{\language\name}%
1084                         {\ifx\relax#3\else
1085                             \\fontencoding{#3}\\selectfont
1086                             \fi
1087                             #####1}}}%
1088                 }%
1089                 \toks@\expandafter{##1}%
1090                 \edef##1{%
1091                     \bbl@csarg\noexpand{\ensure@\language\name}%
1092                     {\the\toks@}}%
1093                 \fi
1094                 \expandafter\bbl@tempb
1095             \fi}%
1096 \expandafter\bbl@tempb\bbl@captionslist\today\@empty
1097 \def\bbl@tempa##1{% elt for include list
1098     \ifx##1\@empty\else
1099         \bbl@csarg\in@{\ensure@\language\name\expandafter}\expandafter{##1}%
1100         \ifin@
1101             \bbl@tempb##1\@empty
1102         \fi
1103         \expandafter\bbl@tempa
1104     \fi}%
1105 \bbl@tempa#1\@empty}
1106 \def\bbl@captionslist{%
1107     \prefacename\refname\abstractname\bibname\chaptername\appendixname
1108     \contentsname\listfigurename\listtablename\indexname\figurename
1109     \tablename\partname\enclname\ccname\headtoname\pagename\seename
1110     \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`.

```

1111 \bbl@trace{Macros for setting language files up}
1112 \def\bbl@ldfinit{%
1113   \let\bbl@screset\@empty
1114   \let\BabelStrings\bbl@opt@string
1115   \let\BabelOptions\@empty
1116   \let\BabelLanguages\relax
1117   \ifx\originalTeX\undefined
1118     \let\originalTeX\@empty
1119   \else
1120     \originalTeX
1121   \fi}
1122 \def\LdfInit#1#2{%
1123   \chardef\atcatcode=\catcode`\@
1124   \catcode`\@=11\relax
1125   \chardef\eqcatcode=\catcode`\=
1126   \catcode`\==12\relax
1127   \expandafter\if\expandafter\@backslashchar
1128     \expandafter\@car\string#2\@nil
1129     \ifx#2\undefined\else
1130       \ldf@quit{#1}%
1131     \fi
1132   \else
1133     \expandafter\ifx\csname#2\endcsname\relax\else
1134       \ldf@quit{#1}%
1135     \fi
1136   \fi
1137   \bbl@ldfinit}

```

`\ldf@quit` This macro interrupts the processing of a language definition file.

```

1138 \def\ldf@quit#1{%
1139   \expandafter\main@language\expandafter{#1}%
1140   \catcode`\@=\atcatcode \let\atcatcode\relax
1141   \catcode`\=\eqcatcode \let\eqcatcode\relax
1142   \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.

```

1143 \def\bbl@afterldf#1{% TODO. Merge into the next macro? Unused elsewhere
1144   \bbl@afterlang
1145   \let\bbl@afterlang\relax

```

```

1146 \let\BabelModifiers\relax
1147 \let\bbl@screset\relax}%
1148 \def\ldf@finish#1{%
1149 \loadlocalcfg{#1}%
1150 \bbl@afterldf{#1}%
1151 \expandafter\main@language\expandafter{#1}%
1152 \catcode`\@=\atcatcode \let\atcatcode\relax
1153 \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  $\LaTeX$ .

```

1154 \@onlypreamble\LdfInit
1155 \@onlypreamble\ldf@quit
1156 \@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.

```

1157 \def\main@language#1{%
1158 \def\bbl@main@language{#1}%
1159 \let\language\name\bbl@main@language % TODO. Set localname
1160 \bbl@id@assign
1161 \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`.

```

1162 \def\bbl@beforestart{%
1163 \def\@nolanerr##1{%
1164 \bbl@warning{Undefined language '##1' in aux.\\Reported}}%
1165 \bbl@usehooks{beforestart}}}%
1166 \global\let\bbl@beforestart\relax}
1167 \AtBeginDocument{%
1168 {\@nameuse{bbl@beforestart}}% Group!
1169 \if@filesw
1170 \providecommand\babel@aux[2]{}%
1171 \immediate\write\@mainaux{%
1172 \string\providecommand\string\babel@aux[2]}%
1173 \immediate\write\@mainaux{\string\@nameuse{bbl@beforestart}}%
1174 \fi
1175 \expandafter\selectlanguage\expandafter{\bbl@main@language}%
1176 \ifbbl@single % must go after the line above.
1177 \renewcommand\selectlanguage[1]{}%
1178 \renewcommand\foreignlanguage[2]{#2}%
1179 \global\let\babel@aux\@gobbletwo % Also as flag
1180 \fi
1181 \ifcase\bbl@engine\or\pagedir\bodydir\fi % TODO - a better place

```

A bit of optimization. Select in heads/foots the language only if necessary.

```

1182 \def\select@language@x#1{%
1183 \ifcase\bbl@select@type
1184 \bbl@ifsamestring\language\name{#1}{\select@language{#1}}%
1185 \else
1186 \select@language{#1}%
1187 \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  $\LaTeX$  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.

```

1188 \bbl@trace{Shorhands}
1189 \def\bbl@add@special#1{% 1:a macro like "\", \?, etc.
1190 \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
1191 \bbl@ifunset{@sanitize}{\bbl@add@sanitize{\@makeother#1}}%
1192 \ifx\nfss@catcodes\undefined\else % TODO - same for above
1193 \begingroup
1194 \catcode`#1\active
1195 \nfss@catcodes
1196 \ifnum\catcode`#1=\active
1197 \endgroup
1198 \bbl@add\nfss@catcodes{\@makeother#1}%
1199 \else
1200 \endgroup
1201 \fi
1202 \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.

```

1203 \def\bbl@remove@special#1{%
1204 \begingroup
1205 \def\x##1##2{\ifnum`#1=`##2\noexpand\@empty
1206 \else\noexpand##1\noexpand##2\fi}%
1207 \def\do{\x\do}%
1208 \def\@makeother{\x\@makeother}%
1209 \edef\x{\endgroup
1210 \def\noexpand\dospecials{\dospecials}%
1211 \expandafter\ifx\csname @sanitize\endcsname\relax\else
1212 \def\noexpand\@sanitize{\@sanitize}%
1213 \fi}%
1214 \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).

```

1215 \def\bbl@active@def#1#2#3#4{%
1216 \@namedef{#3#1}{%
1217 \expandafter\ifx\csname#2@sh@#1\endcsname\relax
1218 \bbl@afterelse\bbl@sh@select#2#1{#3@arg#1}{#4#1}%
1219 \else
1220 \bbl@afterfi\csname#2@sh@#1\endcsname
1221 \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.

```

1222 \long\@namedef{#3@arg#1}##1{%
1223 \expandafter\ifx\csname#2@sh@#1\string##1\endcsname\relax
1224 \bbl@afterelse\csname#4#1\endcsname##1%
1225 \else

```



```

1226 \bbl@afterfi\csname#2@sh@#1@\string##1\endcsname
1227 \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.

```

1228 \def\initiate@active@char#1{%
1229 \bbl@ifunset{active@char\string#1}%
1230 {\bbl@withactive
1231 {\expandafter\@initiate@active@char\expandafter}#1\string#1}%
1232 {}}

```

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).

```

1233 \def\@initiate@active@char#1#2#3{%
1234 \bbl@csarg\edef{oricat@#2}{\catcode`#2=\the\catcode`#2\relax}%
1235 \ifx#1\@undefined
1236 \bbl@csarg\def{oridef@#2}{\def#1{\active@prefix#1\@undefined}}%
1237 \else
1238 \bbl@csarg\let{oridef@@#2}#1%
1239 \bbl@csarg\edef{oridef@#2}{%
1240 \let\noexpand#1%
1241 \expandafter\noexpand\csname bbl@oridef@@#2\endcsname}%
1242 \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).

```

1243 \ifx#1#3\relax
1244 \expandafter\let\csname normal@char#2\endcsname#3%
1245 \else
1246 \bbl@info{Making #2 an active character}%
1247 \ifnum\mathcode`#2=\ifodd\bbl@engine"1000000 \else"8000 \fi
1248 \@namedef{normal@char#2}{%
1249 \textormath{#3}{\csname bbl@oridef@@#2\endcsname}}%
1250 \else
1251 \@namedef{normal@char#2}{#3}%
1252 \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).

```

1253 \bbl@restoreactive{#2}%
1254 \AtBeginDocument{%
1255 \catcode`#2\active
1256 \if@filesw
1257 \immediate\write\mainaux{\catcode`\string#2\active}%
1258 \fi}%
1259 \expandafter\bbl@add@special\csname#2\endcsname
1260 \catcode`#2\active
1261 \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>).

```

1262 \let\bbl@tempa\@firstoftwo

```

```

1263 \if\string^#2%
1264 \def\bbl@tempa{\noexpand\textormath}%
1265 \else
1266 \ifx\bbl@mathnormal\undefined\else
1267 \let\bbl@tempa\bbl@mathnormal
1268 \fi
1269 \fi
1270 \expandafter\edef\csname active@char#2\endcsname{%
1271 \bbl@tempa
1272 {\noexpand\if@safe@actives
1273 \noexpand\expandafter
1274 \expandafter\noexpand\csname normal@char#2\endcsname
1275 \noexpand\else
1276 \noexpand\expandafter
1277 \expandafter\noexpand\csname bbl@doactive#2\endcsname
1278 \noexpand\fi}%
1279 {\expandafter\noexpand\csname normal@char#2\endcsname}}}%
1280 \bbl@csarg\edef{doactive#2}{%
1281 \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!).

```

1282 \bbl@csarg\edef{active@#2}{%
1283 \noexpand\active@prefix\noexpand#1%
1284 \expandafter\noexpand\csname active@char#2\endcsname}%
1285 \bbl@csarg\edef{normal@#2}{%
1286 \noexpand\active@prefix\noexpand#1%
1287 \expandafter\noexpand\csname normal@char#2\endcsname}%
1288 \expandafter\let\expandafter#1\csname bbl@normal@#2\endcsname

```

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.

```

1289 \bbl@active@def#2\user@group{user@active}{language@active}%
1290 \bbl@active@def#2\language@group{language@active}{system@active}%
1291 \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  $\TeX$  would see `\protect'\protect'`. To prevent this from happening a couple of shorthand needs to be defined at user level.

```

1292 \expandafter\edef\csname\user@group @sh#2@@\endcsname
1293 {\expandafter\noexpand\csname normal@char#2\endcsname}%
1294 \expandafter\edef\csname\user@group @sh#2@\string\protect@\endcsname
1295 {\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@ms` 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.

```

1296 \if\string'#2%
1297 \let\prim@s\bbl@prim@s
1298 \let\active@math@prime#1%
1299 \fi
1300 \bbl@usehooks{initiateactive}{{#1}{#2}{#3}}

```

The following package options control the behavior of shorthands in math mode.

```

1301 <<(*More package options)>> ≡
1302 \DeclareOption{math=active}{}

```

```

1303 \DeclareOption{math=normal}{\def\bbl@mathnormal{\noexpand\textormath}}
1304 <\/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.

```

1305 \@ifpackagewith{babel}{KeepShorthandsActive}%
1306   {\let\bbl@restoreactive\@gobble}%
1307   {\def\bbl@restoreactive#1{%
1308     \bbl@exp{%
1309       \\\AfterBabelLanguage\\CurrentOption
1310       {\catcode`#1=\the\catcode`#1\relax}%
1311       \\\AtEndOfPackage
1312       {\catcode`#1=\the\catcode`#1\relax}}}%
1313     \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.

```

1314 \def\bbl@sh@select#1#2{%
1315   \expandafter\ifx\csname#1@sh@#2@sel\endcsname\relax
1316     \bbl@afterelse\bbl@scndcs
1317   \else
1318     \bbl@afterfi\csname#1@sh@#2@sel\endcsname
1319   \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 `\ifincname` is available. If there is, the expansion will be more robust.

```

1320 \begingroup
1321 \bbl@ifunset{ifincname}% TODO. Ugly. Correct? Only Plain?
1322 {\gdef\active@prefix#1{%
1323   \ifx\protect\@typeset@protect
1324   \else
1325     \ifx\protect\unexpandable@protect
1326       \noexpand#1%
1327     \else
1328       \protect#1%
1329     \fi
1330     \expandafter\@gobble
1331   \fi}}
1332 {\gdef\active@prefix#1{%
1333   \ifincname
1334     \string#1%
1335     \expandafter\@gobble
1336   \else
1337     \ifx\protect\@typeset@protect
1338     \else
1339       \ifx\protect\unexpandable@protect
1340         \noexpand#1%
1341       \else
1342         \protect#1%
1343       \fi
1344       \expandafter\expandafter\expandafter\@gobble
1345     \fi
1346   \fi}}
1347 \endgroup

```

`\if@safe@actives` In some circumstances it is necessary to be able to change the expansion of an active character 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⟩`.

```
1348 \newif\if@safe@actives
1349 \@safe@activesfalse
```

`\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.

```
1350 \def\bbl@restore@actives{\if@safe@actives\@safe@activesfalse\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`.

```
1351 \chardef\bbl@activated\z@
1352 \def\bbl@activate#1{%
1353   \chardef\bbl@activated\@ne
1354   \bbl@withactive{\expandafter\let\expandafter}#1%
1355     \csname bbl@active@\string#1\endcsname}
1356 \def\bbl@deactivate#1{%
1357   \chardef\bbl@activated\tw@
1358   \bbl@withactive{\expandafter\let\expandafter}#1%
1359     \csname bbl@normal@\string#1\endcsname}
```

`\bbl@firstcs` These macros are used only as a trick when declaring shorthands.

```
\bbl@scndcs
1360 \def\bbl@firstcs#1#2{\csname#1\endcsname}
1361 \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.

```
1362 \def\babel@texpdf#1#2#3#4{%
1363   \ifx\texorpdfstring\undefined
1364     \textormath{#1}{#3}%
1365   \else
1366     \texorpdfstring{\textormath{#1}{#3}}{#2}%
1367     % \texorpdfstring{\textormath{#1}{#3}}{\textormath{#2}{#4}}%
1368   \fi}
1369 %
1370 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
1371 \def\@decl@short#1#2#3\@nil#4{%
1372   \def\bbl@tempa{#3}%
1373   \ifx\bbl@tempa\empty
1374     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
1375     \bbl@ifunset{#1@sh@\string#2@}{}%
1376     {\def\bbl@tempa{#4}%
1377       \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbl@tempa
1378       \else
1379         \bbl@info
1380           {Redefining #1 shorthand \string#2\\%
1381            in language \CurrentOption}%
1382       \fi}%
1383   \@namedef{#1@sh@\string#2@}{#4}%
```

```

1384 \else
1385 \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bb1@firstcs
1386 \bb1@ifunset{#1@sh@\string#2@\string#3@}{}%
1387 {\def\bb1@tempa{#4}%
1388 \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bb1@tempa
1389 \else
1390 \bb1@info
1391 {Redefining #1 shorthand \string#2\string#3\\%
1392 in language \CurrentOption}%
1393 \fi}%
1394 \@namedef{#1@sh@\string#2@\string#3@}{#4}%
1395 \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.

1396 \def\textormath{%
1397 \ifmmode
1398 \expandafter\@secondoftwo
1399 \else
1400 \expandafter\@firstoftwo
1401 \fi}

\user@group The current concept of ‘shorthands’ supports three levels or groups of shorthands. For each level the
\language@group name of the level or group is stored in a macro. The default is to have a user group; use language
\system@group group ‘english’ and have a system group called ‘system’.

1402 \def\user@group{user}
1403 \def\language@group{english} % TODO. I don't like defaults
1404 \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.

1405 \def\usesshorthands{%
1406 \@ifstar\bb1@usesesh@s{\bb1@usesesh@x{}}%
1407 \def\bb1@usesesh@s#1{%
1408 \bb1@usesesh@x
1409 {\AddBabelHook{babel-sh-\string#1}{afterextras}{\bb1@activate{#1}}}%
1410 {#1}}
1411 \def\bb1@usesesh@x#1#2{%
1412 \bb1@ifshorthand{#2}%
1413 {\def\user@group{user}%
1414 \initiate@active@char{#2}%
1415 #1%
1416 \bb1@activate{#2}}%
1417 {\bb1@error
1418 {I can't declare a shorthand turned off (\string#2)}
1419 {Sorry, but you can't use shorthands which have been\\%
1420 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.

1421 \def\user@language@group{user@\language@group}
1422 \def\bb1@set@user@generic#1#2{%
1423 \bb1@ifunset{user@generic@active#1}%
1424 {\bb1@active@def#1\user@language@group{user@active}{user@generic@active}%
1425 \bb1@active@def#1\user@group{user@generic@active}{language@active}%
1426 \expandafter\edef\csname#2@sh@#1@\endcsname{%
1427 \expandafter\noexpand\csname normal@char#1\endcsname}%
1428 \expandafter\edef\csname#2@sh@#1@\string\protect@\endcsname{%

```

```

1429 \expandafter\noexpand\csname user@active#1\endcsname}}%
1430 \@empty}
1431 \newcommand\defineshorthand[3][user]{%
1432 \edef\bbl@tempa{\zap@space#1 \@empty}%
1433 \bbl@for\bbl@tempb\bbl@tempa{%
1434 \if*\expandafter\@car\bbl@tempb\@nil
1435 \edef\bbl@tempb{user\expandafter\@gobble\bbl@tempb}%
1436 \@expandtwoargs
1437 \bbl@set@user@generic{\expandafter\string\@car#2\@nil}\bbl@tempb
1438 \fi
1439 \declare@shorthand{\bbl@tempb}{#2}{#3}}

```

`\languageshorthands` 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].

```

1440 \def\languageshorthands#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`.

```

1441 \def\aliasshorthand#1#2{%
1442 \bbl@ifshorthand{#2}%
1443 {\expandafter\ifx\csname active@char\string#2\endcsname\relax
1444 \ifx\document\@notprerr
1445 \@notshorthand{#2}%
1446 \else
1447 \initiate@active@char{#2}%
1448 \expandafter\let\csname active@char\string#2\expandafter\endcsname
1449 \csname active@char\string#1\endcsname
1450 \expandafter\let\csname normal@char\string#2\expandafter\endcsname
1451 \csname normal@char\string#1\endcsname
1452 \bbl@activate{#2}%
1453 \fi
1454 \fi}%
1455 {\bbl@error
1456 {Cannot declare a shorthand turned off (\string#2)}
1457 {Sorry, but you cannot use shorthands which have been\\%
1458 turned off in the package options}}}

```

`\@notshorthand`

```

1459 \def\@notshorthand#1{%
1460 \bbl@error{%
1461 The character '\string #1' should be made a shorthand character;\\%
1462 add the command \string\usesshorthands\string{#1\string} to
1463 the preamble.\\%
1464 I will ignore your instruction}%
1465 {You may proceed, but expect unexpected results}}

```

`\shorthandon` The first level definition of these macros just passes the argument on to `\bbl@switch@sh`, adding `\shorthandoff` `\@nil` at the end to denote the end of the list of characters.

```

1466 \newcommand*\shorthandon[1]{\bbl@switch@sh\@ne#1\@nnil}
1467 \DeclareRobustCommand*\shorthandoff{%
1468 \@ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
1469 \def\bbl@shorthandoff#1#2{\bbl@switch@sh#1#2\@nnil}

```

`\bbl@switch@sh` The macro `\bbl@switch@sh` takes the list of characters apart one by one and subsequently switches the category code of the shorthand character according to the first argument of `\bbl@switch@sh`. But before any of this switching takes place we make sure that the character we are dealing with is known as a shorthand character. If it is, a macro such as `\active@char` should exist. Switching off and on is easy – we just set the category code to ‘other’ (12) and `\active`. With the starred version, the original catcode and the original definition, saved in `\initiate@active@char`, are restored.

```

1470 \def\bbl@switch@sh#1#2{%
1471   \ifx#2\@nnil\else
1472     \bbl@ifunset{bbl@active@\string#2}%
1473     {\bbl@error
1474      {I can't switch '\string#2' on or off--not a shorthand}%
1475      {This character is not a shorthand. Maybe you made\\%
1476       a typing mistake? I will ignore your instruction.}}}%
1477   {\ifcase#1%   off, on, off*
1478    \catcode`#212\relax
1479    \or
1480    \catcode`#2\active
1481    \bbl@ifunset{bbl@shdef@\string#2}%
1482    {}%
1483    {\bbl@withactive{\expandafter\let\expandafter}#2%
1484     \csname bbl@shdef@\string#2\endcsname
1485     \bbl@csarg\let{shdef@\string#2}\relax}%
1486    \ifcase\bbl@activated\or
1487     \bbl@activate{#2}%
1488    \else
1489     \bbl@deactivate{#2}%
1490    \fi
1491    \or
1492     \bbl@ifunset{bbl@shdef@\string#2}%
1493     {\bbl@withactive{\bbl@csarg\let{shdef@\string#2}}#2}%
1494     {}%
1495     \csname bbl@oricat@\string#2\endcsname
1496     \csname bbl@oridef@\string#2\endcsname
1497     \fi}%
1498   \bbl@afterfi\bbl@switch@sh#1%
1499 \fi}

```

Note the value is that at the expansion time; eg, in the preamble shorthands are usually deactivated.

```

1500 \def\babelshorthand{\active@prefix\babelshorthand\bbl@putsh}
1501 \def\bbl@putsh#1{%
1502   \bbl@ifunset{bbl@active@\string#1}%
1503   {\bbl@putsh@i#1\@empty\@nnil}%
1504   {\csname bbl@active@\string#1\endcsname}}
1505 \def\bbl@putsh@i#1#2\@nnil{%
1506   \csname\language@group @sh@\string#1@%
1507   \ifx\@empty#2\else\string#2@\fi\endcsname}
1508 \ifx\bbl@opt@shorthands\@nnil\else
1509   \let\bbl@s@initiate@active@char\initiate@active@char
1510   \def\initiate@active@char#1{%
1511     \bbl@ifshorthand{#1}{\bbl@s@initiate@active@char{#1}}{}}
1512   \let\bbl@s@switch@sh\bbl@switch@sh
1513   \def\bbl@switch@sh#1#2{%
1514     \ifx#2\@nnil\else
1515       \bbl@afterfi
1516       \bbl@ifshorthand{#2}{\bbl@s@switch@sh#1{#2}}{\bbl@switch@sh#1}%
1517     \fi}
1518   \let\bbl@s@activate\bbl@activate
1519   \def\bbl@activate#1{%
1520     \bbl@ifshorthand{#1}{\bbl@s@activate{#1}}{}}
1521   \let\bbl@s@deactivate\bbl@deactivate
1522   \def\bbl@deactivate#1{%
1523     \bbl@ifshorthand{#1}{\bbl@s@deactivate{#1}}{}}
1524 \fi

```

You may want to test if a character is a shorthand. Note it does not test whether the shorthand is on or off.

```

1525 \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.

```

1526 \def\bbl@prim@s{%
1527   \prime\futurelet\@let@token\bbl@pr@m@s}
1528 \def\bbl@if@primes#1#2{%
1529   \ifx#1\@let@token
1530     \expandafter\@firstoftwo
1531   \else\ifx#2\@let@token
1532     \bbl@afterelse\expandafter\@firstoftwo
1533   \else
1534     \bbl@afterfi\expandafter\@secondoftwo
1535   \fi\fi}
1536 \begingroup
1537   \catcode`\^=7 \catcode`\*=\active \lccode`\*='^
1538   \catcode`\'=12 \catcode`\"=\active \lccode`\"='\'
1539   \lowercase{%
1540     \gdef\bbl@pr@m@s{%
1541       \bbl@if@primes""%
1542       \pr@@@s
1543       {\bbl@if@primes*^ \pr@@@t\egroup}}
1544 \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).

```

1545 \initiate@active@char{~}
1546 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }
1547 \bbl@activate{~}

```

`\OT1dqpos` The position of the double quote character is different for the OT1 and T1 encodings. It will later be selected using the `\f@encoding` macro. Therefore we define two macros here to store the position of the character in these encodings.

```

1548 \expandafter\def\csname OT1dqpos\endcsname{127}
1549 \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

```

1550 \ifx\f@encoding\undefined
1551   \def\f@encoding{OT1}
1552 \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.

```

1553 \bbl@trace{Language attributes}
1554 \newcommand\languageattribute[2]{%
1555   \def\bbl@tempc{#1}%
1556   \bbl@fixname\bbl@tempc
1557   \bbl@iflanguage\bbl@tempc{%
1558     \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.

```

1559     \ifx\bbl@known@attribs\undefined

```



```

1560     \in@false
1561   \else
1562     \bbl@xin@{\bbl@tempc-##1,}{\bbl@known@attribs,}%
1563   \fi
1564   \ifin@
1565     \bbl@warning{%
1566       You have more than once selected the attribute '##1'\%
1567       for language #1. Reported}%
1568   \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 T<sub>E</sub>X-code.

```

1569     \bbl@exp{%
1570       \\bbl@add@list\\bbl@known@attribs{\bbl@tempc-##1}}%
1571   \edef\bbl@tempa{\bbl@tempc-##1}%
1572   \expandafter\bbl@ifknown@ttrib\expandafter{\bbl@tempa}\bbl@attributes%
1573   {\csname\bbl@tempc @attr##1\endcsname}%
1574   {\@attrerr{\bbl@tempc}{##1}}%
1575   \fi}}
1576 \@onlypreamble\languageattribute

```

The error text to be issued when an unknown attribute is selected.

```

1577 \newcommand*{\@attrerr}[2]{%
1578   \bbl@error
1579   {The attribute #2 is unknown for language #1.}%
1580   {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}.

```

1581 \def\bbl@declare@ttribute#1#2#3{%
1582   \bbl@xin@{, #2, }{\BabelModifiers,}%
1583   \ifin@
1584     \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
1585   \fi
1586   \bbl@add@list\bbl@attributes{#1-#2}%
1587   \expandafter\def\csname#1@attr#2\endcsname{#3}}

```

**\bbl@ifattributeset** This internal macro has 4 arguments. It can be used to interpret T<sub>E</sub>X 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.

```

1588 \def\bbl@ifattributeset#1#2#3#4{%
1589   \ifx\bbl@known@attribs\undefined
1590     \in@false
1591   \else
1592     \bbl@xin@{, #1-#2, }{\bbl@known@attribs,}%
1593   \fi
1594   \ifin@
1595     \bbl@afterelse#3%
1596   \else
1597     \bbl@afterfi#4%
1598   \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 T<sub>E</sub>X-code to be executed when the attribute is known and the T<sub>E</sub>X-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.

```

1599 \def\bbl@ifknown@ttrib#1#2{%
1600   \let\bbl@tempa\@secondoftwo

```

```

1601 \bbl@loopx\bbl@tempb{#2}{%
1602   \expandafter\in\expandafter{\expandafter,\bbl@tempb,}{, #1,}%
1603   \ifin@
1604     \let\bbl@tempa\@firstoftwo
1605   \else
1606     \fi}%
1607 \bbl@tempa}

```

`\bbl@clear@ttribs` This macro removes all the attribute code from  $\TeX$ 's memory at `\begin{document}` time (if any is present).

```

1608 \def\bbl@clear@ttribs{%
1609   \ifx\bbl@attributes\@undefined\else
1610     \bbl@loopx\bbl@tempa{\bbl@attributes}{%
1611       \expandafter\bbl@clear@trib\bbl@tempa.
1612     }%
1613     \let\bbl@attributes\@undefined
1614   \fi}
1615 \def\bbl@clear@trib#1-#2.{%
1616   \expandafter\let\csname#1@attr@#2\endcsname\@undefined}
1617 \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`

```

1618 \bbl@trace{Macros for saving definitions}
1619 \def\babel@beginsave{\babel@savecnt\z@}

```

Before it's forgotten, allocate the counter and initialize all.

```

1620 \newcount\babel@savecnt
1621 \babel@beginsave

```

`\babel@save` The macro `\babel@save⟨csname⟩` saves the current meaning of the control sequence `⟨csname⟩` to `\originalTeX`<sup>32</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.

```

1622 \def\babel@save#1{%
1623   \expandafter\let\csname babel@\number\babel@savecnt\endcsname#1\relax
1624   \toks@\expandafter{\originalTeX\let#1=}
1625   \bbl@exp{%
1626     \def\originalTeX{\the\toks@<\babel@\number\babel@savecnt>\relax}}%
1627   \advance\babel@savecnt\@ne}
1628 \def\babel@savevariable#1{%
1629   \toks@\expandafter{\originalTeX #1=}
1630   \bbl@exp{\def\originalTeX{\the\toks@the#1\relax}}}

```

`\bbl@frenchspacing` Some languages need to have `\frenchspacing` in effect. Others don't want that. The command `\bbl@frenchspacing` switches it on when it isn't already in effect and `\bbl@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.

```

1631 \def\bbl@frenchspacing{%
1632   \ifnum\the\sfcode`\.=\@m

```

<sup>32</sup>`\originalTeX` has to be expandable, i.e. you shouldn't let it to `\relax`.

```

1633 \let\bbl@nonfrenchspacing\relax
1634 \else
1635 \frenchspacing
1636 \let\bbl@nonfrenchspacing\nonfrenchspacing
1637 \fi}
1638 \let\bbl@nonfrenchspacing\nonfrenchspacing
1639 \let\bbl@elt\relax
1640 \edef\bbl@fs@chars{%
1641 \bbl@elt{\string.}\@m{3000}\bbl@elt{\string?}\@m{3000}%
1642 \bbl@elt{\string!}\@m{3000}\bbl@elt{\string:}\@m{2000}%
1643 \bbl@elt{\string;}\@m{1500}\bbl@elt{\string,}\@m{1250}}
1644 \def\bbl@pre@fs{%
1645 \def\bbl@elt##1##2##3{\sfcode`##1=\the\sfcode`##1\relax}%
1646 \edef\bbl@save@sfcodes{\bbl@fs@chars}}%
1647 \def\bbl@post@fs{%
1648 \bbl@save@sfcodes
1649 \edef\bbl@tempa{\bbl@cl{frspc}}%
1650 \edef\bbl@tempa{\expandafter\@car\bbl@tempa\@nil}%
1651 \if u\bbl@tempa % do nothing
1652 \else\if n\bbl@tempa % non french
1653 \def\bbl@elt##1##2##3{%
1654 \ifnum\sfcode`##1=##2\relax
1655 \babel@savevariable{\sfcode`##1}%
1656 \sfcode`##1=##3\relax
1657 \fi}%
1658 \bbl@fs@chars
1659 \else\if y\bbl@tempa % french
1660 \def\bbl@elt##1##2##3{%
1661 \ifnum\sfcode`##1=##3\relax
1662 \babel@savevariable{\sfcode`##1}%
1663 \sfcode`##1=##2\relax
1664 \fi}%
1665 \bbl@fs@chars
1666 \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.

```

1667 \bbl@trace{Short tags}
1668 \def\babeltags#1{%
1669 \edef\bbl@tempa{\zap@space#1 \@empty}%
1670 \def\bbl@tempb##1=##2\@{%
1671 \edef\bbl@tempc{%
1672 \noexpand\newcommand
1673 \expandafter\noexpand\csname ##1\endcsname{%
1674 \noexpand\protect
1675 \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
1676 \noexpand\newcommand
1677 \expandafter\noexpand\csname text##1\endcsname{%
1678 \noexpand\foreignlanguage{##2}}}
1679 \bbl@tempc}%
1680 \bbl@for\bbl@tempa\bbl@tempa{%
1681 \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.

```

1682 \bbl@trace{Hyphens}

```

```

1683 \@onlypreamble\babelhyphenation
1684 \AtEndOfPackage{%
1685   \newcommand\babelhyphenation[2][\@empty]{%
1686     \ifx\bbbl@hyphenation@relax
1687       \let\bbbl@hyphenation@\@empty
1688     \fi
1689     \ifx\bbbl@hyphlist\@empty\else
1690       \bbbl@warning{%
1691         You must not intermingle \string\selectlanguage\space and\\%
1692         \string\babelhyphenation\space or some exceptions will not\\%
1693         be taken into account. Reported}%
1694     \fi
1695     \ifx\@empty#1%
1696       \protected@edef\bbbl@hyphenation@{\bbbl@hyphenation@\space#2}%
1697     \else
1698       \bbbl@foreach{#1}{%
1699         \def\bbbl@tempa{##1}%
1700         \bbbl@fixname\bbbl@tempa
1701         \bbbl@iflanguage\bbbl@tempa{%
1702           \bbbl@csarg\protected@edef{hyphenation@\bbbl@tempa}{%
1703             \bbbl@ifunset{bbbl@hyphenation@\bbbl@tempa}%
1704             {}%
1705             {\csname bbl@hyphenation@\bbbl@tempa\endcsname\space}%
1706             #2}}}%
1707       \fi}}

```

`\bbbl@allowhyphens` This macro makes hyphenation possible. Basically its definition is nothing more than `\nobreak \hskip Opt plus Opt`<sup>33</sup>.

```

1708 \def\bbbl@allowhyphens{\ifvmode\else\nobreak\hskip\z@skip\fi}
1709 \def\bbbl@t@one{T1}
1710 \def\allowhyphens{\ifx\cf@encoding\bbbl@t@one\else\bbbl@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`.

```

1711 \newcommand\babelnullhyphen{\char\hyphenchar\font}
1712 \def\babelhyphen{\active@prefix\babelhyphen\bbbl@hyphen}
1713 \def\bbbl@hyphen{%
1714   \@ifstar{\bbbl@hyphen@i @}{\bbbl@hyphen@i \@empty}}
1715 \def\bbbl@hyphen@i#1#2{%
1716   \bbbl@ifunset{bbbl@hy@#1#2\@empty}%
1717   {\csname bbl@#1usehyphen\endcsname{\discretionary{#2}{}{#2}}}%
1718   {\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.

```

1719 \def\bbbl@usehyphen#1{%
1720   \leavevmode
1721   \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
1722   \nobreak\hskip\z@skip}
1723 \def\bbbl@@usehyphen#1{%
1724   \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}

```

The following macro inserts the hyphen char.

```

1725 \def\bbbl@hyphenchar{%
1726   \ifnum\hyphenchar\font=\m@ne

```

<sup>33</sup>TeX begins and ends a word for hyphenation at a glue node. The penalty prevents a linebreak at this glue node.

```

1727 \babeInnullhyphen
1728 \else
1729 \char\hyphenchar\font
1730 \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.

```

1731 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
1732 \def\bbl@hy@@soft{\bbl@@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
1733 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
1734 \def\bbl@hy@@hard{\bbl@@usehyphen\bbl@hyphenchar}
1735 \def\bbl@hy@nobreak{\bbl@usehyphen{\mbox{\bbl@hyphenchar}}{}}
1736 \def\bbl@hy@@nobreak{\mbox{\bbl@hyphenchar}}
1737 \def\bbl@hy@repeat{%
1738   \bbl@usehyphen{%
1739     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}
1740 \def\bbl@hy@repeat{%
1741   \bbl@@usehyphen{%
1742     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}
1743 \def\bbl@hy@empty{\hskip\z@skip}
1744 \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.

```

1745 \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 couple of tools. The first one makes global a local variable. This is not the best solution, but it works.

```

1746 \bbl@trace{Multiencoding strings}
1747 \def\bbl@tglobal#1{\global\let#1#1}
1748 \def\bbl@recatcode#1{% TODO. Used only once?
1749   \@tempcnta="7F
1750   \def\bbl@tempa{%
1751     \ifnum\@tempcnta>"FF\else
1752       \catcode\@tempcnta=#1\relax
1753       \advance\@tempcnta\@ne
1754       \expandafter\bbl@tempa
1755     \fi}%
1756   \bbl@tempa}

```

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).

```

1757 \ifpackagewith{babel}{nocase}%
1758   {\let\bbl@patchuclc\relax}%
1759   {\def\bbl@patchuclc{%
1760     \global\let\bbl@patchuclc\relax
1761     \g@addto@macro\@uclclist{\reserved@b{\reserved@b\bbl@uclc}}}%

```

```

1762 \gdef\bbl@uclc##1{%
1763 \let\bbl@encoded\bbl@encoded@uclc
1764 \bbl@ifunset{\language @bbl@uclc}% and resumes it
1765 {##1}%
1766 {\let\bbl@tempa##1\relax % Used by LANG@bbl@uclc
1767 \csname\language @bbl@uclc\endcsname}%
1768 {\bbl@tolower\empty}{\bbl@toupper\empty}}%
1769 \gdef\bbl@tolower{\csname\language @bbl@lc\endcsname}%
1770 \gdef\bbl@toupper{\csname\language @bbl@uc\endcsname}}
1771 <<More package options>> ≡
1772 \DeclareOption{nocase}{}
1773 <</More package options>>

```

The following package options control the behavior of `\SetString`.

```

1774 <<More package options>> ≡
1775 \let\bbl@opt@strings\@nnil % accept strings=value
1776 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
1777 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
1778 \def\BabelStringsDefault{generic}
1779 <</More package options>>

```

**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.

```

1780 \@onlypreamble\StartBabelCommands
1781 \def\StartBabelCommands{%
1782 \begingroup
1783 \bbl@recatcode{11}%
1784 <<Macros local to BabelCommands>>
1785 \def\bbl@provstring##1##2{%
1786 \providecommand##1{##2}%
1787 \bbl@tglobal##1}%
1788 \global\let\bbl@scafter\empty
1789 \let\StartBabelCommands\bbl@startcmds
1790 \ifx\BabelLanguages\relax
1791 \let\BabelLanguages\CurrentOption
1792 \fi
1793 \begingroup
1794 \let\bbl@screset\@nnil % local flag - disable 1st stopcommands
1795 \StartBabelCommands}
1796 \def\bbl@startcmds{%
1797 \ifx\bbl@screset\@nnil\else
1798 \bbl@usehooks{stopcommands}{}%
1799 \fi
1800 \endgroup
1801 \begingroup
1802 \@ifstar
1803 {\ifx\bbl@opt@strings\@nnil
1804 \let\bbl@opt@strings\BabelStringsDefault
1805 \fi
1806 \bbl@startcmds@i}%
1807 \bbl@startcmds@i}
1808 \def\bbl@startcmds@i#1#2{%
1809 \edef\bbl@L{\zap@space#1 \empty}%
1810 \edef\bbl@G{\zap@space#2 \empty}%
1811 \bbl@startcmds@ii}
1812 \let\bbl@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.

```

1813 \newcommand\bbbl@startcmds@ii[1][\@empty]{%
1814   \let\SetString\@gobbletwo
1815   \let\bbbl@stringdef\@gobbletwo
1816   \let\AfterBabelCommands\@gobble
1817   \ifx\@empty#1%
1818     \def\bbbl@sc@label{generic}%
1819     \def\bbbl@encstring##1##2{%
1820       \ProvideTextCommandDefault##1{##2}%
1821       \bbbl@tglobal##1%
1822       \expandafter\bbbl@tglobal\csname\string?\string##1\endcsname}%
1823     \let\bbbl@sctest\in@true
1824   \else
1825     \let\bbbl@sc@charset\space % <- zapped below
1826     \let\bbbl@sc@fontenc\space % <- " "
1827     \def\bbbl@tempa##1=##2\@nil{%
1828       \bbbl@csarg\edef{sc\zap@space##1 \@empty}{##2 }}%
1829     \bbbl@vforeach{label=#1}{\bbbl@tempa##1\@nil}%
1830     \def\bbbl@tempa##1 ##2{% space -> comma
1831       ##1%
1832       \ifx\@empty##2\else\ifx,##1,\else,\fi\bbbl@afterfi\bbbl@tempa##2\fi}%
1833     \edef\bbbl@sc@fontenc{\expandafter\bbbl@tempa\bbbl@sc@fontenc\@empty}%
1834     \edef\bbbl@sc@label{\expandafter\zap@space\bbbl@sc@label\@empty}%
1835     \edef\bbbl@sc@charset{\expandafter\zap@space\bbbl@sc@charset\@empty}%
1836     \def\bbbl@encstring##1##2{%
1837       \bbbl@foreach\bbbl@sc@fontenc{%
1838         \bbbl@ifunset{T####1}%
1839         }%
1840         {\ProvideTextCommand##1{####1}{##2}%
1841         \bbbl@tglobal##1%
1842         \expandafter
1843         \bbbl@tglobal\csname####1\string##1\endcsname}}}%
1844     \def\bbbl@sctest{%
1845       \bbbl@xin@{\bbbl@opt@strings,}{,\bbbl@sc@label,\bbbl@sc@fontenc,}}%
1846   \fi
1847   \ifx\bbbl@opt@strings\@nnil % ie, no strings key -> defaults
1848   \else\ifx\bbbl@opt@strings\relax % ie, strings=encoded
1849     \let\AfterBabelCommands\bbbl@aftercmds
1850     \let\SetString\bbbl@setstring
1851     \let\bbbl@stringdef\bbbl@encstring
1852   \else % ie, strings=value
1853     \bbbl@sctest
1854   \ifin@
1855     \let\AfterBabelCommands\bbbl@aftercmds
1856     \let\SetString\bbbl@setstring
1857     \let\bbbl@stringdef\bbbl@provstring
1858   \fi\fi\fi
1859   \bbbl@scswitch
1860   \ifx\bbbl@G\@empty
1861     \def\SetString##1##2{%
1862       \bbbl@error{Missing group for string \string##1}%
1863       {You must assign strings to some category, typically\\%
1864       captions or extras, but you set none}}%
1865   \fi
1866   \ifx\@empty#1%
1867     \bbbl@usehooks{defaultcommands}{}%
1868   \else
1869     \@expandtwoargs
1870     \bbbl@usehooks{encodedcommands}{\bbbl@sc@charset}{\bbbl@sc@fontenc}}%

```

```
1871 \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 version 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).

```
1872 \def\bbl@forlang#1#2{%
1873   \bbl@for#1\bbl@L{%
1874     \bbl@xin@{,#1,},{, \BabelLanguages,}%
1875     \ifin@#2\relax\fi}}
1876 \def\bbl@scswitch{%
1877   \bbl@forlang\bbl@tempa{%
1878     \ifx\bbl@G\@empty\else
1879       \ifx\SetString\@gobbletwo\else
1880         \edef\bbl@GL{\bbl@G\bbl@tempa}%
1881         \bbl@xin@{, \bbl@GL,},{, \bbl@screset,}%
1882         \ifin@\else
1883           \global\expandafter\let\csname\bbl@GL\endcsname\@undefined
1884           \xdef\bbl@screset{\bbl@screset, \bbl@GL}%
1885           \fi
1886         \fi
1887       \fi}}
1888 \AtEndOfPackage{%
1889   \def\bbl@forlang#1#2{\bbl@for#1\bbl@L{\bbl@ifunset{date#1}{#2}}}%
1890   \let\bbl@scswitch\relax}
1891 \@onlypreamble\EndBabelCommands
1892 \def\EndBabelCommands{%
1893   \bbl@usehooks{stopcommands}{}}%
1894   \endgroup
1895   \endgroup
1896   \bbl@scafter}
1897 \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.

```
1898 \def\bbl@setstring#1#2{% eg, \prefacename{<string>}
1899   \bbl@forlang\bbl@tempa{%
1900     \edef\bbl@LC{\bbl@tempa\bbl@stripslash#1}%
1901     \bbl@ifunset{\bbl@LC}% eg, \germanchaptername
1902     {\bbl@exp{%
1903       \global\bbbl@add\<\bbl@G\bbl@tempa>{\bbbl@scset\#1\<\bbl@LC>}}}%
1904     }%
1905     \def\BabelString{#2}%
1906     \bbl@usehooks{stringprocess}{}}%
1907     \expandafter\bbl@stringdef
1908     \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`.

```
1909 \ifx\bbl@opt@strings\relax
1910   \def\bbl@scset#1#2{\def#1{\bbl@encoded#2}}
1911   \bbl@patchuclc
1912   \let\bbl@encoded\relax
```



```

1913 \def\bbl@encoded@uclc#1{%
1914   \inmathwarn#1%
1915   \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
1916     \expandafter\ifx\csname ?\string#1\endcsname\relax
1917       \TextSymbolUnavailable#1%
1918     \else
1919       \csname ?\string#1\endcsname
1920     \fi
1921   \else
1922     \csname\cf@encoding\string#1\endcsname
1923   \fi}
1924 \else
1925   \def\bbl@scset#1#2{\def#1{#2}}
1926 \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.

```

1927 <<(*Macros local to BabelCommands)>> ≡
1928 \def\SetStringLoop##1##2{%
1929   \def\bbl@templ####1{\expandafter\noexpand\csname##1\endcsname}%
1930   \count@\z@
1931   \bbl@loop\bbl@tempa{##2}{% empty items and spaces are ok
1932     \advance\count@\@ne
1933     \toks@\expandafter{\bbl@tempa}%
1934     \bbl@exp{%
1935       \\SetString\bbl@templ{\romannumeral\count@}{\the\toks@}%
1936       \count@=\the\count@\relax}}}%
1937 <</Macros local to BabelCommands>>

```

**Delaying code** Now the definition of `\AfterBabelCommands` when it is activated.

```

1938 \def\bbl@aftercmds#1{%
1939   \toks@\expandafter{\bbl@scafter#1}%
1940   \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.

```

1941 <<(*Macros local to BabelCommands)>> ≡
1942 \newcommand\SetCase[3][{}]{%
1943   \bbl@patchuclc
1944   \bbl@forlang\bbl@tempa{%
1945     \expandafter\bbl@encstring
1946     \csname\bbl@tempa @bbl@uclc\endcsname{\bbl@tempa##1}%
1947     \expandafter\bbl@encstring
1948     \csname\bbl@tempa @bbl@uc\endcsname{##2}%
1949     \expandafter\bbl@encstring
1950     \csname\bbl@tempa @bbl@lc\endcsname{##3}}}%
1951 <</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.

```

1952 <<(*Macros local to BabelCommands)>> ≡
1953 \newcommand\SetHyphenMap[1]{%
1954   \bbl@forlang\bbl@tempa{%
1955     \expandafter\bbl@stringdef
1956     \csname\bbl@tempa @bbl@hyphenmap\endcsname{##1}}}%
1957 <</Macros local to BabelCommands>>

```

There are 3 helper macros which do most of the work for you.

```

1958 \newcommand\BabelLower[2]{% one to one.

```

```

1959 \ifnum\lccode#1=#2\else
1960   \babel@savevariable{\lccode#1}%
1961   \lccode#1=#2\relax
1962 \fi}
1963 \newcommand\BabelLowerMM[4]{% many-to-many
1964   \@tempcnta=#1\relax
1965   \@tempcntb=#4\relax
1966   \def\bbl@tempa{%
1967     \ifnum\@tempcnta>#2\else
1968       \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
1969       \advance\@tempcnta#3\relax
1970       \advance\@tempcntb#3\relax
1971       \expandafter\bbl@tempa
1972     \fi}%
1973   \bbl@tempa}
1974 \newcommand\BabelLowerMO[4]{% many-to-one
1975   \@tempcnta=#1\relax
1976   \def\bbl@tempa{%
1977     \ifnum\@tempcnta>#2\else
1978       \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
1979       \advance\@tempcnta#3
1980       \expandafter\bbl@tempa
1981     \fi}%
1982   \bbl@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

1983 <(*More package options)> ≡
1984 \DeclareOption{hyphenmap=off}{\chardef\bbl@opt@hyphenmap\z@}
1985 \DeclareOption{hyphenmap=first}{\chardef\bbl@opt@hyphenmap\@ne}
1986 \DeclareOption{hyphenmap=select}{\chardef\bbl@opt@hyphenmap\tw@}
1987 \DeclareOption{hyphenmap=other}{\chardef\bbl@opt@hyphenmap\thr@@}
1988 \DeclareOption{hyphenmap=other*}{\chardef\bbl@opt@hyphenmap4\relax}
1989 <(/More package options)>

```

Initial setup to provide a default behavior if hyphenmap is not set.

```

1990 \AtEndOfPackage{%
1991   \ifx\bbl@opt@hyphenmap\undefined
1992     \bbl@xin@{,}{\bbl@language@opts}%
1993     \chardef\bbl@opt@hyphenmap\ifin4\else\@ne\fi
1994   \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.

```

1995 \newcommand\setlocalecaption{% TODO. Catch typos. What about ensure?
1996   \ifstar\bbl@setcaption@s\bbl@setcaption@x}
1997 \def\bbl@setcaption@x#1#2#3{% language caption-name string
1998   \bbl@trim@def\bbl@tempa{#2}%
1999   \bbl@xin@{.template}{\bbl@tempa}%
2000   \ifin@
2001     \bbl@ini@captions@template{#3}{#1}%
2002   \else
2003     \edef\bbl@tempd{%
2004       \expandafter\expandafter\expandafter
2005       \strip@prefix\expandafter\meaning\csname captions#1\endcsname}%
2006     \bbl@xin@
2007       {\expandafter\string\csname #2name\endcsname}%
2008     {\bbl@tempd}%
2009     \ifin@ % Renew caption
2010       \bbl@xin@{\string\bbl@scset}{\bbl@tempd}%
2011     \ifin@
2012       \bbl@exp{%
2013         \\bbl@ifsamestring{\bbl@tempa}{\language\name}%
2014         {\bbl@scset\<#2name>\<#1#2name>}}%

```

```

2015         {}}%
2016     \else % Old way converts to new way
2017         \bbl@ifunset{#1#2name}%
2018         {\bbl@exp{%
2019             \\bbl@add\<captions#1>{\def\<#2name>{\<#1#2name>}}}%
2020             \\bbl@ifsamestring{\bbl@tempa}{\language}%
2021             {\def\<#2name>{\<#1#2name>}}}%
2022         {}}%
2023     }%
2024     \fi
2025     \else
2026         \bbl@xin@{\string\bbl@scset}{\bbl@tempd}% New
2027         \ifin@ % New way
2028         \bbl@exp{%
2029             \\bbl@add\<captions#1>{\bbl@scset\<#2name>\<#1#2name>}}%
2030             \\bbl@ifsamestring{\bbl@tempa}{\language}%
2031             {\bbl@scset\<#2name>\<#1#2name>}}%
2032         {}}%
2033     \else % Old way, but defined in the new way
2034         \bbl@exp{%
2035             \\bbl@add\<captions#1>{\def\<#2name>{\<#1#2name>}}}%
2036             \\bbl@ifsamestring{\bbl@tempa}{\language}%
2037             {\def\<#2name>{\<#1#2name>}}}%
2038         {}}%
2039     \fi%
2040     \fi
2041     \@namedef{#1#2name}{#3}%
2042     \toks@ \expandafter{\bbl@captionslist}%
2043     \bbl@exp{\in@{\<#2name>}{\the\toks@}}%
2044     \ifin@ \else
2045         \bbl@exp{\bbl@add\bbl@captionslist{\<#2name>}}%
2046         \bbl@to\global\bbl@captionslist
2047     \fi
2048     \fi}
2049 % \def\bbl@setcaption@s#1#2#3{} % TODO. Not yet implemented

```

## 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.

```

2050 \bbl@trace{Macros related to glyphs}
2051 \def\set@low@box#1{\setbox\tw@ \hbox{,}\setbox\z@ \hbox{#1}%
2052     \dimen\z@ \ht\z@ \advance\dimen\z@ -\ht\tw@%
2053     \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.

```

2054 \def\save@sf@q#1{\leavevmode
2055     \begingroup
2056     \edef\@SF{\spacefactor\the\spacefactor}#1\@SF
2057     \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.

```

2058 \ProvideTextCommand{\quotedblbase}{OT1}{%

```

```

2059 \save@sf@q{\set@low@box{\textquotedblright\}%
2060 \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.

```

2061 \ProvideTextCommandDefault{\quotedblbase}{%
2062 \UseTextSymbol{OT1}{\quotedblbase}}

```

`\quotesinglbase` We also need the single quote character at the baseline.

```

2063 \ProvideTextCommand{\quotesinglbase}{OT1}{%
2064 \save@sf@q{\set@low@box{\textquoteright\}%
2065 \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.

```

2066 \ProvideTextCommandDefault{\quotesinglbase}{%
2067 \UseTextSymbol{OT1}{\quotesinglbase}}

```

`\guillemetleft` The guillemet characters are not available in OT1 encoding. They are faked. (Wrong names with o  
`\guillemetright` preserved for compatibility.)

```

2068 \ProvideTextCommand{\guillemetleft}{OT1}{%
2069 \ifmmode
2070 \ll
2071 \else
2072 \save@sf@q{\nobreak
2073 \raise.2ex\hbox{\scriptscriptstyle\ll}\bbl@allowhyphens}%
2074 \fi}
2075 \ProvideTextCommand{\guillemetright}{OT1}{%
2076 \ifmmode
2077 \gg
2078 \else
2079 \save@sf@q{\nobreak
2080 \raise.2ex\hbox{\scriptscriptstyle\gg}\bbl@allowhyphens}%
2081 \fi}
2082 \ProvideTextCommand{\guillemotleft}{OT1}{%
2083 \ifmmode
2084 \ll
2085 \else
2086 \save@sf@q{\nobreak
2087 \raise.2ex\hbox{\scriptscriptstyle\ll}\bbl@allowhyphens}%
2088 \fi}
2089 \ProvideTextCommand{\guillemotright}{OT1}{%
2090 \ifmmode
2091 \gg
2092 \else
2093 \save@sf@q{\nobreak
2094 \raise.2ex\hbox{\scriptscriptstyle\gg}\bbl@allowhyphens}%
2095 \fi}

```

Make sure that when an encoding other than OT1 or T1 is used these glyphs can still be typeset.

```

2096 \ProvideTextCommandDefault{\guillemetleft}{%
2097 \UseTextSymbol{OT1}{\guillemetleft}}
2098 \ProvideTextCommandDefault{\guillemetright}{%
2099 \UseTextSymbol{OT1}{\guillemetright}}
2100 \ProvideTextCommandDefault{\guillemotleft}{%
2101 \UseTextSymbol{OT1}{\guillemotleft}}
2102 \ProvideTextCommandDefault{\guillemotright}{%
2103 \UseTextSymbol{OT1}{\guillemotright}}

```

`\guilsinglleft` The single guillemets are not available in OT1 encoding. They are faked.  
`\guilsinglright`

```

2104 \ProvideTextCommand{\guilsinglleft}{OT1}{%
2105 \ifmmode
2106 <%
2107 \else
2108 \save@sf@q{\nobreak

```

```

2109      \raise.2ex\hbox{$\scriptscriptstyle<$}\bbl@allowhyphens}%
2110 \fi}
2111 \ProvideTextCommand{\guilsinglright}{OT1}{%
2112   \ifmmode
2113     >%
2114   \else
2115     \save@sf@q{\nobreak
2116       \raise.2ex\hbox{$\scriptscriptstyle>$}\bbl@allowhyphens}%
2117   \fi}

```

Make sure that when an encoding other than OT1 or T1 is used these glyphs can still be typeset.

```

2118 \ProvideTextCommandDefault{\guilsinglleft}{%
2119   \UseTextSymbol{OT1}{\guilsinglleft}}
2120 \ProvideTextCommandDefault{\guilsinglright}{%
2121   \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.

```

2122 \DeclareTextCommand{\ij}{OT1}{%
2123   i\kern-0.02em\bbl@allowhyphens j}
2124 \DeclareTextCommand{\IJ}{OT1}{%
2125   I\kern-0.02em\bbl@allowhyphens J}
2126 \DeclareTextCommand{\ij}{T1}{\char188}
2127 \DeclareTextCommand{\IJ}{T1}{\char156}

```

Make sure that when an encoding other than OT1 or T1 is used these glyphs can still be typeset.

```

2128 \ProvideTextCommandDefault{\ij}{%
2129   \UseTextSymbol{OT1}{\ij}}
2130 \ProvideTextCommandDefault{\IJ}{%
2131   \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).

```

2132 \def\crrtic@{\hrule height0.1ex width0.3em}
2133 \def\crttic@{\hrule height0.1ex width0.33em}
2134 \def\ddj@{%
2135   \setbox0\hbox{d}\dimen@=\ht0
2136   \advance\dimen@1ex
2137   \dimen@.45\dimen@
2138   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2139   \advance\dimen@ii.5ex
2140   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\ vbox{\crrtic@}}}}
2141 \def\DDJ@{%
2142   \setbox0\hbox{D}\dimen@=.55\ht0
2143   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2144   \advance\dimen@ii.15ex % correction for the dash position
2145   \advance\dimen@ii-.15\fontdimen7\font % correction for cmtt font
2146   \dimen\thr@@\expandafter\rem@pt\the\fontdimen7\font\dimen@
2147   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\ vbox{\crttic@}}}}
2148 %
2149 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
2150 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}

```

Make sure that when an encoding other than OT1 or T1 is used these glyphs can still be typeset.

```

2151 \ProvideTextCommandDefault{\dj}{%
2152   \UseTextSymbol{OT1}{\dj}}
2153 \ProvideTextCommandDefault{\DJ}{%
2154   \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.

```
2155 \DeclareTextCommand{\SS}{OT1}{SS}
2156 \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
2157 \ProvideTextCommandDefault{\glq}{%
2158   \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}
```

The definition of `\grq` depends on the fontencoding. With T1 encoding no extra kerning is needed.

```
2159 \ProvideTextCommand{\grq}{T1}{%
2160   \textormath{\kern\z@\textquoteleft}{\mbox{\textquoteleft}}}%
2161 \ProvideTextCommand{\grq}{TU}{%
2162   \textormath{\textquoteleft}{\mbox{\textquoteleft}}}%
2163 \ProvideTextCommand{\grq}{OT1}{%
2164   \save@sf@q{\kern-.0125em
2165     \textormath{\textquoteleft}{\mbox{\textquoteleft}}}%
2166     \kern.07em\relax}}
2167 \ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}
```

`\glqq` The ‘german’ double quotes.

```
\grqq
2168 \ProvideTextCommandDefault{\glqq}{%
2169   \textormath{\quotedblbase}{\mbox{\quotedblbase}}}
```

The definition of `\grqq` depends on the fontencoding. With T1 encoding no extra kerning is needed.

```
2170 \ProvideTextCommand{\grqq}{T1}{%
2171   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}%
2172 \ProvideTextCommand{\grqq}{TU}{%
2173   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}%
2174 \ProvideTextCommand{\grqq}{OT1}{%
2175   \save@sf@q{\kern-.07em
2176     \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}%
2177     \kern.07em\relax}}
2178 \ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}
```

`\flq` The ‘french’ single guillemets.

```
\frq
2179 \ProvideTextCommandDefault{\flq}{%
2180   \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}%
2181 \ProvideTextCommandDefault{\frq}{%
2182   \textormath{\guilsinglright}{\mbox{\guilsinglright}}}%
2183 \ProvideTextCommandDefault{\flqq}{%
2184   \textormath{\guillemetleft}{\mbox{\guillemetleft}}}%
2185 \ProvideTextCommandDefault{\frqq}{%
2186   \textormath{\guillemetright}{\mbox{\guillemetright}}}%
2187 \ProvideTextCommandDefault{\flq}{\UseTextSymbol{OT1}\flq}
```

`\flqq` The ‘french’ double guillemets.

```
\frqq
2183 \ProvideTextCommandDefault{\flqq}{%
2184   \textormath{\guillemetleft}{\mbox{\guillemetleft}}}%
2185 \ProvideTextCommandDefault{\frqq}{%
2186   \textormath{\guillemetright}{\mbox{\guillemetright}}}%
2187 \ProvideTextCommandDefault{\flqq}{\UseTextSymbol{OT1}\flqq}
```

### 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  
`\umlautlow` default will be `\umlauthigh` (the normal positioning).

```
2187 \def\umlauthigh{%
2188   \def\bbl@umlauta##1{\leavevmode\bgroup%
2189     \expandafter\accent\csname\f@encoding dqpos\endcsname
2190     ##1\bbl@allowhyphens\egroup}%
2191   \let\bbl@umlaute\bbl@umlauta}
2192 \def\umlautlow{%
2193   \def\bbl@umlauta{\protect\lower@umlaut}}
2194 \def\umlautelowlow{%
2195   \def\bbl@umlaute{\protect\lower@umlaut}}
2196 \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.

```
2197 \expandafter\ifx\csname U@D\endcsname\relax
2198   \csname newdimen\endcsname\U@D
2199 \fi
```

The following code fools T<sub>E</sub>X'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.

```
2200 \def\lower@umlaut#1{%
2201   \leavevmode\bgroup
2202   \U@D 1ex%
2203   {\setbox\z@\hbox{%
2204     \expandafter\char\csname\f@encoding dqpos\endcsname}%
2205     \dimen@ -.45ex\advance\dimen@ \ht\z@
2206     \ifdim 1ex<\dimen@ \fontdimen5\font\dimen@ \fi}%
2207   \expandafter\accent\csname\f@encoding dqpos\endcsname
2208   \fontdimen5\font\U@D #1%
2209   \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).

```
2210 \AtBeginDocument{%
2211   \DeclareTextCompositeCommand{\"}{OT1}{a}{\bbl@umlauta{a}}%
2212   \DeclareTextCompositeCommand{\"}{OT1}{e}{\bbl@umlaute{e}}%
2213   \DeclareTextCompositeCommand{\"}{OT1}{i}{\bbl@umlaute{i}}%
2214   \DeclareTextCompositeCommand{\"}{OT1}{\i}{\bbl@umlaute{i}}%
2215   \DeclareTextCompositeCommand{\"}{OT1}{o}{\bbl@umlauta{o}}%
2216   \DeclareTextCompositeCommand{\"}{OT1}{u}{\bbl@umlauta{u}}%
2217   \DeclareTextCompositeCommand{\"}{OT1}{A}{\bbl@umlauta{A}}%
2218   \DeclareTextCompositeCommand{\"}{OT1}{E}{\bbl@umlaute{E}}%
2219   \DeclareTextCompositeCommand{\"}{OT1}{I}{\bbl@umlaute{I}}%
2220   \DeclareTextCompositeCommand{\"}{OT1}{O}{\bbl@umlauta{O}}%
2221   \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.

```
2222 \ifx\l@english\undefined
2223   \chardef\l@english\z@
2224 \fi
2225 % The following is used to cancel rules in ini files (see Amharic).
```

```

2226 \ifx\l@unhyphenated\@undefined
2227   \newlanguage\l@unhyphenated
2228 \fi

```

### 7.13 Layout

Layout is mainly intended to set bidi documents, but there is at least a tool useful in general.

```

2229 \bbl@trace{Bidi layout}
2230 \providecommand\IfBabelLayout[3]{#3}%
2231 \newcommand\BabelPatchSection[1]{%
2232   \@ifundefined{#1}{}{%
2233     \bbl@exp{\let\<bbl@ss@#1>\<#1>}%
2234     \@namedef{#1}{%
2235       \ifstar{\bbl@presec@#1}%
2236       {\@dblarg{\bbl@presec@x{#1}}}}%
2237 \def\bbl@presec@x#1[#2]#3{%
2238   \bbl@exp{%
2239     \select@language@x{\bbl@main@language}%
2240     \bbl@cs{sspre@#1}%
2241     \bbl@cs{ss@#1}%
2242     [\foreignlanguage{\language}{\unexpanded{#2}}}%
2243     {\foreignlanguage{\language}{\unexpanded{#3}}}%
2244     \select@language@x{\language}}}
2245 \def\bbl@presec@#1#2{%
2246   \bbl@exp{%
2247     \select@language@x{\bbl@main@language}%
2248     \bbl@cs{sspre@#1}%
2249     \bbl@cs{ss@#1}*%
2250     {\foreignlanguage{\language}{\unexpanded{#2}}}%
2251     \select@language@x{\language}}}
2252 \IfBabelLayout{sectioning}%
2253   {\BabelPatchSection{part}%
2254    \BabelPatchSection{chapter}%
2255    \BabelPatchSection{section}%
2256    \BabelPatchSection{subsection}%
2257    \BabelPatchSection{subsubsection}%
2258    \BabelPatchSection{paragraph}%
2259    \BabelPatchSection{subparagraph}%
2260    \def\babel@toc#1{%
2261      \select@language@x{\bbl@main@language}}}%
2262 \IfBabelLayout{captions}%
2263   {\BabelPatchSection{caption}}%

```

### 7.14 Load engine specific macros

```

2264 \bbl@trace{Input engine specific macros}
2265 \ifcase\bbl@engine
2266   \input txtbabel.def
2267 \or
2268   \input luababel.def
2269 \or
2270   \input xebabel.def
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 \let\bbl@KVP@captions\@nil
2282 \let\bbl@KVP@date\@nil
2283 \let\bbl@KVP@import\@nil
2284 \let\bbl@KVP@main\@nil
2285 \let\bbl@KVP@script\@nil
2286 \let\bbl@KVP@language\@nil
2287 \let\bbl@KVP@hyphenrules\@nil
2288 \let\bbl@KVP@linebreaking\@nil
2289 \let\bbl@KVP@justification\@nil
2290 \let\bbl@KVP@mapfont\@nil
2291 \let\bbl@KVP@maparabic\@nil
2292 \let\bbl@KVP@mapdigits\@nil
2293 \let\bbl@KVP@intraspace\@nil
2294 \let\bbl@KVP@intrapenalty\@nil
2295 \let\bbl@KVP@onchar\@nil
2296 \let\bbl@KVP@transforms\@nil
2297 \global\let\bbl@release@transforms\@empty
2298 \let\bbl@KVP@alph\@nil
2299 \let\bbl@KVP@Alph\@nil
2300 \let\bbl@KVP@labels\@nil
2301 \bbl@csarg\let{KVP@labels*}\@nil
2302 \global\let\bbl@inidata\@empty
2303 \global\let\bbl@extend@ini\@gobble
2304 \gdef\bbl@key@list{;}%
2305 \bbl@forkv{#1}{% TODO - error handling
2306   \in@{/}{##1}%
2307   \ifin@
2308     \global\let\bbl@extend@ini\bbl@extend@ini@aux
2309     \bbl@renewinikey##1\@{##2}%
2310   \else
2311     \bbl@csarg\def{KVP@##1}{##2}%
2312   \fi}%
2313 \chardef\bbl@howloaded=% 0:none; 1:ldf without ini; 2:ini
2314 \bbl@ifunset{date#2}\z{\bbl@ifunset{\bbl@llevel@#2}\@ne\tw}%
2315 % == init ==
2316 \ifx\bbl@screset\@undefined
2317   \bbl@ldfinit
2318 \fi
2319 % ==
2320 \let\bbl@lbkflag\relax % \@empty = do setup linebreak
2321 \ifcase\bbl@howloaded
2322   \let\bbl@lbkflag\@empty % new
2323 \else
2324   \ifx\bbl@KVP@hyphenrules\@nil\else
2325     \let\bbl@lbkflag\@empty
2326   \fi
2327   \ifx\bbl@KVP@import\@nil\else
2328     \let\bbl@lbkflag\@empty
2329   \fi
2330 \fi
2331 % == import, captions ==
2332 \ifx\bbl@KVP@import\@nil\else
2333   \bbl@exp{\bbl@ifblank{\bbl@KVP@import}}%
2334   {\ifx\bbl@initload\relax
2335     \begingroup
2336       \def\BabelBeforeIni##1##2{\gdef\bbl@KVP@import{##1}\endinput}%
2337       \bbl@input@texini{#2}%
2338     \endgroup

```

```

2339         \else
2340         \xdef\bbl@KVP@import{\bbl@initoload}%
2341         \fi}%
2342     {}%
2343 \fi
2344 \ifx\bbl@KVP@captions\@nil
2345     \let\bbl@KVP@captions\bbl@KVP@import
2346 \fi
2347 % ==
2348 \ifx\bbl@KVP@transforms\@nil\else
2349     \bbl@replace\bbl@KVP@transforms{ }{,}%
2350 \fi
2351 % == Load ini ==
2352 \ifcase\bbl@howloaded
2353     \bbl@provide@new{#2}%
2354 \else
2355     \bbl@ifblank{#1}%
2356     {}% With \bbl@load@basic below
2357     {\bbl@provide@renew{#2}}%
2358 \fi
2359 % Post tasks
2360 % -----
2361 % == subsequent calls after the first provide for a locale ==
2362 \ifx\bbl@inidata\@empty\else
2363     \bbl@extend@ini{#2}%
2364 \fi
2365 % == ensure captions ==
2366 \ifx\bbl@KVP@captions\@nil\else
2367     \bbl@ifunset{\bbl@extracaps@#2}%
2368     {\bbl@exp{\babelensure[exclude=\today]{#2}}}%
2369     {\bbl@exp{\babelensure[exclude=\today,
2370         include=\bbl@extracaps@#2]{#2}}}%
2371     \bbl@ifunset{\bbl@ensure@language}%
2372     {\bbl@exp{%
2373         \DeclareRobustCommand\<bbl@ensure@language>[1]{%
2374             \foreignlanguage{language}%
2375             {###1}}}%
2376     }%
2377     \bbl@exp{%
2378         \bbl@toggle\<bbl@ensure@language>%
2379         \bbl@toggle\<bbl@ensure@language\space>%
2380 \fi
2381 % ==
2382 % At this point all parameters are defined if 'import'. Now we
2383 % execute some code depending on them. But what about if nothing was
2384 % imported? We just set the basic parameters, but still loading the
2385 % whole ini file.
2386 \bbl@load@basic{#2}%
2387 % == script, language ==
2388 % Override the values from ini or defines them
2389 \ifx\bbl@KVP@script\@nil\else
2390     \bbl@csarg\edef{sname@#2}{\bbl@KVP@script}%
2391 \fi
2392 \ifx\bbl@KVP@language\@nil\else
2393     \bbl@csarg\edef{lname@#2}{\bbl@KVP@language}%
2394 \fi
2395 \ifcase\bbl@engine\or
2396     \bbl@ifunset{\bbl@chrng@language}{}%
2397     {\directlua{
2398         Babel.set_chranges_b('\bbl@cl{sbc}', '\bbl@cl{chrng}') }}%
2399 \fi
2400 % == onchar ==
2401 \ifx\bbl@KVP@onchar\@nil\else

```

```

2402 \bbl@luahyphenate
2403 \bbl@exp{%
2404   \\\AddToHook{env/document/before}{\select@language{#2}}}%
2405 \directlua{
2406   if Babel.locale_mapped == nil then
2407     Babel.locale_mapped = true
2408     Babel.linebreaking.add_before(Babel.locale_map)
2409     Babel.loc_to_scr = {}
2410     Babel.chr_to_loc = Babel.chr_to_loc or {}
2411   end}%
2412 \bbl@xin@{ ids }{ \bbl@KVP@onchar\space}%
2413 \ifin@
2414   \ifx\bbl@starthyphens\undefined % Needed if no explicit selection
2415     \AddBabelHook{babel-onchar}{beforestart}{\bbl@starthyphens}%
2416   \fi
2417   \bbl@exp{\bbl@add\bbl@starthyphens
2418     {\bbl@patterns@lua{\language}}}%
2419   % TODO - error/warning if no script
2420   \directlua{
2421     if Babel.script_blocks['\bbl@cl{sbc}'] then
2422       Babel.loc_to_scr[\the\localeid] =
2423         Babel.script_blocks['\bbl@cl{sbc}']
2424       Babel.locale_props[\the\localeid].lc = \the\localeid\space
2425       Babel.locale_props[\the\localeid].lg = \the\@nameuse{1@\language}\space
2426     end
2427   }%
2428   \fi
2429   \bbl@xin@{ fonts }{ \bbl@KVP@onchar\space}%
2430   \ifin@
2431     \bbl@ifunset{bbl@lsys@\language}{\bbl@provide@lsys{\language}}}%
2432     \bbl@ifunset{bbl@wdir@\language}{\bbl@provide@dirs{\language}}}%
2433     \directlua{
2434       if Babel.script_blocks['\bbl@cl{sbc}'] then
2435         Babel.loc_to_scr[\the\localeid] =
2436           Babel.script_blocks['\bbl@cl{sbc}']
2437       end}%
2438     \ifx\bbl@mapselect\undefined % TODO. almost the same as mapfont
2439       \AtBeginDocument{%
2440         \bbl@patchfont{\bbl@mapselect}%
2441         {\selectfont}}%
2442       \def\bbl@mapselect{%
2443         \let\bbl@mapselect\relax
2444         \edef\bbl@prefontid{\fontid\font}%
2445         \def\bbl@mapdir##1{%
2446           {\def\language{##1}%
2447             \let\bbl@ifrestoring\@firstoftwo % To avoid font warning
2448             \bbl@switchfont
2449             \ifnum\fontid\font>z@ % A hack, for the pgf nullfont hack
2450               \directlua{
2451                 Babel.locale_props[\the\csname bbl@id@##1\endcsname]%
2452                   ['/\bbl@prefontid'] = \fontid\font\space}%
2453               \fi}}%
2454         \fi
2455         \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language}}}%
2456       \fi
2457       % TODO - catch non-valid values
2458     \fi
2459     % == mapfont ==
2460     % For bidi texts, to switch the font based on direction
2461     \ifx\bbl@KVP@mapfont\@nil\else
2462       \bbl@ifsamestring{\bbl@KVP@mapfont}{direction}{}%
2463       {\bbl@error{Option '\bbl@KVP@mapfont' unknown for\%
2464         mapfont. Use 'direction'.%

```

```

2465         {See the manual for details.}}}%
2466 \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}}%
2467 \bbl@ifunset{\bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}}%
2468 \ifx\bbl@mapselect\undefined % TODO. See onchar.
2469 \AtBeginDocument{%
2470   \bbl@patchfont{\bbl@mapselect}}%
2471   {\selectfont}}%
2472 \def\bbl@mapselect{%
2473   \let\bbl@mapselect\relax
2474   \edef\bbl@prefontid{\fontid\font}}%
2475 \def\bbl@mapdir##1{%
2476   {\def\languagename{##1}%
2477     \let\bbl@ifrestoring\@firstoftwo % avoid font warning
2478     \bbl@switchfont
2479     \directlua{Babel.fontmap
2480       [\the\csname bbl@wdir@##1\endcsname]%
2481       [\bbl@prefontid]=\fontid\font}}}%
2482 \fi
2483 \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\languagename}}}%
2484 \fi
2485 % == Line breaking: intraspace, intrapenalty ==
2486 % For CJK, East Asian, Southeast Asian, if interspace in ini
2487 \ifx\bbl@KVP@intraspace\@nil\else % We can override the ini or set
2488   \bbl@csarg\edef{intsp@#2}{\bbl@KVP@intraspace}%
2489 \fi
2490 \bbl@provide@intraspace
2491 % == Line breaking: CJK quotes ==
2492 \ifcase\bbl@engine\or
2493   \bbl@xin@{/c}{\bbl@cl{lnbrk}}}%
2494 \ifin@
2495   \bbl@ifunset{\bbl@quote@\languagename}{}%
2496   {\directlua{
2497     Babel.locale_props[\the\localeid].cjk_quotes = {}
2498     local cs = 'op'
2499     for c in string.utfvalues(
2500       [[\csname bbl@quote@\languagename\endcsname]]) do
2501       if Babel.cjk_characters[c].c == 'qu' then
2502         Babel.locale_props[\the\localeid].cjk_quotes[c] = cs
2503       end
2504       cs = ( cs == 'op') and 'cl' or 'op'
2505     end
2506   }}%
2507 \fi
2508 \fi
2509 % == Line breaking: justification ==
2510 \ifx\bbl@KVP@justification\@nil\else
2511   \let\bbl@KVP@linebreaking\bbl@KVP@justification
2512 \fi
2513 \ifx\bbl@KVP@linebreaking\@nil\else
2514   \bbl@xin@{\bbl@KVP@linebreaking,}{,elongated,kashida,cjk,unhyphenated,}%
2515   \ifin@
2516     \bbl@csarg\xdef
2517       {\lnbrk@\languagename}{\expandafter\@car\bbl@KVP@linebreaking\@nil}%
2518   \fi
2519 \fi
2520 \bbl@xin@{/e}{\bbl@cl{lnbrk}}}%
2521 \ifin@else\bbl@xin@{/k}{\bbl@cl{lnbrk}}\fi
2522 \ifin@\bbl@arabicjust\fi
2523 % == Line breaking: hyphenate.other.(locale|script) ==
2524 \ifx\bbl@lbfkflag\@empty
2525   \bbl@ifunset{\bbl@hyotl@\languagename}{}%
2526   {\bbl@csarg\bbl@replace{hyotl@\languagename}{ },}%
2527   \bbl@startcommands*\languagename}}}%

```

```

2528 \bbl@csarg\bbl@foreach{hyotl@\languagename}{%
2529 \ifcase\bbl@engine
2530 \ifnum##1<257
2531 \SetHyphenMap{\BabelLower{##1}{##1}}%
2532 \fi
2533 \else
2534 \SetHyphenMap{\BabelLower{##1}{##1}}%
2535 \fi}%
2536 \bbl@endcommands}%
2537 \bbl@ifunset{bbl@hyots@\languagename}{}%
2538 {\bbl@csarg\bbl@replace{hyots@\languagename}{ }{,}}%
2539 \bbl@csarg\bbl@foreach{hyots@\languagename}{%
2540 \ifcase\bbl@engine
2541 \ifnum##1<257
2542 \global\lccode##1=##1\relax
2543 \fi
2544 \else
2545 \global\lccode##1=##1\relax
2546 \fi}}%
2547 \fi
2548 % == Counters: maparabic ==
2549 % Native digits, if provided in ini (TeX level, xe and lua)
2550 \ifcase\bbl@engine\else
2551 \bbl@ifunset{bbl@dgnat@\languagename}{}%
2552 {\expandafter\ifx\csname bbl@dgnat@\languagename\endcsname\@empty\else
2553 \expandafter\expandafter\expandafter
2554 \bbl@setdigits\csname bbl@dgnat@\languagename\endcsname
2555 \ifx\bbl@KVP@maparabic\@nil\else
2556 \ifx\bbl@latinarabic\@undefined
2557 \expandafter\let\expandafter\@arabic
2558 \csname bbl@counter@\languagename\endcsname
2559 \else % ie, if layout=counters, which redefines \@arabic
2560 \expandafter\let\expandafter\bbl@latinarabic
2561 \csname bbl@counter@\languagename\endcsname
2562 \fi
2563 \fi
2564 \fi}%
2565 \fi
2566 % == Counters: mapdigits ==
2567 % Native digits (lua level).
2568 \ifodd\bbl@engine
2569 \ifx\bbl@KVP@mapdigits\@nil\else
2570 \bbl@ifunset{bbl@dgnat@\languagename}{}%
2571 {\RequirePackage{luatexbase}%
2572 \bbl@activate@preotf
2573 \directlua{
2574 Babel = Babel or {} %%% -> presets in luababel
2575 Babel.digits_mapped = true
2576 Babel.digits = Babel.digits or {}
2577 Babel.digits[\the\localeid] =
2578 table.pack(string.utfvalue('\bbl@cl{dgnat}'))
2579 if not Babel.numbers then
2580 function Babel.numbers(head)
2581 local LOCALE = Babel.attr_locale
2582 local GLYPH = node.id'glyph'
2583 local inmath = false
2584 for item in node.traverse(head) do
2585 if not inmath and item.id == GLYPH then
2586 local temp = node.get_attribute(item, LOCALE)
2587 if Babel.digits[temp] then
2588 local chr = item.char
2589 if chr > 47 and chr < 58 then
2590 item.char = Babel.digits[temp][chr-47]

```

```

2591         end
2592     end
2593     elseif item.id == node.id'math' then
2594         inmath = (item.subtype == 0)
2595     end
2596 end
2597 return head
2598 end
2599 end
2600 }}%
2601 \fi
2602 \fi
2603 % == Counters: alph, Alph ==
2604 % What if extras<lang> contains a \babel@save\@alph? It won't be
2605 % restored correctly when exiting the language, so we ignore
2606 % this change with the \bbl@alph@saved trick.
2607 \ifx\bbl@KVP@alph\@nil\else
2608     \bbl@extras@wrap{\bbl@alph@saved}%
2609     {\let\bbl@alph@saved\@alph}%
2610     {\let\@alph\bbl@alph@saved
2611     \babel@save\@alph}%
2612     \bbl@exp{%
2613     \bbl@add<extras\language>%
2614     \let\@alph<bbl@cntr\bbl@KVP@alph @\language>}}%
2615 \fi
2616 \ifx\bbl@KVP@Alph\@nil\else
2617     \bbl@extras@wrap{\bbl@Alph@saved}%
2618     {\let\bbl@Alph@saved\@Alph}%
2619     {\let\@Alph\bbl@Alph@saved
2620     \babel@save\@Alph}%
2621     \bbl@exp{%
2622     \bbl@add<extras\language>%
2623     \let\@Alph<bbl@cntr\bbl@KVP@Alph @\language>}}%
2624 \fi
2625 % == require.babel in ini ==
2626 % To load or reload the babel-*.tex, if require.babel in ini
2627 \ifx\bbl@beforestart\relax\else % But not in doc aux or body
2628     \bbl@ifunset{\bbl@rqtex\@language}{%
2629         {\expandafter\ifx\c@babel\bbl@rqtex\@language\endcsname\@empty\else
2630             \let\BabelBeforeIni\@gobbles
2631             \chardef\atcatcode=\catcode\@
2632             \catcode\@=11\relax
2633             \bbl@input@texini{\bbl@cs{rqtex\@language}}%
2634             \catcode\@=\atcatcode
2635             \let\atcatcode\relax
2636             \global\bbl@csarg\let{rqtex\@language}\relax
2637         \fi}%
2638 \fi
2639 % == frenchspacing ==
2640 \ifcase\bbl@howloaded\in@true\else\in@false\fi
2641 \ifin@else\bbl@xin@{typography/frenchspacing}{\bbl@key@list}\fi
2642 \ifin@
2643     \bbl@extras@wrap{\bbl@pre@fs}%
2644     {\bbl@pre@fs}%
2645     {\bbl@post@fs}%
2646 \fi
2647 % == Release saved transforms ==
2648 \bbl@release@transforms\relax % \relax closes the last item.
2649 % == main ==
2650 \ifx\bbl@KVP@main\@nil % Restore only if not 'main'
2651     \let\language\bbl@savelangname
2652     \chardef\localeid\bbl@savelocaleid\relax
2653 \fi}

```

Depending on whether or not the language exists (based on `\date<language>`), we define two macros. Remember `\bbl@startcommands` opens a group.

```

2654 \def\bbl@provide@new#1{%
2655   \@namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
2656   \@namedef{extras#1}{}%
2657   \@namedef{noextras#1}{}%
2658   \bbl@startcommands*{#1}{captions}%
2659   \ifx\bbl@KVP@captions\@nil % and also if import, implicit
2660     \def\bbl@tempb##1{% elt for \bbl@captionslist
2661       \ifx##1\@empty\else
2662         \bbl@exp{%
2663           \\SetString\\##1{%
2664             \\bbl@nocaption{\bbl@stripslash##1}{#1\bbl@stripslash##1}}}%
2665           \expandafter\bbl@tempb
2666         \fi}%
2667     \expandafter\bbl@tempb\bbl@captionslist\@empty
2668   \else
2669     \ifx\bbl@initoload\relax
2670       \bbl@read@ini{\bbl@KVP@captions}2% % Here letters cat = 11
2671     \else
2672       \bbl@read@ini{\bbl@initoload}2% % Same
2673     \fi
2674   \fi
2675   \StartBabelCommands*{#1}{date}%
2676   \ifx\bbl@KVP@import\@nil
2677     \bbl@exp{%
2678       \\SetString\\today{\\bbl@nocaption{today}{#1today}}}%
2679   \else
2680     \bbl@savetoday
2681     \bbl@savedate
2682   \fi
2683   \bbl@endcommands
2684   \bbl@load@basic{#1}%
2685   % == hyphenmins == (only if new)
2686   \bbl@exp{%
2687     \gdef\<#1hyphenmins>{%
2688       {\bbl@ifunset{\bbl@lfthm@#1}{2}{\bbl@cs{lfthm@#1}}}%
2689       {\bbl@ifunset{\bbl@rgthm@#1}{3}{\bbl@cs{rgthm@#1}}}}}%
2690   % == hyphenrules (also in renew) ==
2691   \bbl@provide@hyphens{#1}%
2692   \ifx\bbl@KVP@main\@nil\else
2693     \expandafter\main@language\expandafter{#1}%
2694   \fi}
2695 %
2696 \def\bbl@provide@renew#1{%
2697   \ifx\bbl@KVP@captions\@nil\else
2698     \StartBabelCommands*{#1}{captions}%
2699     \bbl@read@ini{\bbl@KVP@captions}2% % Here all letters cat = 11
2700     \EndBabelCommands
2701   \fi
2702   \ifx\bbl@KVP@import\@nil\else
2703     \StartBabelCommands*{#1}{date}%
2704     \bbl@savetoday
2705     \bbl@savedate
2706     \EndBabelCommands
2707   \fi
2708   % == hyphenrules (also in new) ==
2709   \ifx\bbl@lbkflag\@empty
2710     \bbl@provide@hyphens{#1}%
2711   \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.)

```

2712 \def\bbl@load@basic#1{%
2713   \ifcase\bbl@howloaded\or\or
2714     \ifcase\csname bbl@llevel@\language\endcsname
2715       \bbl@csarg\let{lname@\language}\relax
2716     \fi
2717   \fi
2718   \bbl@ifunset{\bbl@lname@#1}%
2719   {\def\BabelBeforeIni##1##2{%
2720     \begingroup
2721       \let\bbl@ini@captions@aux\@gobbletwo
2722       \def\bbl@inidate ####1.####2.####3.####4\relax ####5####6{}}%
2723       \bbl@read@ini{##1}1%
2724       \ifx\bbl@initoload\relax\endinput\fi
2725     \endgroup}%
2726     \begingroup      % boxed, to avoid extra spaces:
2727     \ifx\bbl@initoload\relax
2728       \bbl@input@texini{#1}%
2729     \else
2730       \setbox\z@\hbox{\BabelBeforeIni{\bbl@initoload}}}%
2731     \fi
2732   \endgroup}%
2733   {}}

```

The hyphenrules option is handled with an auxiliary macro.

```

2734 \def\bbl@provide@hyphens#1{%
2735   \let\bbl@tempa\relax
2736   \ifx\bbl@KVP@hyphenrules\@nil\else
2737     \bbl@replace\bbl@KVP@hyphenrules{ }{,}%
2738     \bbl@foreach\bbl@KVP@hyphenrules{%
2739       \ifx\bbl@tempa\relax % if not yet found
2740         \bbl@ifsamestring{##1}{+}%
2741         {\bbl@exp{\addlanguage<l@##1>}}}%
2742       {}%
2743       \bbl@ifunset{l@##1}%
2744       {}%
2745       {\bbl@exp{\let\bbl@tempa<l@##1>}}}%
2746     \fi}%
2747   \fi
2748   \ifx\bbl@tempa\relax % if no opt or no language in opt found
2749     \ifx\bbl@KVP@import\@nil
2750       \ifx\bbl@initoload\relax\else
2751         \bbl@exp{%
2752           and hyphenrules is not empty
2753           \\bbl@ifblank{\bbl@cs{hyphr@#1}}%
2754           {\let\\bbl@tempa<l@bbl@cl{hyphr}>}}%
2755         \fi
2756       \else % if importing
2757         \bbl@exp{%
2758           and hyphenrules is not empty
2759           \\bbl@ifblank{\bbl@cs{hyphr@#1}}%
2760           {\let\\bbl@tempa<l@bbl@cl{hyphr}>}}%
2761         \fi
2762       \fi
2763     \bbl@ifunset{\bbl@tempa}% ie, relax or undefined
2764     {\bbl@ifunset{l@#1}% no hyphenrules found - fallback
2765      {\bbl@exp{\adddialect<l@#1>\language}}%
2766      {}}% so, l@<lang> is ok - nothing to do
2767     {\bbl@exp{\adddialect<l@#1>\bbl@tempa}}% found in opt list or ini

```

The reader of babel-...tex files. We reset temporarily some catcodes.

```

2768 \def\bbl@input@texini#1{%
2769   \bbl@bsphack

```



```

2770 \bbl@exp{%
2771 \catcode`\%%=14 \catcode`\==0
2772 \catcode`\={1 \catcode`\}=2
2773 \lowercase{\InputIfFileExists{babel-#1.tex}{}}}%
2774 \catcode`\==\the\catcode`\\relax
2775 \catcode`\==\the\catcode`\\relax
2776 \catcode`\={\the\catcode`\\relax
2777 \catcode`\}= \the\catcode`\\relax}%
2778 \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.

```

2779 \def\bbl@inline#1\bbl@inline{%
2780 \@ifnextchar[\bbl@inisect{\@ifnextchar\bbl@iniskip\bbl@inistore}#1\@@}% ]
2781 \def\bbl@inisect[#1]#2\@@{\def\bbl@section{#1}}
2782 \def\bbl@iniskip#1\@@{% if starts with ;
2783 \def\bbl@inistore#1=#2\@@{% full (default)
2784 \bbl@trim@def\bbl@tempa{#1}%
2785 \bbl@trim\toks@{#2}%
2786 \bbl@xin@{\bbl@section/\bbl@tempa;}{\bbl@key@list}%
2787 \ifin@
2788 \bbl@exp{%
2789 \\\g@addto@macro\\bbl@inidata{%
2790 \\\bbl@elt{\bbl@section}{\bbl@tempa}{\the\toks@}}}%
2791 \fi}
2792 \def\bbl@inistore@min#1=#2\@@{% minimal (maybe set in \bbl@read@ini)
2793 \bbl@trim@def\bbl@tempa{#1}%
2794 \bbl@trim\toks@{#2}%
2795 \bbl@xin@{.identification.}{.\bbl@section.}%
2796 \ifin@
2797 \bbl@exp{\\g@addto@macro\\bbl@inidata{%
2798 \\\bbl@elt{identification}{\bbl@tempa}{\the\toks@}}}%
2799 \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.

```

2800 \ifx\bbl@readstream\undefined
2801 \csname newread\endcsname\bbl@readstream
2802 \fi
2803 \def\bbl@read@ini#1#2{%
2804 \global\let\bbl@extend@ini\@gobble
2805 \openin\bbl@readstream=babel-#1.ini
2806 \ifeof\bbl@readstream
2807 \bbl@error
2808 {There is no ini file for the requested language\\%
2809 (#1: \language). Perhaps you misspelled it or your\\%
2810 installation is not complete.}%
2811 {Fix the name or reinstall babel.}%
2812 \else
2813 % == Store ini data in \bbl@inidata ==
2814 \catcode`\[=12 \catcode`\]=12 \catcode`\&=12 \catcode`\&=12
2815 \catcode`\;=12 \catcode`\|=12 \catcode`\%=14 \catcode`\-=12
2816 \bbl@info{Importing
2817 \ifcase#2font and identification \or basic \fi
2818 data for \language\\%
2819 from babel-#1.ini. Reported}%
2820 \ifnum#2=\z@
2821 \global\let\bbl@inidata\@empty
2822 \let\bbl@inistore\bbl@inistore@min % Remember it's local

```

```

2823 \fi
2824 \def\bbl@section{identification}%
2825 \bbl@exp{\bbl@inistore tag.ini=#1\\@@}%
2826 \bbl@inistore load.level=#2\\@@
2827 \loop
2828 \if T\ifeof\bbl@readstream F\fi T\relax % Trick, because inside \loop
2829 \endlinechar\m@ne
2830 \read\bbl@readstream to \bbl@line
2831 \endlinechar`^^M
2832 \ifx\bbl@line\@empty\else
2833 \expandafter\bbl@iniline\bbl@line\bbl@iniline
2834 \fi
2835 \repeat
2836 % == Process stored data ==
2837 \bbl@csarg\xdef{lini@\\language}{#1}%
2838 \bbl@read@ini@aux
2839 % == 'Export' data ==
2840 \bbl@ini@exports{#2}%
2841 \global\bbl@csarg\let{inidata@\\language}\bbl@inidata
2842 \global\let\bbl@inidata\@empty
2843 \bbl@exp{\bbl@add@list\bbl@ini@loaded{\\language}}%
2844 \bbl@tglobal\bbl@ini@loaded
2845 \fi}
2846 \def\bbl@read@ini@aux{%
2847 \let\bbl@savestrings\@empty
2848 \let\bbl@savetoday\@empty
2849 \let\bbl@savestate\@empty
2850 \def\bbl@elt##1##2##3{%
2851 \def\bbl@section{##1}%
2852 \in@{=date.}{=##1}% Find a better place
2853 \ifin@
2854 \bbl@ini@calendar{##1}%
2855 \fi
2856 \in@{=identification/extension.}{=##1/##2}%
2857 \ifin@
2858 \bbl@ini@extension{##2}%
2859 \fi
2860 \bbl@ifunset{bbl@inikv@##1}{}%
2861 {\csname bbl@inikv@##1\endcsname{##2}{##3}}%
2862 \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.

```

2863 \def\bbl@extend@ini@aux#1{%
2864 \bbl@startcommands*{#1}{captions}%
2865 % Activate captions/... and modify exports
2866 \bbl@csarg\def{inikv@captions.licr}##1##2{%
2867 \setlocalecaption{#1}{##1}{##2}%
2868 \def\bbl@inikv@captions##1##2{%
2869 \bbl@ini@captions@aux{##1}{##2}%
2870 \def\bbl@stringdef##1##2{\gdef##1{##2}}%
2871 \def\bbl@exportkey##1##2##3{%
2872 \bbl@ifunset{bbl@kv@##2}{}%
2873 {\expandafter\ifx\csname bbl@kv@##2\endcsname\@empty\else
2874 \bbl@exp{\global\let<bbl@##1@\\language><bbl@kv@##2>}}%
2875 \fi}}%
2876 % As with \bbl@read@ini, but with some changes
2877 \bbl@read@ini@aux
2878 \bbl@ini@exports\tw@
2879 % Update inidata@lang by pretending the ini is read.
2880 \def\bbl@elt##1##2##3{%
2881 \def\bbl@section{##1}%
2882 \bbl@iniline##2=##3\bbl@iniline}%

```

```

2883 \csname bbl@inidata@#1\endcsname
2884 \global\bbbl@csarg\let{inidata@#1}\bbbl@inidata
2885 \StartBabelCommands*{#1}{date}% And from the import stuff
2886 \def\bbbl@stringdef##1##2{\gdef##1{##2}}%
2887 \bbbl@savetoday
2888 \bbbl@savedate
2889 \bbbl@endcommands}

```

A somewhat hackish tool to handle calendar sections. To be improved.

```

2890 \def\bbbl@ini@calendar#1{%
2891 \lowercase{\def\bbbl@tempa{#1=}}%
2892 \bbbl@replace\bbbl@tempa{=date.gregorian}{}}%
2893 \bbbl@replace\bbbl@tempa{=date.}{}}%
2894 \in@{.licr=}{#1=}%
2895 \ifin@
2896 \ifcase\bbbl@engine
2897 \bbbl@replace\bbbl@tempa{.licr=}{}}%
2898 \else
2899 \let\bbbl@tempa\relax
2900 \fi
2901 \fi
2902 \ifx\bbbl@tempa\relax\else
2903 \bbbl@replace\bbbl@tempa{=}{}}%
2904 \bbbl@exp{%
2905 \def\<bbbl@inikv@#1>####1####2{%
2906 \\\bbbl@inidate####1...\relax{####2}{\bbbl@tempa}}}%
2907 \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 \bbbl@inistore above).

```

2908 \def\bbbl@renewinikey#1/#2\@#3{%
2909 \edef\bbbl@tempa{\zap@space #1 \@empty}% section
2910 \edef\bbbl@tempb{\zap@space #2 \@empty}% key
2911 \bbbl@trim\toks@{#3}% value
2912 \bbbl@exp{%
2913 \edef\\bbbl@key@list{\bbbl@key@list \bbbl@tempa/\bbbl@tempb;}%
2914 \\\g@addto@macro\\bbbl@inidata{%
2915 \\\bbbl@elt{\bbbl@tempa}{\bbbl@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.

```

2916 \def\bbbl@exportkey#1#2#3{%
2917 \bbbl@ifunset{bbbl@kv@#2}%
2918 {\bbbl@csarg\gdef{#1@\language name}{#3}}%
2919 {\expandafter\ifx\csname bbl@kv@#2\endcsname\@empty
2920 \bbbl@csarg\gdef{#1@\language name}{#3}%
2921 \else
2922 \bbbl@exp{\global\let\<bbbl@#1@\language name>\<bbbl@kv@#2>}}%
2923 \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 \bbbl@ini@exports is called always (via \bbbl@inisec), while \bbbl@after@ini must be called explicitly after \bbbl@read@ini if necessary.

```

2924 \def\bbbl@iniwarning#1{%
2925 \bbbl@ifunset{bbbl@kv@identification.warning#1}{}}%
2926 {\bbbl@warning{%
2927 From babel-\bbbl@cs{lini@\language name}.ini:\%
2928 \bbbl@cs{kv@identification.warning#1}\%
2929 Reported }}}
2930 %
2931 \let\bbbl@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.

```

2932 \def\bbl@ini@extension#1{%
2933   \def\bbl@tempa{#1}%
2934   \bbl@replace\bbl@tempa{extension.}{}%
2935   \bbl@replace\bbl@tempa{.tag.bcp47}{}%
2936   \bbl@ifunset\bbl@info{#1}%
2937     {\bbl@csarg\xdef{info@#1}{ext/\bbl@tempa}%
2938     \bbl@exp{%
2939       \\g@addto@macro\\bbl@moreinfo{%
2940         \\bbl@exportkey{ext/\bbl@tempa}{identification.#1}{}}}%
2941     {}%
2942 \let\bbl@moreinfo\@empty
2943 %
2944 \def\bbl@ini@exports#1{%
2945   % Identification always exported
2946   \bbl@iniwarning{}%
2947   \ifcase\bbl@engine
2948     \bbl@iniwarning{.pdflatex}%
2949   \or
2950     \bbl@iniwarning{.lualatex}%
2951   \or
2952     \bbl@iniwarning{.xelatex}%
2953   \fi%
2954   \bbl@exportkey{llevel}{identification.load.level}{}%
2955   \bbl@exportkey{elname}{identification.name.english}{}%
2956   \bbl@exp{\\bbl@exportkey{lname}{identification.name.opentype}%
2957     {\csname bbl@elname@\language\endcsname}}%
2958   \bbl@exportkey{tbc}{identification.tag.bcp47}{}%
2959   \bbl@exportkey{lbc}{identification.language.tag.bcp47}{}%
2960   \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
2961   \bbl@exportkey{esname}{identification.script.name}{}%
2962   \bbl@exp{\\bbl@exportkey{sname}{identification.script.name.opentype}%
2963     {\csname bbl@esname@\language\endcsname}}%
2964   \bbl@exportkey{sbc}{identification.script.tag.bcp47}{}%
2965   \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}%
2966   \bbl@exportkey{rbcp}{identification.region.tag.bcp47}{}%
2967   \bbl@exportkey{vbc}{identification.variant.tag.bcp47}{}%
2968   \bbl@moreinfo
2969   % Also maps bcp47 -> language
2970   \ifbbl@bcptoname
2971     \bbl@csarg\xdef{bcp@map@\bbl@cl{tbc}}{\language}%
2972   \fi
2973   % Conditional
2974   \ifnum#1>\z@ % 0 = only info, 1, 2 = basic, (re)new
2975     \bbl@exportkey{lnbrk}{typography.linebreaking}{h}%
2976     \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
2977     \bbl@exportkey{lfthm}{typography.lefthyphenmin}{2}%
2978     \bbl@exportkey{rgthm}{typography.righthyphenmin}{3}%
2979     \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
2980     \bbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
2981     \bbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
2982     \bbl@exportkey{intsp}{typography.intraspaces}{}%
2983     \bbl@exportkey{frspc}{typography.frenchspacing}{u}%
2984     \bbl@exportkey{chrng}{characters.ranges}{}%
2985     \bbl@exportkey{quote}{characters.delimiters.quotes}{}%
2986     \bbl@exportkey{dgnat}{numbers.digits.native}{}%
2987   \ifnum#1=\tw@ % only (re)new
2988     \bbl@exportkey{rqtex}{identification.require.babel}{}%
2989     \bbl@to@global\bbl@savetoday
2990     \bbl@to@global\bbl@savestate
2991     \bbl@savestrings
2992   \fi

```

2993 \fi}

A shared handler for key=val lines to be stored in \bbl@kv@<section>.<key>.

```
2994 \def\bbl@inikv#1#2{%      key=value
2995   \toks@{#2}%              This hides #'s from ini values
2996   \bbl@csarg\edef{@kv@\bbl@section.#1}{\the\toks@}}
```

By default, the following sections are just read. Actions are taken later.

```
2997 \let\bbl@inikv@identification\bbl@inikv
2998 \let\bbl@inikv@typography\bbl@inikv
2999 \let\bbl@inikv@characters\bbl@inikv
3000 \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 \localnumeral, and another one preserving the trailing .1 for the ‘units’.

```
3001 \def\bbl@inikv@counters#1#2{%
3002   \bbl@ifsamestring{#1}{digits}%
3003   {\bbl@error{The counter name 'digits' is reserved for mapping\\%
3004     decimal digits}%
3005     {Use another name.}}%
3006   }%
3007   \def\bbl@tempc{#1}%
3008   \bbl@trim@def{\bbl@tempb*}{#2}%
3009   \in@{.1$}{#1$}%
3010   \ifin@
3011     \bbl@replace\bbl@tempc{.1}{}%
3012     \bbl@csarg\protected@xdef{cnt@#\bbl@tempc @\language}%
3013     \noexpand\bbl@alphanumeric{\bbl@tempc}%
3014   \fi
3015   \in@{.F.}{#1}%
3016   \ifin@else\in@{.S.}{#1}\fi
3017   \ifin@
3018     \bbl@csarg\protected@xdef{cnt@#1@\language}{\bbl@tempb*}%
3019   \else
3020     \toks@{}% Required by \bbl@buildifcase, which returns \bbl@tempa
3021     \expandafter\bbl@buildifcase\bbl@tempb* \ \ % Space after \
3022     \bbl@csarg{\global\expandafter\let}{cnt@#1@\language}\bbl@tempa
3023   \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.

```
3024 \ifcase\bbl@engine
3025   \bbl@csarg\def{inikv@captions.licr}#1#2{%
3026     \bbl@ini@captions@aux{#1}{#2}}
3027 \else
3028   \def\bbl@inikv@captions#1#2{%
3029     \bbl@ini@captions@aux{#1}{#2}}
3030 \fi
```

The auxiliary macro for captions define \<caption>name.

```
3031 \def\bbl@ini@captions@template#1#2{% string language tempa=capt-name
3032   \bbl@replace\bbl@tempa{.template}{}%
3033   \def\bbl@toreplace{#1}{}%
3034   \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace}%
3035   \bbl@replace\bbl@toreplace{[ ]}{\csname}%
3036   \bbl@replace\bbl@toreplace{[ ]}{\csname the}%
3037   \bbl@replace\bbl@toreplace{[ ]}{\name\endcsname}%
3038   \bbl@replace\bbl@toreplace{[ ]}{\endcsname}%
3039   \bbl@xin@{,\bbl@tempa,}{,chapter,appendix,part,}%
3040   \ifin@
3041     \@nameuse{bbl@patch\bbl@tempa}%
3042     \global\bbl@csarg\let{\bbl@tempa fmt@#2}\bbl@toreplace
```

```

3043 \fi
3044 \bbl@xin@{\bbl@tempa,}{,figure,table,}%
3045 \ifin@
3046 \toks@{\expandafter{\bbl@toreplace}%
3047 \bbl@exp{\gdef\<fnum@\bbl@tempa>{\the\toks@}}%
3048 \fi}
3049 \def\bbl@ini@captions@aux#1#2{%
3050 \bbl@trim@def\bbl@tempa{#1}%
3051 \bbl@xin@{.template}{\bbl@tempa}%
3052 \ifin@
3053 \bbl@ini@captions@template{#2}\language\name
3054 \else
3055 \bbl@ifblank{#2}%
3056 {\bbl@exp{%
3057 \toks@{\bbl@nocaption{\bbl@tempa}{\language\name\bbl@tempa name}}}%
3058 {\bbl@trim\toks@{#2}}%
3059 \bbl@exp{%
3060 \bbl@add\bbl@savestrings{%
3061 \SetString\<\bbl@tempa name>{\the\toks@}}%
3062 \toks@{\expandafter{\bbl@captionslist}%
3063 \bbl@exp{\in{\<\bbl@tempa name>}{\the\toks@}}%
3064 \ifin@else
3065 \bbl@exp{%
3066 \bbl@add\<\bbl@extracaps@\language\name>{\<\bbl@tempa name>}%
3067 \bbl@tglobal\<\bbl@extracaps@\language\name>}%
3068 \fi
3069 \fi}

```

**Labels.** Captions must contain just strings, no format at all, so there is new group in ini files.

```

3070 \def\bbl@list@the{%
3071 part,chapter,section,subsection,subsubsection,paragraph,%
3072 subparagraph,enumi,enumii,enumiii,enumiv,equation,figure,%
3073 table,page,footnote,mpfootnote,mpfn}
3074 \def\bbl@map@cnt#1{% #1:roman,etc, // #2:enumi,etc
3075 \bbl@ifunset{\bbl@map@#1@\language\name}%
3076 {\@nameuse{#1}}%
3077 {\@nameuse{\bbl@map@#1@\language\name}}}
3078 \def\bbl@inikv@labels#1#2{%
3079 \in@{.map}{#1}%
3080 \ifin@
3081 \ifx\bbl@KVP@labels\@nil\else
3082 \bbl@xin@{ map }{ \bbl@KVP@labels\space}%
3083 \ifin@
3084 \def\bbl@tempc{#1}%
3085 \bbl@replace\bbl@tempc{.map}{}%
3086 \in@{, #2,}{,arabic,roman,Roman,alph,Alph,fnsymbol,}%
3087 \bbl@exp{%
3088 \gdef\<\bbl@map@\bbl@tempc @\language\name>%
3089 {\ifin@<#2>\else\localecounter{#2}\fi}}%
3090 \bbl@foreach\bbl@list@the{%
3091 \bbl@ifunset{the##1}{}%
3092 {\bbl@exp{\let\bbl@tempd\<the##1>}%
3093 \bbl@exp{%
3094 \bbl@sreplace\<the##1>%
3095 {\<\bbl@tempc>{##1}}{\bbl@map@cnt{\bbl@tempc}{##1}}%
3096 \bbl@sreplace\<the##1>%
3097 {\<\empty @\bbl@tempc>\<c@##1>}{\bbl@map@cnt{\bbl@tempc}{##1}}}%
3098 \expandafter\ifx\csname the##1\endcsname\bbl@tempd\else
3099 \toks@{\expandafter\expandafter\expandafter{%
3100 \csname the##1\endcsname}%
3101 \expandafter\xdef\csname the##1\endcsname{\the\toks@}}%
3102 \fi}}%
3103 \fi

```

```

3104 \fi
3105 %
3106 \else
3107 %
3108 % The following code is still under study. You can test it and make
3109 % suggestions. Eg, enumerate.2 = ([enumi]).([enumii]). It's
3110 % language dependent.
3111 \in@{enumerate.}{#1}%
3112 \ifin@
3113 \def\bbl@tempa{#1}%
3114 \bbl@replace\bbl@tempa{enumerate.}{}%
3115 \def\bbl@toreplace{#2}%
3116 \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace{}}%
3117 \bbl@replace\bbl@toreplace{[ ]}{\csname the}%
3118 \bbl@replace\bbl@toreplace{[ ]}{\endcsname{}}}%
3119 \toks@ \expandafter{\bbl@toreplace}%
3120 % TODO. Execute only once:
3121 \bbl@exp{%
3122   \\bbl@add\<extras\language\>%
3123   \\babel@save\<labelenum\romannumeral\bbl@tempa>%
3124   \def\<labelenum\romannumeral\bbl@tempa>{\the\toks@}%
3125   \\bbl@tglobal\<extras\language\>%
3126 \fi
3127 \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.

```

3128 \def\bbl@chapttype{chapter}
3129 \ifx\@makechapterhead\@undefined
3130 \let\bbl@patchchapter\relax
3131 \else\ifx\thechapter\@undefined
3132 \let\bbl@patchchapter\relax
3133 \else\ifx\ps@headings\@undefined
3134 \let\bbl@patchchapter\relax
3135 \else
3136 \def\bbl@patchchapter{%
3137   \global\let\bbl@patchchapter\relax
3138   \gdef\bbl@chfmt{%
3139     \bbl@ifunset{bbl@\bbl@chapttype fmt@\language}%
3140     {\@chapapp\space\thechapter}
3141     {\@nameuse{bbl@\bbl@chapttype fmt@\language}}}%
3142   \bbl@add\appendix{\def\bbl@chapttype{appendix}}% Not harmful, I hope
3143   \bbl@sreplace\ps@headings{\@chapapp\ \thechapter}{\bbl@chfmt}%
3144   \bbl@sreplace\chaptermark{\@chapapp\ \thechapter}{\bbl@chfmt}%
3145   \bbl@sreplace\@makechapterhead{\@chapapp\space\thechapter}{\bbl@chfmt}%
3146   \bbl@tglobal\appendix
3147   \bbl@tglobal\ps@headings
3148   \bbl@tglobal\chaptermark
3149   \bbl@tglobal\@makechapterhead}
3150 \let\bbl@patchappendix\bbl@patchchapter
3151 \fi\fi\fi
3152 \ifx\@part\@undefined
3153 \let\bbl@patchpart\relax
3154 \else
3155 \def\bbl@patchpart{%
3156   \global\let\bbl@patchpart\relax
3157   \gdef\bbl@partformat{%
3158     \bbl@ifunset{bbl@partfmt@\language}%
3159     {\partname\nobreakspace\thepart}
3160     {\@nameuse{bbl@partfmt@\language}}}%
3161   \bbl@sreplace\@part{\partname\nobreakspace\thepart}{\bbl@partformat}%

```

```

3162 \bbl@toglobal\@part}
3163 \fi

Date. TODO. Document

3164 % Arguments are _not_ protected.
3165 \let\bbl@calendar\@empty
3166 \DeclareRobustCommand\localedate[1][\bbl@localedate{#1}]
3167 \def\bbl@localedate#1#2#3#4{%
3168 \begingroup
3169 \ifx\@empty#1\@empty\else
3170 \let\bbl@ld@calendar\@empty
3171 \let\bbl@ld@variant\@empty
3172 \edef\bbl@tempa{\zap@space#1 \@empty}%
3173 \def\bbl@tempb##1=##2\@{\@namedef\bbl@ld@##1}{##2}}%
3174 \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
3175 \edef\bbl@calendar{%
3176 \bbl@ld@calendar
3177 \ifx\bbl@ld@variant\@empty\else
3178 .\bbl@ld@variant
3179 \fi}%
3180 \bbl@replace\bbl@calendar{gregorian}{}}%
3181 \fi
3182 \bbl@cased
3183 {\@nameuse\bbl@date@\language @\bbl@calendar}{#2}{#3}{#4}}%
3184 \endgroup}
3185 % eg: 1=months, 2=wide, 3=1, 4=dummy, 5=value, 6=calendar
3186 \def\bbl@inidate#1.#2.#3.#4\relax#5#6{% TODO - ignore with 'captions'
3187 \bbl@trim@def\bbl@tempa{#1.#2}%
3188 \bbl@ifsamestring{\bbl@tempa}{months.wide}% to savedate
3189 {\bbl@trim@def\bbl@tempa{#3}%
3190 \bbl@trim\toks@{#5}%
3191 \@temptokena\expandafter{\bbl@savedate}%
3192 \bbl@exp{% Reverse order - in ini last wins
3193 \def\\bbl@savedate{%
3194 \\SetString<month\romannumeral\bbl@tempa#6name>{\the\toks@}%
3195 \the\@temptokena}}}%
3196 {\bbl@ifsamestring{\bbl@tempa}{date.long}% defined now
3197 {\lowercase{\def\bbl@tempb{#6}}}%
3198 \bbl@trim@def\bbl@toreplace{#5}%
3199 \bbl@TG@@date
3200 \bbl@ifunset\bbl@date@\language @}%
3201 {\bbl@exp{% TODO. Move to a better place.
3202 \gdef<\language date>{\protect<\language date >}}%
3203 \gdef<\language date >#####1#####2#####3{%
3204 \\bbl@usedategroupttrue
3205 <\bbl@ensure@\language >{%
3206 \\localedate{#####1}{#####2}{#####3}}}%
3207 \\bbl@add\\bbl@savetoday{%
3208 \\SetString\\today{%
3209 <\language date>%
3210 {\the\year}{\the\month}{\the\day}}}}}%
3211 {}%
3212 \global\bbl@csarg\let{date@\language @}\bbl@toreplace
3213 \ifx\bbl@tempb\@empty\else
3214 \global\bbl@csarg\let{date@\language @\bbl@tempb}\bbl@toreplace
3215 \fi}%
3216 {}}}

```

**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).

```

3217 \let\bbl@calendar\@empty

```



```

3218 \newcommand\BabelDateSpace{\nobreakspace}
3219 \newcommand\BabelDateDot{.\@} % TODO. \let instead of repeating
3220 \newcommand\BabelDated[1]{\number#1}
3221 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}
3222 \newcommand\BabelDateM[1]{\number#1}
3223 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
3224 \newcommand\BabelDateMMMM[1]{%
3225   \csname month\romannumeral#1\bbl@calendar name\endcsname}%
3226 \newcommand\BabelDatey[1]{\number#1}%
3227 \newcommand\BabelDateyy[1]{%
3228   \ifnum#1<10 0\number#1 %
3229   \else\ifnum#1<100 \number#1 %
3230   \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
3231   \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
3232   \else
3233     \bbl@error
3234     {Currently two-digit years are restricted to the\
3235      range 0-9999.}%
3236     {There is little you can do. Sorry.}%
3237   \fi\fi\fi\fi}
3238 \newcommand\BabelDateyyyy[1]{\number#1} % TODO - add leading 0
3239 \def\bbl@replace@finish@iii#1{%
3240   \bbl@exp{\def\#1####1####2####3{\the\toks@}}
3241 \def\bbl@TG@date{%
3242   \bbl@replace\bbl@toreplace{[ ]}{\BabelDateSpace{}}%
3243   \bbl@replace\bbl@toreplace{[.]}{\BabelDateDot{}}%
3244   \bbl@replace\bbl@toreplace{[d]}{\BabelDated{####3}}%
3245   \bbl@replace\bbl@toreplace{[dd]}{\BabelDatedd{####3}}%
3246   \bbl@replace\bbl@toreplace{[M]}{\BabelDateM{####2}}%
3247   \bbl@replace\bbl@toreplace{[MM]}{\BabelDateMM{####2}}%
3248   \bbl@replace\bbl@toreplace{[MMMM]}{\BabelDateMMMM{####2}}%
3249   \bbl@replace\bbl@toreplace{[y]}{\BabelDatey{####1}}%
3250   \bbl@replace\bbl@toreplace{[yy]}{\BabelDateyy{####1}}%
3251   \bbl@replace\bbl@toreplace{[yyyy]}{\BabelDateyyyy{####1}}%
3252   \bbl@replace\bbl@toreplace{[y]}{\bbl@datecctr[####1]}%
3253   \bbl@replace\bbl@toreplace{[m]}{\bbl@datecctr[####2]}%
3254   \bbl@replace\bbl@toreplace{[d]}{\bbl@datecctr[####3]}%
3255   \bbl@replace@finish@iii\bbl@toreplace}
3256 \def\bbl@datecctr{\expandafter\bbl@xdatecctr\expandafter}
3257 \def\bbl@xdatecctr[#1|#2]{\localenumeral{#2}{#1}}

```

### Transforms.

```

3258 \let\bbl@release@transforms\@empty
3259 \@namedef{bbl@inikv@transforms.prehyphenation}{%
3260   \bbl@transforms\babelprehyphenation}
3261 \@namedef{bbl@inikv@transforms.posthyphenation}{%
3262   \bbl@transforms\babelposthyphenation}
3263 \def\bbl@transforms@aux#1#2#3#4,#5\relax{%
3264   #1[#2]{#3}{#4}{#5}}
3265 \begingroup % A hack. TODO. Don't require an specific order
3266   \catcode`\%=12
3267   \catcode`\&=14
3268   \gdef\bbl@transforms#1#2#3{&%
3269     \ifx\bbl@KVP@transforms\@nil\else
3270       \directlua{
3271         local str = [==[#2]==]
3272         str = str:gsub('%.%d+%.%d+$', '')
3273         tex.print([[def\string\babeltempa{]] .. str .. [[}}]])
3274       }&%
3275       \bbl@xin@{,\babeltempa,}{,\bbl@KVP@transforms,}&%
3276       \ifin@
3277         \in@{.0$}{#2$}&%
3278       \ifin@

```

```

3279 \directlua{
3280   local str = string.match([[\\bbl@KVP@transforms]],
3281     '%(([^%([-)%)][^%)]-\\babeltempa')
3282   if str == nil then
3283     tex.print([[\\def\\string\\babeltempb{}}])
3284   else
3285     tex.print([[\\def\\string\\babeltempb{,attribute=}] .. str .. [{}]])
3286   end
3287 }
3288 \\toks@{#3}&%
3289 \\bbl@exp{&%
3290   \\g@addto@macro\\bbl@release@transforms{&%
3291     \\relax &% Closes previous \\bbl@transforms@aux
3292     \\bbl@transforms@aux
3293     \\#1{label=\\babeltempa\\babeltempb}{\\language\\the\\toks@}}&%
3294   \\else
3295     \\g@addto@macro\\bbl@release@transforms{, {#3}}&%
3296   \\fi
3297 \\fi
3298 \\fi}
3299 \\endgroup

```

Language and Script values to be used when defining a font or setting the direction are set with the following macros.

```

3300 \\def\\bbl@provide@lsys#1{%
3301   \\bbl@ifunset{\\bbl@lname@#1}%
3302     {\\bbl@load@info{#1}}%
3303   }%
3304   \\bbl@csarg\\let{\\sys@#1}\\@empty
3305   \\bbl@ifunset{\\bbl@sname@#1}{\\bbl@csarg\\gdef{sname@#1}{Default}}{}%
3306   \\bbl@ifunset{\\bbl@sotf@#1}{\\bbl@csarg\\gdef{sotf@#1}{DFLT}}{}%
3307   \\bbl@csarg\\bbl@add@list{\\sys@#1}{Script=\\bbl@cs{sname@#1}}%
3308   \\bbl@ifunset{\\bbl@lname@#1}{%
3309     {\\bbl@csarg\\bbl@add@list{\\sys@#1}{Language=\\bbl@cs{lname@#1}}}%
3310   \\ifcase\\bbl@engine\\or\\or
3311     \\bbl@ifunset{\\bbl@prehc@#1}{%
3312       {\\bbl@exp{\\bbl@ifblank{\\bbl@cs{prehc@#1}}}%
3313       }%
3314       {\\ifx\\bbl@xenohyph\\@undefined
3315         \\let\\bbl@xenohyph\\bbl@xenohyph@d
3316         \\ifx\\AtBeginDocument\\@notprerr
3317           \\expandafter\\@secondoftwo % to execute right now
3318         \\fi
3319         \\AtBeginDocument{%
3320           \\bbl@patchfont{\\bbl@xenohyph}%
3321           \\expandafter\\selectlanguage\\expandafter{\\language\\the\\toks@}}%
3322         \\fi}}%
3323     \\fi
3324     \\bbl@csarg\\bbl@to@global{\\sys@#1}}
3325   \\def\\bbl@xenohyph@d{%
3326     \\bbl@ifset{\\bbl@prehc@\\language}%
3327       {\\ifnum\\hyphenchar\\font=\\defaultthyphenchar
3328         \\iffontchar\\font\\bbl@cl{prehc}\\relax
3329         \\hyphenchar\\font\\bbl@cl{prehc}\\relax
3330       \\else\\iffontchar\\font"200B
3331         \\hyphenchar\\font"200B
3332       \\else
3333         \\bbl@warning
3334         {Neither 0 nor ZERO WIDTH SPACE are available\\%
3335         in the current font, and therefore the hyphen\\%
3336         will be printed. Try changing the fontspec's\\%
3337         'HyphenChar' to another value, but be aware\\%
3338         this setting is not safe (see the manual)}}%

```

```

3339         \hyphenchar\font\defaultshyphenchar
3340         \fi\fi
3341         \fi}%
3342     {\hyphenchar\font\defaultshyphenchar}}
3343 % \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).

```

3344 \def\bbl@load@info#1{%
3345   \def\BabelBeforeIni##1##2{%
3346     \begingroup
3347       \bbl@read@ini{##1}0%
3348       \endinput           % babel- .tex may contain onlypreamble's
3349     \endgroup}%          boxed, to avoid extra spaces:
3350   {\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  $\TeX$ . Non-digits characters are kept. The first macro is the generic “localized” command.

```

3351 \def\bbl@setdigits#1#2#3#4#5{%
3352   \bbl@exp{%
3353     \def\<\language\name digits>####1{%       ie, \langdigits
3354       \<\bbl@digits@\language\name>####1\\\@nil}%
3355     \let\<\bbl@cntr@digits@\language\name>\<\language\name digits>%
3356     \def\<\language\name counter>####1{%       ie, \langcounter
3357       \\\expandafter\<\bbl@counter@\language\name>%
3358       \\\csname c@####1\endcsname}%
3359     \def\<\bbl@counter@\language\name>####1{% ie, \bbl@counter@lang
3360       \\\expandafter\<\bbl@digits@\language\name>%
3361       \\\number####1\\\@nil}}}%
3362 \def\bbl@tempa##1##2##3##4##5{%
3363   \bbl@exp{%    Wow, quite a lot of hashes! :- (
3364     \def\<\bbl@digits@\language\name>#####1{%
3365       \\\ifx#####1\\\@nil                % ie, \bbl@digits@lang
3366       \\\else
3367         \\\ifx0#####1#1%
3368         \\\else\\\ifx1#####1#2%
3369         \\\else\\\ifx2#####1#3%
3370         \\\else\\\ifx3#####1#4%
3371         \\\else\\\ifx4#####1#5%
3372         \\\else\\\ifx5#####1##1%
3373         \\\else\\\ifx6#####1##2%
3374         \\\else\\\ifx7#####1##3%
3375         \\\else\\\ifx8#####1##4%
3376         \\\else\\\ifx9#####1##5%
3377         \\\else#####1%
3378         \\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi
3379         \\\expandafter\<\bbl@digits@\language\name>%
3380         \\\fi}}}%
3381   \bbl@tempa}

```

Alphabetic counters must be converted from a space separated list to an \ifcase structure.

```

3382 \def\bbl@buildifcase#1 {% Returns \bbl@tempa, requires \toks@={%
3383   \ifx\#1%           % \ before, in case #1 is multiletter
3384     \bbl@exp{%
3385       \def\#1\bbl@tempa####1{%
3386         \<ifcase>####1\space\the\toks@\<else>\@ctrerr\<fi>}}%
3387   \else
3388     \toks@\expandafter{\the\toks@\or #1}%
3389     \expandafter\bbl@buildifcase
3390 \fi}

```

The code for additive counters is somewhat tricky and it's based on the fact the arguments just before \@ collect digits which have been left 'unused' in previous arguments, the first of them being the number of digits in the number to be converted. This explains the reverse set 76543210. Digits above 10000 are not handled yet. When the key contains the subkey .F., the number after is treated as a special case, for a fixed form (see babel-he.ini, for example).

```

3391 \newcommand\localecnumeral[2]{\bbl@cs{cntr@#1@\language}{#2}}
3392 \def\bbl@localecnumeral#1#2{\localecnumeral{#2}{#1}}
3393 \newcommand\localecounter[2]{%
3394   \expandafter\bbl@localecnumeral
3395   \expandafter{\number\csname c@#2\endcsname}{#1}}
3396 \def\bbl@alphnumeral#1#2{%
3397   \expandafter\bbl@alphnumeral@i\number#2 76543210\@@{#1}}
3398 \def\bbl@alphnumeral@i#1#2#3#4#5#6#7#8\@@#9{%
3399   \ifcase\@car#8\@nil\or    % Currenty <10000, but prepared for bigger
3400     \bbl@alphnumeral@ii{#9}000000#1\or
3401     \bbl@alphnumeral@ii{#9}000000#1#2\or
3402     \bbl@alphnumeral@ii{#9}0000#1#2#3\or
3403     \bbl@alphnumeral@ii{#9}000#1#2#3#4\else
3404     \bbl@alphnum@invalid{>9999}%
3405   \fi}
3406 \def\bbl@alphnumeral@ii#1#2#3#4#5#6#7#8{%
3407   \bbl@ifunset{bbl@cntr@#1.F.\number#5#6#7#8@\language}%
3408     {\bbl@cs{cntr@#1.4@\language}{#5}
3409     \bbl@cs{cntr@#1.3@\language}{#6}
3410     \bbl@cs{cntr@#1.2@\language}{#7}
3411     \bbl@cs{cntr@#1.1@\language}{#8}
3412     \ifnum#6#7#8>\z@ % TODO. An ad hoc rule for Greek. Ugly.
3413       \bbl@ifunset{bbl@cntr@#1.S.321@\language}{}%
3414       {\bbl@cs{cntr@#1.S.321@\language}{}}%
3415     \fi}%
3416   {\bbl@cs{cntr@#1.F.\number#5#6#7#8@\language}}%
3417 \def\bbl@alphnum@invalid#1{%
3418   \bbl@error{Alphabetic numeral too large (#1)}%
3419   {Currently this is the limit.}}

```

The information in the identification section can be useful, so the following macro just exposes it with a user command.

```

3420 \def\bbl@localeinfo#1#2{%
3421   \bbl@ifunset{bbl@info@#2}{#1}%
3422   {\bbl@ifunset{bbl@csname bbl@info@#2\endcsname @\language}{#1}%
3423     {\bbl@cs{\csname bbl@info@#2\endcsname @\language}}}%
3424 \newcommand\localeinfo[1]{%
3425   \ifx*#1\@empty    % TODO. A bit hackish to make it expandable.
3426     \bbl@afterelse\bbl@localeinfo{}%
3427   \else
3428     \bbl@localeinfo
3429     {\bbl@error{I've found no info for the current locale.\%
3430       The corresponding ini file has not been loaded\%
3431       Perhaps it doesn't exist}%
3432     {See the manual for details.}}%
3433   {#1}%
3434   \fi}
3435 % \@namedef{bbl@info@name.locale}{lcname}
3436 \@namedef{bbl@info@tag.ini}{lini}
3437 \@namedef{bbl@info@name.english}{elname}
3438 \@namedef{bbl@info@name.opentype}{lname}
3439 \@namedef{bbl@info@tag.bcp47}{tbc}
3440 \@namedef{bbl@info@language.tag.bcp47}{lbc}
3441 \@namedef{bbl@info@tag.opentype}{lotf}
3442 \@namedef{bbl@info@script.name}{esname}
3443 \@namedef{bbl@info@script.name.opentype}{sname}
3444 \@namedef{bbl@info@script.tag.bcp47}{sbcp}
3445 \@namedef{bbl@info@script.tag.opentype}{sotf}

```

```

3446 \@namedef{bbl@info@region.tag.bcp47}{rbcp}
3447 \@namedef{bbl@info@variant.tag.bcp47}{vbcp}
3448 % extensions are dealt with in a special way
3449 \let\bbl@ensureinfo@gobble
3450 % An internal \LaTeX{} macro:
3451 \providecommand\BCPdata[1]{\localeinfo*{#1.tag.bcp47}}

```

Now \BabelEnsureInfo is executed always, but there is an option to disable it.

```

3452 <(*More package options)> ≡
3453 \DeclareOption{ensureinfo=off}{}
3454 <(/More package options)>
3455 %
3456 \newcommand\BabelEnsureInfo{%
3457   \ifx\InputIfFileExists\@undefined\else
3458     \def\bbl@ensureinfo##1{%
3459       \bbl@ifunset{bbl@lname@##1}{\bbl@load@info{##1}}{}}%
3460   \fi
3461   \bbl@foreach\bbl@loaded{%
3462     \def\language{##1}%
3463     \bbl@ensureinfo{##1}}}%
3464 \@ifpackagewith{babel}{ensureinfo=off}{}%
3465 {\AtEndOfPackage{% Test for plain.
3466   \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.

```

3467 \newcommand\getlocaleproperty{%
3468   \@ifstar\bbl@getproperty@s\bbl@getproperty@x}
3469 \def\bbl@getproperty@s#1#2#3{%
3470   \let#1\relax
3471   \def\bbl@elt##1##2##3{%
3472     \bbl@ifsamestring{##1/##2}{#3}%
3473     {\providecommand#1{##3}%
3474     \def\bbl@elt####1####2####3{}}}%
3475   {}}%
3476   \bbl@cs{inidata@#2}%
3477 \def\bbl@getproperty@x#1#2#3{%
3478   \bbl@getproperty@s{#1}{#2}{#3}%
3479   \ifx#1\relax
3480     \bbl@error
3481     {Unknown key for locale '#2':\%
3482     #3\%
3483     \string#1 will be set to \relax}%
3484     {Perhaps you misspelled it.}%
3485   \fi}
3486 \let\bbl@ini@loaded\@empty
3487 \newcommand\LocaleForEach{\bbl@foreach\bbl@ini@loaded}

```

## 8 Adjusting the Babel behavior

A generic high level interface is provided to adjust some global and general settings.

```

3488 \newcommand\babeladjust[1]{% TODO. Error handling.
3489   \bbl@forkv{#1}{%
3490     \bbl@ifunset{bbl@ADJ@##1@##2}%
3491     {\bbl@cs{ADJ@##1}{##2}}%
3492     {\bbl@cs{ADJ@##1@##2}}}%
3493 %
3494 \def\bbl@adjust@lua#1#2{%
3495   \ifvmode
3496     \ifnum\currentgrouplevel=\z@
3497       \directlua{ Babel.#2 }%

```

```

3498 \expandafter\expandafter\expandafter\@gobble
3499 \fi
3500 \fi
3501 {\bbl@error % The error is gobbled if everything went ok.
3502 {Currently, #1 related features can be adjusted only\%
3503 in the main vertical list.}%
3504 {Maybe things change in the future, but this is what it is.}}}
3505 \@namedef{bbl@ADJ@bidi.mirroring@on}{%
3506 \bbl@adjust@lua{bidi}{mirroring_enabled=true}}
3507 \@namedef{bbl@ADJ@bidi.mirroring@off}{%
3508 \bbl@adjust@lua{bidi}{mirroring_enabled=false}}
3509 \@namedef{bbl@ADJ@bidi.text@on}{%
3510 \bbl@adjust@lua{bidi}{bidi_enabled=true}}
3511 \@namedef{bbl@ADJ@bidi.text@off}{%
3512 \bbl@adjust@lua{bidi}{bidi_enabled=false}}
3513 \@namedef{bbl@ADJ@bidi.mapdigits@on}{%
3514 \bbl@adjust@lua{bidi}{digits_mapped=true}}
3515 \@namedef{bbl@ADJ@bidi.mapdigits@off}{%
3516 \bbl@adjust@lua{bidi}{digits_mapped=false}}
3517 %
3518 \@namedef{bbl@ADJ@linebreak.sea@on}{%
3519 \bbl@adjust@lua{linebreak}{sea_enabled=true}}
3520 \@namedef{bbl@ADJ@linebreak.sea@off}{%
3521 \bbl@adjust@lua{linebreak}{sea_enabled=false}}
3522 \@namedef{bbl@ADJ@linebreak.cjk@on}{%
3523 \bbl@adjust@lua{linebreak}{cjk_enabled=true}}
3524 \@namedef{bbl@ADJ@linebreak.cjk@off}{%
3525 \bbl@adjust@lua{linebreak}{cjk_enabled=false}}
3526 \@namedef{bbl@ADJ@justify.arabic@on}{%
3527 \bbl@adjust@lua{linebreak}{arabic.justify_enabled=true}}
3528 \@namedef{bbl@ADJ@justify.arabic@off}{%
3529 \bbl@adjust@lua{linebreak}{arabic.justify_enabled=false}}
3530 %
3531 \def\bbl@adjust@layout#1{%
3532 \ifvmode
3533 #1%
3534 \expandafter\@gobble
3535 \fi
3536 {\bbl@error % The error is gobbled if everything went ok.
3537 {Currently, layout related features can be adjusted only\%
3538 in vertical mode.}%
3539 {Maybe things change in the future, but this is what it is.}}}
3540 \@namedef{bbl@ADJ@layout.tabular@on}{%
3541 \bbl@adjust@layout{\let\@tabular\bbl@NL@tabular}}
3542 \@namedef{bbl@ADJ@layout.tabular@off}{%
3543 \bbl@adjust@layout{\let\@tabular\bbl@OL@tabular}}
3544 \@namedef{bbl@ADJ@layout.lists@on}{%
3545 \bbl@adjust@layout{\let\list\bbl@NL@list}}
3546 \@namedef{bbl@ADJ@layout.lists@off}{%
3547 \bbl@adjust@layout{\let\list\bbl@OL@list}}
3548 \@namedef{bbl@ADJ@hyphenation.extra@on}{%
3549 \bbl@activateposthyphen}
3550 %
3551 \@namedef{bbl@ADJ@autoload.bcp47@on}{%
3552 \bbl@bcpallowedtrue}
3553 \@namedef{bbl@ADJ@autoload.bcp47@off}{%
3554 \bbl@bcpallowedfalse}
3555 \@namedef{bbl@ADJ@autoload.bcp47.prefix}#1{%
3556 \def\bbl@bcp@prefix{#1}}
3557 \def\bbl@bcp@prefix{bcp47-}
3558 \@namedef{bbl@ADJ@autoload.options}#1{%
3559 \def\bbl@autoload@options{#1}}
3560 \let\bbl@autoload@bcptoptions\empty

```

```

3561 \@namedef{bbl@ADJ@autoload.bcp47.options}#1{%
3562   \def\bbl@autoload@bcptoptions{#1}}
3563 \newif\ifbbl@bcptname
3564 \@namedef{bbl@ADJ@bcp47.toname@on}{%
3565   \bbl@bcptnametrue
3566   \BabelEnsureInfo}
3567 \@namedef{bbl@ADJ@bcp47.toname@off}{%
3568   \bbl@bcptnamefalse}
3569 \@namedef{bbl@ADJ@prehyphenation.disable@nohyphenation}{%
3570   \directlua{ Babel.ignore_pre_char = function(node)
3571     return (node.lang == \the\csname l@nohyphenation\endcsname)
3572   end }}
3573 \@namedef{bbl@ADJ@prehyphenation.disable@off}{%
3574   \directlua{ Babel.ignore_pre_char = function(node)
3575     return false
3576   end }}
3577 \@namedef{bbl@ADJ@select.write@shift}{%
3578   \let\bbl@restorelastskip\relax
3579   \def\bbl@savelastskip{%
3580     \let\bbl@restorelastskip\relax
3581     \ifvmode
3582       \ifdim\lastskip=\z@
3583         \let\bbl@restorelastskip\nobreak
3584       \else
3585         \bbl@exp{%
3586           \def\\bbl@restorelastskip{%
3587             \skip@=\the\lastskip
3588             \\nobreak \vskip-\skip@ \vskip\skip@}}%
3589       \fi
3590     \fi}}
3591 \@namedef{bbl@ADJ@select.write@keep}{%
3592   \let\bbl@restorelastskip\relax
3593   \let\bbl@savelastskip\relax}
3594 \@namedef{bbl@ADJ@select.write@omit}{%
3595   \let\bbl@restorelastskip\relax
3596   \def\bbl@savelastskip##1\bbl@restorelastskip{}}

```

As the final task, load the code for lua. TODO: use babel name, override

```

3597 \ifx\directlua\@undefined\else
3598   \ifx\bbl@luapatterns\@undefined
3599     \input luababel.def
3600   \fi
3601 \fi

```

Continue with  $\LaTeX$ .

```

3602 \end{package}
3603 \end{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.

```

3604 \langle *More package options \rangle \equiv
3605 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
3606 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}

```

```

3607 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
3608 \DeclareOption{safe=refbib}{\def\bbl@opt@safe{BR}}
3609 \DeclareOption{safe=bibref}{\def\bbl@opt@safe{BR}}
3610 \</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.

```

3611 \bbl@trace{Cross referencing macros}
3612 \ifx\bbl@opt@safe\empty\else % ie, if 'ref' and/or 'bib'
3613   \def\@newl@bel#1#2#3{%
3614     {\@safe@activestrue
3615       \bbl@ifunset{#1@#2}%
3616       \relax
3617       {\gdef\@multiplelabels{%
3618         \@latex@warning@no@line{There were multiply-defined labels}}%
3619         \@latex@warning@no@line{Label `#2' multiply defined}}%
3620       \global\@namedef{#1@#2}{#3}}}

```

`\@testdef` An internal  $\TeX$  macro used to test if the labels that have been written on the `.aux` file have changed. It is called by the `\enddocument` macro.

```

3621 \CheckCommand*\@testdef[3]{%
3622   \def\reserved@a{#3}%
3623   \expandafter\ifx\csname#1@#2\endcsname\reserved@a
3624   \else
3625     \@tempswatrue
3626   \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.

```

3627 \def\@testdef#1#2#3{% TODO. With @samestring?
3628   \@safe@activestrue
3629   \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname
3630   \def\bbl@tempb{#3}%
3631   \@safe@activesfalse
3632   \ifx\bbl@tempa\relax
3633   \else
3634     \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
3635   \fi
3636   \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
3637   \ifx\bbl@tempa\bbl@tempb
3638   \else
3639     \@tempswatrue
3640   \fi}
3641 \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.

```

3642 \bbl@xin@{R}\bbl@opt@safe
3643 \ifin@
3644   \edef\bbl@tempc{\expandafter\string\csname ref code\endcsname}%
3645   \bbl@xin@{\expandafter\strip@prefix\meaning\bbl@tempc}%
3646   {\expandafter\strip@prefix\meaning\ref}%
3647 \ifin@
3648   \bbl@redefine\@kernel@ref#1{%
3649     \@safe@activestrue\org@kernel@ref{#1}\@safe@activesfalse}
3650   \bbl@redefine\@kernel@pageref#1{%
3651     \@safe@activestrue\org@kernel@pageref{#1}\@safe@activesfalse}
3652   \bbl@redefine\@kernel@sref#1{%

```



```

3653     \@safe@activetrue\org@@kernel@sref{#1}\@safe@activfalse}
3654     \bbl@redefine\@kernel@spageref#1{%
3655     \@safe@activetrue\org@@kernel@spageref{#1}\@safe@activfalse}
3656 \else
3657     \bbl@redefineroast\ref#1{%
3658     \@safe@activetrue\org@ref{#1}\@safe@activfalse}
3659     \bbl@redefineroast\pageref#1{%
3660     \@safe@activetrue\org@pageref{#1}\@safe@activfalse}
3661 \fi
3662 \else
3663     \let\org@ref\ref
3664     \let\org@pageref\pageref
3665 \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.

```

3666 \bbl@xin@{B}\bbl@opt@safe
3667 \ifin@
3668     \bbl@redefine\@citex[#1]#2{%
3669     \@safe@activetrue\edef\@tempa{#2}\@safe@activfalse
3670     \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.

```

3671 \AtBeginDocument{%
3672     \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.)

```

3673     \def\@citex[#1][#2]#3{%
3674     \@safe@activetrue\edef\@tempa{#3}\@safe@activfalse
3675     \org@@citex[#1][#2]{\@tempa}}%
3676     }{}

```

The package `cite` has a definition of `\@citex` where the shorthands need to be turned off in both arguments.

```

3677 \AtBeginDocument{%
3678     \ifpackageloaded{cite}{%
3679     \def\@citex[#1]#2{%
3680     \@safe@activetrue\org@@citex[#1][#2]\@safe@activfalse}%
3681     }{}

```

`\nocite` The macro `\nocite` which is used to instruct BiB<sub>T</sub><sub>E</sub>X to extract uncited references from the database.

```

3682 \bbl@redefine\nocite#1{%
3683     \@safe@activetrue\org@nocite{#1}\@safe@activfalse}

```

`\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@activetrue` 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.

```

3684 \bbl@redefine\bibcite{%
3685     \bbl@cite@choice
3686     \bibcite}

```

`\bbl@bibcite` The macro `\bbl@bibcite` holds the definition of `\bibcite` needed when neither `natbib` nor `cite` is loaded.

```
3687 \def\bbl@bibcite#1#2{%
3688   \org@bibcite{#1}{\@safe@activesfalse#2}}
```

`\bbl@cite@choice` The macro `\bbl@cite@choice` determines which definition of `\bibcite` is needed. First we give `\bibcite` its default definition.

```
3689 \def\bbl@cite@choice{%
3690   \global\let\bibcite\bbl@bibcite
3691   \@ifpackageloaded{natbib}{\global\let\bibcite\org@bibcite}{}%
3692   \@ifpackageloaded{cite}{\global\let\bibcite\org@bibcite}{}%
3693   \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.

```
3694 \AtBeginDocument{\bbl@cite@choice}
```

`\@bibitem` One of the two internal  $\TeX$  macros called by `\bibitem` that write the citation label on the `.aux` file.

```
3695 \bbl@redefine\@bibitem#1{%
3696   \@safe@activetrue\org@bibitem{#1}\@safe@activesfalse}
3697 \else
3698   \let\org@nocite\nocite
3699   \let\org@@citex\@citex
3700   \let\org@bibcite\bibcite
3701   \let\org@bibitem\@bibitem
3702 \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.

```
3703 \bbl@trace{Marks}
3704 \IfBabelLayout{sectioning}
3705   {\ifx\bbl@opt@headfoot\@nnil
3706     \g@addto@macro\@resetactivechars{
3707       \set@typeset@protect
3708       \expandafter\select@language\x\expandafter{\bbl@main@language}%
3709       \let\protect\noexpand
3710       \ifcase\bbl@bidimode\else % Only with bidi. See also above
3711         \edef\thepage{%
3712           \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}%
3713       \fi}%
3714   \fi}
3715 {\ifbbl@single\else
3716   \bbl@ifunset{markright }{\bbl@redefine\bbl@redefineroobust
3717     \markright#1{%
3718       \bbl@ifblank{#1}%
3719       {\org@markright}{}}%
3720     {\toks@{#1}}%
3721     \bbl@exp{%
3722       \\org@markright{\\protect\\foreignlanguage{\language}\language}%
3723       {\\protect\\bbl@restore@actives\the\toks@}}}}}%
3724 }
```

`\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,  $\LaTeX$  stores the definition in an intermediate macro, so it's not necessary anymore, but it's preserved for older versions.)

```

3724 \ifx\@mkboth\markboth
3725 \def\bbl@tempc{\let\@mkboth\markboth}
3726 \else
3727 \def\bbl@tempc{}
3728 \fi
3729 \bbl@ifunset{markboth}{\bbl@redefine\bbl@redefineroobust
3730 \markboth#1#2{%
3731 \protected@edef\bbl@tempb##1{%
3732 \protect\foreignlanguage
3733 {\language}\protect\bbl@restore@actives##1}}%
3734 \bbl@ifblank{#1}%
3735 {\toks@{}}%
3736 {\toks@\expandafter{\bbl@tempb{#1}}}%
3737 \bbl@ifblank{#2}%
3738 {\@temptokena{}}%
3739 {\@temptokena\expandafter{\bbl@tempb{#2}}}%
3740 \bbl@exp{\org@markboth{the\toks@}{the\@temptokena}}
3741 \bbl@tempc
3742 \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.

```

3743 \bbl@trace{Preventing clashes with other packages}
3744 \ifx\org@ref\undefined\else
3745 \bbl@xin@{R}\bbl@opt@safe
3746 \ifin@
3747 \AtBeginDocument{%
3748 \@ifpackageloaded{ifthen}{%
3749 \bbl@redefine@long\ifthenelse#1#2#3{%
3750 \let\bbl@temp@pref\pageref
3751 \let\pageref\org@pageref
3752 \let\bbl@temp@ref\ref
3753 \let\ref\org@ref
3754 \@safe@activestrue
3755 \org@ifthenelse{#1}%
3756 {\let\pageref\bbl@temp@pref
3757 \let\ref\bbl@temp@ref
3758 \@safe@activesfalse
3759 #2}%
3760 {\let\pageref\bbl@temp@pref
3761 \let\ref\bbl@temp@ref
3762 \@safe@activesfalse
3763 #3}%

```

```

3764         }%
3765     }{}%
3766 }
3767 \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 `\vrefpagemum`.

```

3768 \AtBeginDocument{%
3769     \@ifpackageloaded{varioref}{%
3770         \bbl@redefine\@@vpageref#1[#2]#3{%
3771             \@safe@activetrue
3772             \org@@vpageref{#1}[#2]#3}%
3773         \@safe@activesfalse}%
3774     \bbl@redefine\vrefpagemum#1#2{%
3775         \@safe@activetrue
3776         \org@vrefpagemum{#1}#2}%
3777     \@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.

```

3778     \expandafter\def\csname Ref \endcsname#1{%
3779         \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
3780     }{}%
3781 }
3782 \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.

```

3783 \AtEndOfPackage{%
3784     \AtBeginDocument{%
3785         \@ifpackageloaded{hhline}%
3786         {\expandafter\ifx\csname normal@char\string\endcsname\relax
3787             \else
3788                 \makeatletter
3789                 \def\@currname{hhline}\input{hhline.sty}\makeatother
3790                 \fi}%
3791         {}}}

```

`\substitutefontfamily` Deprecated. Use the tools provided 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.

```

3792 \def\substitutefontfamily#1#2#3{%
3793     \lowercase{\immediate\openout15=#1#2.fd\relax}%
3794     \immediate\write15{%
3795         \string\ProvidesFile{#1#2.fd}%
3796         [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
3797         \space generated font description file]^^J
3798         \string\DeclareFontFamily{#1}{#2}{^^J
3799         \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{^^J
3800         \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{^^J
3801         \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{^^J

```

```

3802 \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{^^J
3803 \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{^^J
3804 \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{^^J
3805 \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{^^J
3806 \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{^^J
3807 }%
3808 \closeout15
3809 }
3810 \@onlypreamble\substitutefontfamily

```

## 8.4 Encoding and fonts

Because documents may use non-ASCII font encodings, we make sure that the logos of  $\TeX$  and  $\LaTeX$  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`

```

3811 \bbl@trace{Encoding and fonts}
3812 \newcommand\BabelNonASCII{LGR,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU}
3813 \newcommand\BabelNonText{TS1,T3,TS3}
3814 \let\org@TeX\TeX
3815 \let\org@LaTeX\LaTeX
3816 \let\ensureascii\@firstofone
3817 \AtBeginDocument{%
3818   \def\@elt#1{,#1,}%
3819   \edef\bbl@tempa{\expandafter\@gobbletwo\fontenc@load@list}%
3820   \let\@elt\relax
3821   \let\bbl@tempb\empty
3822   \def\bbl@tempc{OT1}%
3823   \bbl@foreach\BabelNonASCII{% LGR loaded in a non-standard way
3824     \bbl@ifunset{T@#1}{\def\bbl@tempb{#1}}}%
3825   \bbl@foreach\bbl@tempa{%
3826     \bbl@xin@{#1}{\BabelNonASCII}%
3827     \ifin@
3828       \def\bbl@tempb{#1}% Store last non-ascii
3829     \else\bbl@xin@{#1}{\BabelNonText}% Pass
3830     \ifin@else
3831       \def\bbl@tempc{#1}% Store last ascii
3832     \fi
3833   \fi}%
3834   \ifx\bbl@tempb\empty\else
3835     \bbl@xin@{,\cf@encoding,}{,\BabelNonASCII,\BabelNonText,}%
3836     \ifin@else
3837       \edef\bbl@tempc{\cf@encoding}% The default if ascii wins
3838     \fi
3839     \edef\ensureascii#1{%
3840       {\noexpand\fontencoding{\bbl@tempc}\noexpand\selectfont#1}}%
3841     \DeclareTextCommandDefault{\TeX}{\ensureascii\org@TeX}%
3842     \DeclareTextCommandDefault{\LaTeX}{\ensureascii\org@LaTeX}%
3843   \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.

```

3844 \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.

```

3845 \AtBeginDocument{%
3846   \@ifpackageloaded{fontspec}%
3847     {\xdef\latinencoding{%
3848       \ifx\UTFencname\@undefined
3849         EU\ifcase\bbl@engine\or2\or1\fi
3850       \else
3851         \UTFencname
3852       \fi}}%
3853   {\gdef\latinencoding{OT1}%
3854     \ifx\cf@encoding\bbl@t@one
3855       \xdef\latinencoding{\bbl@t@one}%
3856     \else
3857       \def\@elt#1{, #1,}%
3858       \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
3859       \let\@elt\relax
3860       \bbl@xin@{, T1, }\bbl@tempa
3861       \fin@
3862       \xdef\latinencoding{\bbl@t@one}%
3863     \fi
3864   \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.

```

3865 \DeclareRobustCommand{\latintext}{%
3866   \fontencoding{\latinencoding}\selectfont
3867   \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.

```

3868 \ifx\@undefined\DeclareTextFontCommand
3869   \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}
3870 \else
3871   \DeclareTextFontCommand{\textlatin}{\latintext}
3872 \fi

```

For several functions, we need to execute some code with `\selectfont`. With  $\text{\LaTeX}$  2021-06-01, there is a hook for this purpose, but in older versions the  $\text{\LaTeX}$  command is patched (the latter solution will be eventually removed).

```

3873 \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  $\text{\TeX}$  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 LuaTeX-jā shows, vertical typesetting is possible, too.

```

3874 \bbl@trace{Loading basic (internal) bidi support}
3875 \ifodd\bbl@engine
3876 \else % TODO. Move to txtbabel
3877   \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
3878     \bbl@error
3879     {The bidi method 'basic' is available only in\\%
3880      luatex. I'll continue with 'bidi=default', so\\%
3881      expect wrong results}%
3882     {See the manual for further details.}%
3883     \let\bbl@beforeforeign\leavevmode
3884     \AtEndOfPackage{%
3885       \EnableBabelHook{babel-bidi}%
3886       \bbl@xebidipar}
3887   \fi\fi
3888   \def\bbl@loadxebidi#1{%
3889     \ifx\RTLfootnotetext\@undefined
3890       \AtEndOfPackage{%
3891         \EnableBabelHook{babel-bidi}%
3892         \ifx\fontspec\@undefined
3893           \bbl@loadfontspec % bidi needs fontspec
3894         \fi
3895         \usepackage#1{bidi}}%
3896     \fi}
3897   \ifnum\bbl@bidimode>200
3898     \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
3899       \bbl@tentative{bidi=bidi}
3900       \bbl@loadxebidi{}
3901     \or
3902       \bbl@loadxebidi{[rldocument]}
3903     \or
3904       \bbl@loadxebidi{}
3905     \fi
3906   \fi
3907 \fi
3908 % TODO? Separate:
3909 \ifnum\bbl@bidimode=\@ne
3910   \let\bbl@beforeforeign\leavevmode
3911   \ifodd\bbl@engine
3912     \newattribute\bbl@attr@dir
3913     \directlua{ Babel.attr_dir = luatexbase.registernumber'bbl@attr@dir' }
3914     \bbl@exp{\output{\bodydir\pagedir\the\output}}
3915   \fi
3916   \AtEndOfPackage{%
3917     \EnableBabelHook{babel-bidi}%
3918     \ifodd\bbl@engine\else
3919       \bbl@xebidipar
3920     \fi}
3921 \fi

```

Now come the macros used to set the direction when a language is switched. First the (mostly) common macros.

```

3922 \bbl@trace{Macros to switch the text direction}
3923 \def\bbl@alscripts{,Arabic,Syriac,Thaana,}
3924 \def\bbl@rscripts{% TODO. Base on codes ??
3925   ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
3926   Old Hungarian,Old Hungarian,Lydian,Mandaean,Manichaeen,%
3927   Manichaeen,Meroitic Cursive,Meroitic,Old North Arabian,%
3928   Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
3929   Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%

```

```

3930 Old South Arabian,}%
3931 \def\bbl@provide@dirs#1{%
3932   \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts\bbl@rscripts}%
3933   \ifin@
3934     \global\bbl@csarg\chardef{wdir@#1}\@ne
3935     \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts}%
3936     \ifin@
3937       \global\bbl@csarg\chardef{wdir@#1}\tw@ % useless in xetex
3938       \fi
3939   \else
3940     \global\bbl@csarg\chardef{wdir@#1}\z@
3941     \fi
3942   \ifodd\bbl@engine
3943     \bbl@csarg\ifcase{wdir@#1}%
3944       \directlua{ Babel.locale_props[\the\localeid].texdir = 'l' }%
3945     \or
3946       \directlua{ Babel.locale_props[\the\localeid].texdir = 'r' }%
3947     \or
3948       \directlua{ Babel.locale_props[\the\localeid].texdir = 'al' }%
3949     \fi
3950   \fi}
3951 \def\bbl@switchdir{%
3952   \bbl@ifunset{\bbl@lsys{\languagename}}{\bbl@provide@lsys{\languagename}}{}%
3953   \bbl@ifunset{\bbl@wdir{\languagename}}{\bbl@provide@dirs{\languagename}}{}%
3954   \bbl@exp{\bbl@setdirs\bbl@cl{wdir}}}%
3955 \def\bbl@setdirs#1{% TODO - math
3956   \ifcase\bbl@select@type % TODO - strictly, not the right test
3957     \bbl@bodydir{#1}%
3958     \bbl@pardir{#1}%
3959   \fi
3960   \bbl@texdir{#1}}
3961 % TODO. Only if \bbl@bidimode > 0?:
3962 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
3963 \DisableBabelHook{babel-bidi}

```

Now the engine-dependent macros. TODO. Must be moved to the engine files.

```

3964 \ifodd\bbl@engine % luatex=1
3965 \else % pdftex=0, xetex=2
3966   \newcount\bbl@dirlevel
3967   \chardef\bbl@thetexdir\z@
3968   \chardef\bbl@thepardir\z@
3969   \def\bbl@texdir#1{%
3970     \ifcase#1\relax
3971       \chardef\bbl@thetexdir\z@
3972       \bbl@texdir@i\beginL\endL
3973     \else
3974       \chardef\bbl@thetexdir\@ne
3975       \bbl@texdir@i\beginR\endR
3976     \fi}
3977   \def\bbl@texdir@i#1#2{%
3978     \ifhmode
3979       \ifnum\currentgrouplevel>\z@
3980         \ifnum\currentgrouplevel=\bbl@dirlevel
3981           \bbl@error{Multiple bidi settings inside a group}%
3982           {I'll insert a new group, but expect wrong results.}%
3983           \bgroup\aftergroup#2\aftergroup\egroup
3984         \else
3985           \ifcase\currentgrouptype\or % 0 bottom
3986             \aftergroup#2% 1 simple {}
3987           \or
3988             \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
3989           \or
3990             \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox

```



```

3991      \or\or\or % vbox vtop align
3992      \or
3993      \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
3994      \or\or\or\or\or\or % output math disc insert vcent mathchoice
3995      \or
3996      \aftergroup#2% 14 \beginngroup
3997      \else
3998      \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
3999      \fi
4000      \fi
4001      \bbl@dirlevel\currentgrouplevel
4002      \fi
4003      #1%
4004      \fi}
4005      \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
4006      \let\bbl@bodydir\@gobble
4007      \let\bbl@pagedir\@gobble
4008      \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).

```

4009      \def\bbl@xebidipar{%
4010      \let\bbl@xebidipar\relax
4011      \TeXeTstate\@ne
4012      \def\bbl@xeeverypar{%
4013      \ifcase\bbl@thepardir
4014      \ifcase\bbl@thetextdir\else\beginR\fi
4015      \else
4016      {\setbox\z@\lastbox\beginR\box\z@}%
4017      \fi}%
4018      \let\bbl@severypar\everypar
4019      \newtoks\everypar
4020      \everypar=\bbl@severypar
4021      \bbl@severypar{\bbl@xeeverypar\the\everypar}}
4022      \ifnum\bbl@bidimode>200
4023      \let\bbl@textdir@i\@gobbletwo
4024      \let\bbl@xebidipar\@empty
4025      \AddBabelHook{bidi}{foreign}{%
4026      \def\bbl@tempa{\def\BabelText####1}%
4027      \ifcase\bbl@thetextdir
4028      \expandafter\bbl@tempa\expandafter{\BabelText{\LR{##1}}}%
4029      \else
4030      \expandafter\bbl@tempa\expandafter{\BabelText{\RL{##1}}}%
4031      \fi}
4032      \def\bbl@pardir#1{\ifcase#1\relax\setLR\else\setRL\fi}
4033      \fi
4034      \fi

```

A tool for weak L (mainly digits). We also disable warnings with `hyperref`.

```

4035      \DeclareRobustCommand\babelsublr[1]{\leavevmode{\bbl@textdir\z@#1}}
4036      \AtBeginDocument{%
4037      \ifx\pdfstringdefDisableCommands\@undefined\else
4038      \ifx\pdfstringdefDisableCommands\relax\else
4039      \pdfstringdefDisableCommands{\let\babelsublr\@firstofone}%
4040      \fi
4041      \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`.

```

4042 \bbl@trace{Local Language Configuration}
4043 \ifx\loadlocalcfg\undefined
4044   \@ifpackagewith{babel}{noconfigs}%
4045   {\let\loadlocalcfg@gobble}%
4046   {\def\loadlocalcfg#1{%
4047     \InputIfFileExists{#1.cfg}%
4048     {\typeout{*****^J%
4049               * Local config file #1.cfg used^^J%
4050               *}}}%
4051     \@empty}}
4052 \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).

```

4053 \bbl@trace{Language options}
4054 \let\bbl@afterlang\relax
4055 \let\BabelModifiers\relax
4056 \let\bbl@loaded\@empty
4057 \def\bbl@load@language#1{%
4058   \InputIfFileExists{#1.ldf}%
4059   {\edef\bbl@loaded{\CurrentOption
4060     \ifx\bbl@loaded\@empty\else,\bbl@loaded\fi}%
4061     \expandafter\let\expandafter\bbl@afterlang
4062       \csname\CurrentOption.ldf-h@k\endcsname
4063     \expandafter\let\expandafter\BabelModifiers
4064       \csname\bbl@mod@\CurrentOption\endcsname}%
4065     {\bbl@error{%
4066       Unknown option '\CurrentOption'. Either you misspelled it\\%
4067       or the language definition file \CurrentOption.ldf was not found}%
4068       Valid options are, among others: shorthands=, KeepShorthandsActive,\\%
4069       activeacute, activegrave, noconfigs, safe=, main=, math=\\%
4070       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.

```

4071 \def\bbl@try@load@lang#1#2#3{%
4072   \IfFileExists{\CurrentOption.ldf}%
4073   {\bbl@load@language{\CurrentOption}}%
4074   {\#1\bbl@load@language{#2#3}}
4075 %
4076 \DeclareOption{hebrew}{%
4077   \input{rlbabel.def}%
4078   \bbl@load@language{hebrew}}
4079 \DeclareOption{hungarian}{\bbl@try@load@lang{}{magyar}{}}
4080 \DeclareOption{lowersorbian}{\bbl@try@load@lang{}{lsorbian}{}}
4081 \DeclareOption{nynorsk}{\bbl@try@load@lang{}{norsk}{}}
4082 \DeclareOption{polutonikogreek}{%
4083   \bbl@try@load@lang{}{greek}{\languageattribute{greek}{polutoniko}}}
4084 \DeclareOption{russian}{\bbl@try@load@lang{}{russianb}{}}
4085 \DeclareOption{ukrainian}{\bbl@try@load@lang{}{ukraineb}{}}
4086 \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 `.ldf` file loading the actual one. You can also set the name of the file with the package option `config=<name>`, which will load `<name>.cfg` instead.

```

4087 \ifx\bbl@opt@config\@nnil
4088   \@ifpackagewith{babel}{noconfigs}{}%

```

```

4089     {\InputIfFileExists{bblopts.cfg}%
4090      {\typeout{*****^J%
4091               * Local config file bblopts.cfg used^^J%
4092               *}}}%
4093      {}}%
4094 \else
4095   \InputIfFileExists{\bbl@opt@config.cfg}%
4096   {\typeout{*****^J%
4097            * Local config file \bbl@opt@config.cfg used^^J%
4098            *}}}%
4099   {\bbl@error{%
4100    Local config file '\bbl@opt@config.cfg' not found}{%
4101    Perhaps you misspelled it.}}%
4102 \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 `ldf` 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.

```

4103 \ifx\bbl@opt@main\@nnil
4104   \ifnum\bbl@iniflag>\z@ % if all ldf's: set implicitly, no main pass
4105     \let\bbl@tempb\@empty
4106     \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}%
4107     \bbl@foreach\bbl@tempa{\edef\bbl@tempb{#1,\bbl@tempb}}}%
4108     \bbl@foreach\bbl@tempb{%      \bbl@tempb is a reversed list
4109       \ifx\bbl@opt@main\@nnil % ie, if not yet assigned
4110         \ifodd\bbl@iniflag % = *=
4111           \IfFileExists{babel-#1.tex}{\def\bbl@opt@main{#1}}}%
4112         \else % n +=
4113           \IfFileExists{#1.ldf}{\def\bbl@opt@main{#1}}}%
4114       \fi
4115     \fi}%
4116 \fi
4117 \else
4118   \bbl@info{Main language set with 'main='. Except if you have\\
4119             problems, prefer the default mechanism for setting\\
4120             the main language. Reported}%
4121 \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`).

```

4122 \ifx\bbl@opt@main\@nnil\else
4123   \bbl@csarg\let\loadmain\expandafter\csname ds@\bbl@opt@main\endcsname
4124   \expandafter\let\csname ds@\bbl@opt@main\endcsname\relax
4125 \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.

```

4126 \bbl@foreach\bbl@language@opts{%
4127   \def\bbl@tempa{#1}%
4128   \ifx\bbl@tempa\bbl@opt@main\else
4129     \ifnum\bbl@iniflag<\tw@ % 0 0 (other = ldf)
4130       \bbl@ifunset{ds@#1}%
4131       {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4132       {}%
4133     \else % + * (other = ini)
4134       \DeclareOption{#1}{%
4135         \bbl@ldfinit
4136         \babelprovide[import]{#1}%
4137         \bbl@afterldf}}%
4138   \fi

```

```

4139 \fi}
4140 \bbl@foreach\@classoptionslist{%
4141 \def\bbl@tempa{#1}%
4142 \ifx\bbl@tempa\bbl@opt@main\else
4143 \ifnum\bbl@iniflag<\tw@ % 0 0 (other = ldf)
4144 \bbl@ifunset{ds@#1}%
4145 {\IfFileExists{#1.ldf}%
4146 {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4147 {}}%
4148 {}%
4149 \else % + * (other = ini)
4150 \IfFileExists{babel-#1.tex}%
4151 {\DeclareOption{#1}{%
4152 \bbl@ldfinit
4153 \babelprovide[import]{#1}%
4154 \bbl@afterldf{}}}%
4155 {}}%
4156 \fi
4157 \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 processed before):

```

4158 \def\AfterBabelLanguage#1{%
4159 \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang{}}%
4160 \DeclareOption*{}
4161 \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.

```

4162 \bbl@trace{Option 'main'}
4163 \ifx\bbl@opt@main\@nnil
4164 \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
4165 \let\bbl@tempc\@empty
4166 \bbl@for\bbl@tempb\bbl@tempa{%
4167 \bbl@xin@{\bbl@tempb,}{,\bbl@loaded,}%
4168 \ifin\edef\bbl@tempc{\bbl@tempb}\fi}
4169 \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
4170 \expandafter\bbl@tempa\bbl@loaded,\@nnil
4171 \ifx\bbl@tempb\bbl@tempc\else
4172 \bbl@warning{%
4173 Last declared language option is '\bbl@tempc',\%
4174 but the last processed one was '\bbl@tempb'.\%
4175 The main language can't be set as both a global\%
4176 and a package option. Use 'main=\bbl@tempc' as\%
4177 option. Reported}
4178 \fi
4179 \else
4180 \ifodd\bbl@iniflag % case 1,3 (main is ini)
4181 \bbl@ldfinit
4182 \let\CurrentOption\bbl@opt@main
4183 \bbl@exp{% \bbl@opt@provide = empty if *
4184 \\\babelprovide[\bbl@opt@provide,import,main]{\bbl@opt@main}}%
4185 \bbl@afterldf{}
4186 \DeclareOption{\bbl@opt@main}{}
4187 \else % case 0,2 (main is ldf)
4188 \ifx\bbl@loadmain\relax
4189 \DeclareOption{\bbl@opt@main}{\bbl@load@language{\bbl@opt@main}}
4190 \else

```

```

4191 \DeclareOption{\bbl@opt@main}{\bbl@loadmain}
4192 \fi
4193 \ExecuteOptions{\bbl@opt@main}
4194 \namedef{ds@\bbl@opt@main}{}%
4195 \fi
4196 \DeclareOption*{}
4197 \ProcessOptions*
4198 \fi
4199 \def\AfterBabelLanguage{%
4200 \bbl@error
4201 {Too late for \string\AfterBabelLanguage}%
4202 {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.

4203 \ifx\bbl@main@language\@undefined
4204 \bbl@info{%
4205 You haven't specified a language. I'll use 'nil'\%
4206 as the main language. Reported}
4207 \bbl@load@language{nil}
4208 \fi
4209 \</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  $\TeX$  users might want to use some of the features of the babel system too, care has to be taken that plain  $\TeX$  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  $\TeX$  and  $\LaTeX$ , some of it is for the  $\LaTeX$  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

```

4210 \<*kernel>
4211 \let\bbl@onlyswitch\@empty
4212 \input babel.def
4213 \let\bbl@onlyswitch\@undefined
4214 \</kernel>
4215 \<*patterns>

```

## 10 Loading hyphenation patterns

The following code is meant to be read by  $\text{ini}\TeX$  because it should instruct  $\TeX$  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.

```

4216 \<\Make sure ProvidesFile is defined>
4217 \ProvidesFile{hyphen.cfg}[\<\date>\<\version>\< Babel hyphens]
4218 \xdef\bbl@format{\jobname}
4219 \def\bbl@version{\<\version>}
4220 \def\bbl@date{\<\date>}
4221 \ifx\AtBeginDocument\@undefined
4222 \def\@empty{}
4223 \fi
4224 \<\Define core switching macros>

```

$\backslash$ process@line Each line in the file language.dat is processed by  $\backslash$ 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  $\backslash$ process@synonym is called; otherwise the macro  $\backslash$ process@language will continue.

```

4225 \def\process@line#1#2 #3 #4 {%
4226   \ifx=#1%
4227     \process@synonym{#2}%
4228   \else
4229     \process@language{#1#2}{#3}{#4}%
4230   \fi
4231   \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.

```

4232 \toks@{}
4233 \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.

```

4234 \def\process@synonym#1{%
4235   \ifnum\last@language=\m@ne
4236     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
4237   \else
4238     \expandafter\chardef\csname l@#1\endcsname\last@language
4239     \wlog{\string\l@#1=\string\language\the\last@language}%
4240     \expandafter\let\csname #1hyphenmins\endcsname\expandafter\endcsname
4241     \csname\language\endcsname hyphenmins\endcsname
4242     \let\bbl@elt\relax
4243     \edef\bbl@languages{\bbl@languages\bbl@elt{#1}{\the\last@language}{}}%
4244   \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`.  $\TeX$  does not keep track of these assignments. Therefore we try to detect such assignments and store them in the `\langhyphenmins` macro. When no assignments were made we provide a default setting.

Some pattern files contain changes to the `\lccode` and `\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.

```

4245 \def\process@language#1#2#3{%
4246   \expandafter\addlanguage\csname l@#1\endcsname
4247   \expandafter\language\csname l@#1\endcsname
4248   \edef\language{#1}%
4249   \bbl@hook@everylanguage{#1}%
4250   % > luatex

```

```

4251 \bbl@get@enc#1::\@@@
4252 \begingroup
4253   \lefthyphenmin\m@ne
4254   \bbl@hook@loadpatterns{#2}%
4255   % > luatex
4256   \ifnum\lefthyphenmin=\m@ne
4257   \else
4258     \expandafter\xdef\csname #1hyphenmins\endcsname{%
4259       \the\lefthyphenmin\the\righthyphenmin}%
4260   \fi
4261 \endgroup
4262 \def\bbl@tempa{#3}%
4263 \ifx\bbl@tempa\empty\else
4264   \bbl@hook@loadexceptions{#3}%
4265   % > luatex
4266 \fi
4267 \let\bbl@elt\relax
4268 \edef\bbl@languages{%
4269   \bbl@languages\bbl@elt{#1}{\the\language}{#2}{\bbl@tempa}}%
4270 \ifnum\the\language=\z@
4271   \expandafter\ifx\csname #1hyphenmins\endcsname\relax
4272     \set@hyphenmins\tw@\thr@@\relax
4273   \else
4274     \expandafter\expandafter\expandafter\set@hyphenmins
4275     \csname #1hyphenmins\endcsname
4276   \fi
4277   \the\toks@
4278   \toks@{}%
4279 \fi}

```

\bbl@get@enc The macro \bbl@get@enc extracts the font encoding from the language name and stores it in  
\bbl@hyph@enc \bbl@hyph@enc. It uses delimited arguments to achieve this.

```

4280 \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.

```

4281 \def\bbl@hook@everylanguage#1{}
4282 \def\bbl@hook@loadpatterns#1{\input #1\relax}
4283 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
4284 \def\bbl@hook@loadkernel#1{%
4285   \def\addlanguage{\csname newlanguage\endcsname}%
4286   \def\adddialect##1##2{%
4287     \global\chardef##1##2\relax
4288     \wlog{\string##1 = a dialect from \string\language##2}}%
4289   \def\iflanguage##1{%
4290     \expandafter\ifx\csname l@##1\endcsname\relax
4291       \nolannerr{##1}%
4292     \else
4293       \ifnum\csname l@##1\endcsname=\language
4294         \expandafter\expandafter\expandafter\@firstoftwo
4295       \else
4296         \expandafter\expandafter\expandafter\@secondoftwo
4297     \fi
4298   \fi}%
4299 \def\providehyphenmins##1##2{%
4300   \expandafter\ifx\csname ##1hyphenmins\endcsname\relax
4301     \namedef{##1hyphenmins}{##2}%
4302   \fi}%
4303 \def\set@hyphenmins##1##2{%
4304   \lefthyphenmin##1\relax
4305   \righthyphenmin##2\relax}%
4306 \def\selectlanguage{%

```

```

4307 \errhelp{Selecting a language requires a package supporting it}%
4308 \errmessage{Not loaded}}}%
4309 \let\foreignlanguage\selectlanguage
4310 \let\otherlanguage\selectlanguage
4311 \expandafter\let\csname otherlanguage*\endcsname\selectlanguage
4312 \def\bbl@usehooks##1##2{% TODO. Temporary!!
4313 \def\setlocale{%
4314 \errhelp{Find an armchair, sit down and wait}%
4315 \errmessage{Not yet available}}}%
4316 \let\uselocale\setlocale
4317 \let\locale\setlocale
4318 \let\selectlocale\setlocale
4319 \let\localename\setlocale
4320 \let\textlocale\setlocale
4321 \let\textlanguage\setlocale
4322 \let\languagetext\setlocale}
4323 \begingroup
4324 \def\AddBabelHook#1#2{%
4325 \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
4326 \def\next{\toks1}%
4327 \else
4328 \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname###1}%
4329 \fi
4330 \next}
4331 \ifx\directlua@undefined
4332 \ifx\XeTeXinputencoding@undefined\else
4333 \input xebabel.def
4334 \fi
4335 \else
4336 \input luababel.def
4337 \fi
4338 \openin1 = babel-\bbl@format.cfg
4339 \ifeof1
4340 \else
4341 \input babel-\bbl@format.cfg\relax
4342 \fi
4343 \closein1
4344 \endgroup
4345 \bbl@hook@loadkernel{switch.def}

```

\readconfigfile The configuration file can now be opened for reading.

```

4346 \openin1 = language.dat

```

See if the file exists, if not, use the default hyphenation file hyphen.tex. The user will be informed about this.

```

4347 \def\language{english}%
4348 \ifeof1
4349 \message{I couldn't find the file language.dat,\space
4350 I will try the file hyphen.tex}
4351 \input hyphen.tex\relax
4352 \chardef\l@english\z@
4353 \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.

```

4354 \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.

```

4355 \loop

```



```

4356 \endlinechar\m@ne
4357 \read1 to \bbl@line
4358 \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.

```

4359 \if T\ifeof1F\fi T\relax
4360 \ifx\bbl@line\@empty\else
4361 \edef\bbl@line{\bbl@line\space\space\space}%
4362 \expandafter\process@line\bbl@line\relax
4363 \fi
4364 \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.

```

4365 \begingroup
4366 \def\bbl@elt#1#2#3#4{%
4367 \global\language=#2\relax
4368 \gdef\language#1}%
4369 \def\bbl@elt##1##2##3##4{}}%
4370 \bbl@languages
4371 \endgroup
4372 \fi
4373 \closein1

```

We add a message about the fact that babel is loaded in the format and with which language patterns to the \everyjob register.

```

4374 \if/\the\toks@\else
4375 \errhelp{language.dat loads no language, only synonyms}
4376 \errmessage{Orphan language synonym}
4377 \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.

```

4378 \let\bbl@line\@undefined
4379 \let\process@line\@undefined
4380 \let\process@synonym\@undefined
4381 \let\process@language\@undefined
4382 \let\bbl@get@enc\@undefined
4383 \let\bbl@hyph@enc\@undefined
4384 \let\bbl@tempa\@undefined
4385 \let\bbl@hook@loadkernel\@undefined
4386 \let\bbl@hook@everylanguage\@undefined
4387 \let\bbl@hook@loadpatterns\@undefined
4388 \let\bbl@hook@loadexceptions\@undefined
4389 \</patterns>

```

Here the code for init<sub>TeX</sub> ends.

## 11 Font handling with fontspec

Add the bidi handler just before luaoftload, 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].

```

4390 <(*More package options)> ≡
4391 \chardef\bbl@bidimode\z@
4392 \DeclareOption{bidi=default}{\chardef\bbl@bidimode=\@ne}
4393 \DeclareOption{bidi=basic}{\chardef\bbl@bidimode=101 }
4394 \DeclareOption{bidi=basic-r}{\chardef\bbl@bidimode=102 }
4395 \DeclareOption{bidi=bidi}{\chardef\bbl@bidimode=201 }
4396 \DeclareOption{bidi=bidi-r}{\chardef\bbl@bidimode=202 }
4397 \DeclareOption{bidi=bidi-l}{\chardef\bbl@bidimode=203 }
4398 <\/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 message, which is replaced by a more explanatory one.

```

4399 <{*Font selection}> ≡
4400 \bbl@trace{Font handling with fontspec}
4401 \ifx\ExplSyntaxOn\@undefined\else
4402   \ExplSyntaxOn
4403   \catcode\ =10
4404   \def\bbl@loadfontspec{%
4405     \usepackage{fontspec}% TODO. Apply patch always
4406     \expandafter
4407     \def\csname msg~text~>~fontspec/language-not-exist\endcsname##1##2##3##4{%
4408       Font '\l_fontspec_fontname_tl' is using the\\%
4409       default features for language '##1'.\\%
4410       That's usually fine, because many languages\\%
4411       require no specific features, but if the output is\\%
4412       not as expected, consider selecting another font.}
4413     \expandafter
4414     \def\csname msg~text~>~fontspec/no-script\endcsname##1##2##3##4{%
4415       Font '\l_fontspec_fontname_tl' is using the\\%
4416       default features for script '##2'.\\%
4417       That's not always wrong, but if the output is\\%
4418       not as expected, consider selecting another font.}}
4419   \ExplSyntaxOff
4420 \fi
4421 \@onlypreamble\babelfont
4422 \newcommand\babelfont[2][{}]{% 1=langs/scripts 2=fam
4423   \bbl@foreach{#1}{%
4424     \expandafter\ifx\csname date##1\endcsname\relax
4425       \IfFileExists{babel-##1.tex}%
4426       {\babelprovide{##1}}%
4427       {}%
4428     \fi}%
4429   \edef\bbl@tempa{#1}%
4430   \def\bbl@tempb{#2}% Used by \bbl@bblfont
4431   \ifx\fontspec\@undefined
4432     \bbl@loadfontspec
4433   \fi
4434   \EnableBabelHook{babel-fontspec}% Just calls \bbl@switchfont
4435   \bbl@bblfont}
4436 \newcommand\bbl@bblfont[2][{}]{% 1=features 2=fontname, @font=rm|sf|tt
4437   \bbl@ifunset{\bbl@tempb family}%
4438   {\bbl@providedefam{\bbl@tempb}}%
4439   {}%
4440   % For the default font, just in case:
4441   \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
4442   \expandafter\bbl@ifblank\expandafter{\bbl@tempa}%
4443   {\bbl@csarg\edef{\bbl@tempb dflt@}{<{#1}{#2}}% save \bbl@rmdflt@
4444     \bbl@exp{%
4445       \let\bbl@\bbl@tempb dflt@\languagename>\<\bbl@\bbl@tempb dflt@>%
4446       \\\bbl@font@set<\bbl@\bbl@tempb dflt@\languagename>%
4447       \<\bbl@tempb default>\<\bbl@tempb family>}}%
4448     {\bbl@foreach\bbl@tempa{% ie \bbl@rmdflt@lang / *scrt
4449       \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:

```

4450 \def\bbl@providedefam#1{%
4451   \bbl@exp{%
4452     \\\newcommand<#1default>{}% Just define it
4453     \\\bbl@add@list\\bbl@font@fams{#1}%

```

```

4454 \\DeclareRobustCommand\<#1family>{%
4455   \\not@math@alphabet\<#1family>\relax
4456   % \\prepare@family@series@update{#1}\<#1default>% TODO. Fails
4457   \\fontfamily\<#1default>%
4458   \<ifx>\\UseHooks\\@undefined\<else>\\UseHook{#1family}\<fi>%
4459   \\selectfont}%
4460   \\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.

```

4461 \def\bbl@nostdfont#1{%
4462   \bbl@ifunset\bbl@WFF@f@family{%
4463     {\bbl@csarg\gdef{WFF@f@family}}}% Flag, to avoid dupl warns
4464     \bbl@infowarn{The current font is not a babel standard family:\\%
4465       #1%
4466       \fontname\font\\%
4467       There is nothing intrinsically wrong with this warning, and\\%
4468       you can ignore it altogether if you do not need these\\%
4469       families. But if they are used in the document, you should be\\%
4470       aware 'babel' will no set Script and Language for them, so\\%
4471       you may consider defining a new family with \string\babelfont.\\%
4472       See the manual for further details about \string\babelfont.\\%
4473       Reported}}
4474   }%
4475   \gdef\bbl@switchfont{%
4476     \bbl@ifunset\bbl@lsys@language{\bbl@provide@lsys{language}}}%
4477     \bbl@exp{% eg Arabic -> arabic
4478       \lowercase{\edef\\bbl@tempa{\bbl@cl{sname}}}%
4479       \bbl@foreach\bbl@font@fams{%
4480         \bbl@ifunset\bbl@##1dflt@language}% (1) language?
4481         {\bbl@ifunset\bbl@##1dflt@*\bbl@tempa}% (2) from script?
4482         {\bbl@ifunset\bbl@##1dflt@}% 2=F - (3) from generic?
4483         }% 123=F - nothing!
4484         {\bbl@exp{% 3=T - from generic
4485           \global\let\<bbl@##1dflt@language>%
4486             \<bbl@##1dflt@>}}}%
4487         {\bbl@exp{% 2=T - from script
4488           \global\let\<bbl@##1dflt@language>%
4489             \<bbl@##1dflt@*\bbl@tempa>}}}%
4490         }% 1=T - language, already defined
4491       \def\bbl@tempa{\bbl@nostdfont}}}%
4492       \bbl@foreach\bbl@font@fams{% don't gather with prev for
4493         \bbl@ifunset\bbl@##1dflt@language}%
4494         {\bbl@cs{famrst@##1}%
4495         \global\bbl@csarg\let{famrst@##1}\relax}%
4496         {\bbl@exp{% order is relevant. TODO: but sometimes wrong!
4497           \\bbl@add\\originalTeX{%
4498             \\bbl@font@rst{\bbl@cl{##1dflt}}}%
4499             \<##1default>\<##1family>{##1}}}%
4500           \\bbl@font@set\<bbl@##1dflt@language>% the main part!
4501           \<##1default>\<##1family>}}}%
4502       \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.

```

4503 \ifx\fontfamily\undefined\else % if latex
4504   \ifcase\bbl@engine % if pdftex
4505     \let\bbl@cckstdfonts\relax
4506   \else
4507     \def\bbl@cckstdfonts{%
4508       \begin{group}
4509       \global\let\bbl@cckstdfonts\relax
4510       \let\bbl@tempa\empty
4511       \bbl@foreach\bbl@font@fams{%

```

```

4512         \bbl@ifunset{bbl@##1dflt@}%
4513         {\@nameuse{##1family}%
4514         \bbl@csarg\gdef{WFF@f@family}}}% Flag
4515         \bbl@exp{\bbl@add\bbl@tempa{* \<##1family>= \f@family\\\%
4516         \space\space\fontname\font\\\}}}%
4517         \bbl@csarg\xdef{##1dflt@}{f@family}%
4518         \expandafter\xdef\csname ##1default\endcsname{f@family}%
4519         {}}%
4520     \ifx\bbl@tempa@empty\else
4521         \bbl@infowarn{The following font families will use the default\\%
4522         settings for all or some languages:\\%
4523         \bbl@tempa
4524         There is nothing intrinsically wrong with it, but\\%
4525         'babel' will no set Script and Language, which could\\%
4526         be relevant in some languages. If your document uses\\%
4527         these families, consider redefining them with \string\babelfont.\\%
4528         Reported}%
4529     \fi
4530 \endgroup}
4531 \fi
4532 \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.

```

4533 \def\bbl@font@set#1#2#3{% eg \bbl@rmdflt@lang \rmdefault \rmfamily
4534 \bbl@xin@{<>}{#1}%
4535 \ifin@
4536 \bbl@exp{\bbl@fontspec@set\\#1\expandafter@gobbletwo#1\\#3}%
4537 \fi
4538 \bbl@exp{%
4539     \def\\#2{#1}% eg, \rmdefault{\bbl@rmdflt@lang}
4540     \\bbl@ifsamestring{#2}{f@family}%
4541     {\\#3%
4542     \\bbl@ifsamestring{f@series}{bfdefault}{\\bfseries}}}%
4543     \let\\bbl@tempa\relax}%
4544     {}%
4545 % TODO - next should be global?, but even local does its job. I'm
4546 % still not sure -- must investigate:
4547 \def\bbl@fontspec@set#1#2#3#4{% eg \bbl@rmdflt@lang fnt-opt fnt-nme \xxfamily
4548 \let\bbl@tempe\bbl@mapselect
4549 \let\bbl@mapselect\relax
4550 \let\bbl@temp@fam#4% eg, '\rmfamily', to be restored below
4551 \let#4\@empty % Make sure \renewfontfamily is valid
4552 \bbl@exp{%
4553     \let\\bbl@temp@pfam<\bbl@stripslash#4\space>% eg, '\rmfamily '
4554     \<keys_if_exist:nnF>{fontspec-opentype}{Script/\bbl@cl{sname}}}%
4555     {\\newfontscript{\bbl@cl{sname}}{\bbl@cl{sotf}}}%
4556     \<keys_if_exist:nnF>{fontspec-opentype}{Language/\bbl@cl{lname}}}%
4557     {\\newfontlanguage{\bbl@cl{lname}}{\bbl@cl{lotf}}}%
4558     \\renewfontfamily\\#4%
4559     [\bbl@cl{lsys},#2]{#3}% ie \bbl@exp{.}{#3}
4560 \begingroup
4561     #4%
4562     \xdef#1{f@family}% eg, \bbl@rmdflt@lang{FreeSerif(0)}
4563 \endgroup
4564 \let#4\bbl@temp@fam
4565 \bbl@exp{\let<\bbl@stripslash#4\space>\bbl@temp@pfam
4566 \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.

```

4567 \def\bb1@font@rst#1#2#3#4{%
4568   \bb1@csarg\def{famrst@#4}{\bb1@font@set{#1}#2#3}}

```

The default font families. They are eurocentric, but the list can be expanded easily with `\babelfont`.

```

4569 \def\bb1@font@fams{rm,sf,tt}

```

The old tentative way. Short and preverved for compatibility, but deprecated. Note there is no direct alternative for `\babelFSfeatures`. The reason is explained in the user guide, but essentially – that was not the way to go :-).

```

4570 \newcommand\babelFSstore[2][]{%
4571   \bb1@ifblank{#1}%
4572     {\bb1@csarg\def{sname@#2}{Latin}}%
4573     {\bb1@csarg\def{sname@#2}{#1}}%
4574   \bb1@provide@dirs{#2}%
4575   \bb1@csarg\ifnum{wdir@#2}>\z@
4576     \let\bb1@beforeforeign\leavevmode
4577     \EnableBabelHook{babel-bidi}%
4578   \fi
4579   \bb1@foreach{#2}{%
4580     \bb1@FSstore{##1}{rm}\rmdefault\bb1@save@rmdefault
4581     \bb1@FSstore{##1}{sf}\sfdefault\bb1@save@sfdefault
4582     \bb1@FSstore{##1}{tt}\ttdefault\bb1@save@ttdefault}}
4583 \def\bb1@FSstore#1#2#3#4{%
4584   \bb1@csarg\edef{#2default#1}{#3}%
4585   \expandafter\addto\csname extras#1\endcsname{%
4586     \let#4#3%
4587     \ifx#3\f@family
4588       \edef#3{\csname bbl@#2default#1\endcsname}%
4589       \fontfamily{#3}\selectfont
4590     \else
4591       \edef#3{\csname bbl@#2default#1\endcsname}%
4592       \fi}%
4593   \expandafter\addto\csname noextras#1\endcsname{%
4594     \ifx#3\f@family
4595       \fontfamily{#4}\selectfont
4596     \fi
4597     \let#3#4}}
4598 \let\bb1@langfeatures\@empty
4599 \def\babelFSfeatures{% make sure \fontspec is redefined once
4600   \let\bb1@ori@fontspec\fontspec
4601   \renewcommand\fontspec[1][]{%
4602     \bb1@ori@fontspec[\bb1@langfeatures##1]}
4603   \let\babelFSfeatures\bb1@FSfeatures
4604   \babelFSfeatures}
4605 \def\bb1@FSfeatures#1#2{%
4606   \expandafter\addto\csname extras#1\endcsname{%
4607     \babel@save\bb1@langfeatures
4608     \edef\bb1@langfeatures{#2,}}
4609 \langle\langle Font selection\rangle\rangle

```

## 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.

```

4610 \langle\langle *Footnote changes\rangle\rangle \equiv
4611 \bb1@trace{Bidi footnotes}
4612 \ifnum\bb1@bidimode>\z@
4613   \def\bb1@footnote#1#2#3{%
4614     \@ifnextchar[%
4615       {\bb1@footnote@o{#1}{#2}{#3}}%

```

```

4616     {\bbl@footnote@x{#1}{#2}{#3}}
4617 \long\def\bbl@footnote@x#1#2#3#4{%
4618     \bgroup
4619     \select@language@x{\bbl@main@language}%
4620     \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
4621     \egroup}
4622 \long\def\bbl@footnote@o#1#2#3[#4]#5{%
4623     \bgroup
4624     \select@language@x{\bbl@main@language}%
4625     \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
4626     \egroup}
4627 \def\bbl@footnotetext#1#2#3{%
4628     \@ifnextchar[%
4629     {\bbl@footnotetext@o{#1}{#2}{#3}}%
4630     {\bbl@footnotetext@x{#1}{#2}{#3}}}
4631 \long\def\bbl@footnotetext@x#1#2#3#4{%
4632     \bgroup
4633     \select@language@x{\bbl@main@language}%
4634     \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
4635     \egroup}
4636 \long\def\bbl@footnotetext@o#1#2#3[#4]#5{%
4637     \bgroup
4638     \select@language@x{\bbl@main@language}%
4639     \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
4640     \egroup}
4641 \def\BabelFootnote#1#2#3#4{%
4642     \ifx\bbl@fn@footnote\undefined
4643     \let\bbl@fn@footnote\footnote
4644     \fi
4645     \ifx\bbl@fn@footnotetext\undefined
4646     \let\bbl@fn@footnotetext\footnotetext
4647     \fi
4648     \bbl@ifblank{#2}%
4649     {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
4650     \@namedef{\bbl@stripslash#1text}%
4651     {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
4652     {\def#1{\bbl@exp{\bbl@footnote{\foreignlanguage{#2}}}{#3}{#4}}%
4653     \@namedef{\bbl@stripslash#1text}%
4654     {\bbl@exp{\bbl@footnotetext{\foreignlanguage{#2}}}{#3}{#4}}}%
4655 \fi
4656 <\/Footnote changes>>

```

Now, the code.

```

4657 < *xetex >
4658 \def\BabelStringsDefault{unicode}
4659 \let\xebbl@stop\relax
4660 \AddBabelHook{xetex}{encodedcommands}{%
4661     \def\bbl@tempa{#1}%
4662     \ifx\bbl@tempa\empty
4663     \XeTeXinputencoding"bytes"%
4664     \else
4665     \XeTeXinputencoding"#1"%
4666     \fi
4667     \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
4668 \AddBabelHook{xetex}{stopcommands}{%
4669     \xebbl@stop
4670     \let\xebbl@stop\relax}
4671 \def\bbl@intraspace#1 #2 #3\@@{%
4672     \bbl@csarg\gdef{xeisp@languagename}%
4673     {\XeTeXlinebreakskip #1em plus #2em minus #3em\relax}}
4674 \def\bbl@intrapenalty#1\@@{%
4675     \bbl@csarg\gdef{xeipn@languagename}%
4676     {\XeTeXlinebreakpenalty #1\relax}}

```

```

4677 \def\bbl@provide@intraspace{%
4678   \bbl@xin@{/s}{/\bbl@cl{lnbrk}}%
4679   \ifin@else\bbl@xin@{/c}{/\bbl@cl{lnbrk}}\fi
4680   \ifin@
4681     \bbl@ifunset{\bbl@intsp@{language}}{%
4682       \expandafter\ifx\csname\bbl@intsp@{language}\endcsname\empty\else
4683         \ifx\bbl@KVP@intraspace\@nil
4684           \bbl@exp{%
4685             \\bbl@intraspace\bbl@cl{intsp}\\@}%
4686           \fi
4687           \ifx\bbl@KVP@intrapenalty\@nil
4688             \bbl@intrapenalty0@@
4689           \fi
4690         \fi
4691         \ifx\bbl@KVP@intraspace\@nil\else % We may override the ini
4692           \expandafter\bbl@intraspace\bbl@KVP@intraspace@@
4693         \fi
4694         \ifx\bbl@KVP@intrapenalty\@nil\else
4695           \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty@@
4696         \fi
4697         \bbl@exp{%
4698           % TODO. Execute only once (but redundant):
4699           \\bbl@add{<extras{language}>{%
4700             \XeTeXlinebreaklocale "\bbl@cl{tbc}}"%
4701             \<bbl@xeisp@{language}>%
4702             \<bbl@xeipn@{language}>%
4703             \\bbl@tglobal{<extras{language}>%
4704             \\bbl@add{<noextras{language}>{%
4705               \XeTeXlinebreaklocale "en"%
4706               \\bbl@tglobal{<noextras{language}>%
4707             \ifx\bbl@ispace\@undefined
4708               \gdef\bbl@ispace{\bbl@cl{xeisp}}%
4709             \ifx\AtBeginDocument\@notprerr
4710               \expandafter\@secondoftwo % to execute right now
4711             \fi
4712             \AtBeginDocument{\bbl@patchfont{\bbl@ispace}}%
4713           \fi}%
4714         \fi}
4715 \ifx\DisableBabelHook\@undefined\endinput\fi
4716 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
4717 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@ckeckstdfonts}
4718 \DisableBabelHook{babel-fontspec}
4719 <<Font selection>>
4720 \input txtbabel.def
4721 </xetex>

```

## 12.2 Layout

*In progress.*

Note elements like headlines and margins can be modified easily with packages like fancyhdr, typearea or titles, and geometry.

\bbl@startskip and \bbl@endskip are available to package authors. Thanks to the T<sub>E</sub>X expansion mechanism the following constructs are valid: \adim\bbl@startskip,

\advance\bbl@startskip\adim, \bbl@startskip\adim.

Consider txtbabel as a shorthand for *tex-xet babel*, which is the bidi model in both pdftex and xetex.

```

4722 < *texxet>
4723 \providecommand\bbl@provide@intraspace{}
4724 \bbl@trace{Redefinitions for bidi layout}
4725 \def\bbl@sspre@caption{%
4726   \bbl@exp{\everyhbox{\bbl@textdir\bbl@cs{wdir}\bbl@main@language}}}%
4727 \ifx\bbl@opt@layout\@nnil\endinput\fi % No layout
4728 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
4729 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}

```

```

4730 \ifx\bb1@beforeforeign\leavevmode % A poor test for bidi=
4731 \def\@hangfrom#1{%
4732   \setbox\@tempboxa\hbox{#1}%
4733   \hangindent\ifcase\bb1@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
4734   \noindent\box\@tempboxa}
4735 \def\raggedright{%
4736   \let\\\@centercr
4737   \bb1@startskip\z@skip
4738   \@rightskip\@flushglue
4739   \bb1@endskip\@rightskip
4740   \parindent\z@
4741   \parfillskip\bb1@startskip}
4742 \def\raggedleft{%
4743   \let\\\@centercr
4744   \bb1@startskip\@flushglue
4745   \bb1@endskip\z@skip
4746   \parindent\z@
4747   \parfillskip\bb1@endskip}
4748 \fi
4749 \IfBabelLayout{lists}
4750 {\bb1@sreplace\list
4751   {\@totalleftmargin\leftmargin}{\@totalleftmargin\bb1@listleftmargin}%
4752   \def\bb1@listleftmargin{%
4753     \ifcase\bb1@thepardir\leftmargin\else\rightmargin\fi}%
4754   \ifcase\bb1@engine
4755     \def\labelenumii{}\theenumii{}% pdfTeX doesn't reverse ()
4756     \def\p@enumiii{\p@enumii}\theenumii{}%
4757   \fi
4758   \bb1@sreplace\@verbatim
4759     {\leftskip\@totalleftmargin}%
4760     {\bb1@startskip\textwidth
4761       \advance\bb1@startskip-\linewidth}%
4762   \bb1@sreplace\@verbatim
4763     {\rightskip\z@skip}%
4764     {\bb1@endskip\z@skip}}%
4765 {}
4766 \IfBabelLayout{contents}
4767 {\bb1@sreplace\@dottedtocline{\leftskip}{\bb1@startskip}%
4768   \bb1@sreplace\@dottedtocline{\rightskip}{\bb1@endskip}}
4769 {}
4770 \IfBabelLayout{columns}
4771 {\bb1@sreplace\@outputdblcol{\hb@xt@\textwidth}{\bb1@outputbox}%
4772   \def\bb1@outputbox#1{%
4773     \hb@xt@\textwidth{%
4774       \hskip\columnwidth
4775       \hfil
4776       {\normalcolor\vrule \@width\columnseprule}%
4777       \hfil
4778       \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
4779       \hskip-\textwidth
4780       \hb@xt@\columnwidth{\box\@outputbox \hss}%
4781       \hskip\columnsep
4782       \hskip\columnwidth}}}%
4783 {}
4784 \langle Footnote changes \rangle
4785 \IfBabelLayout{footnotes}%
4786 {\BabelFootnote\footnote\language\{}}%
4787 \BabelFootnote\localfootnote\language\{}}%
4788 \BabelFootnote\mainfootnote\{}}%
4789 {}

```

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.



```

4790 \IfBabelLayout{counters}%
4791 {\let\bbl@latin@arabic=\@arabic
4792 \def\@arabic#1{\babelsublr{\bbl@latin@arabic#1}}}%
4793 \let\bbl@asci@roman=\@roman
4794 \def\@roman#1{\babelsublr{\ensureascii{\bbl@asci@roman#1}}}%
4795 \let\bbl@asci@Roman=\@Roman
4796 \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asci@Roman#1}}}{}}
4797 \</texet>

```

## 12.3 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`).

```

4798 \<!*luatex>
4799 \ifx\AddBabelHook\@undefined % When plain.def, babel.sty starts
4800 \bbl@trace{Read language.dat}
4801 \ifx\bbl@readstream\@undefined
4802 \csname newread\endcsname\bbl@readstream
4803 \fi
4804 \begingroup
4805 \toks@{}
4806 \count@\z@ % 0=start, 1=0th, 2=normal
4807 \def\bbl@process@line#1#2 #3 #4 {%
4808 \ifx=#1%
4809 \bbl@process@synonym{#2}%
4810 \else
4811 \bbl@process@language{#1#2}{#3}{#4}%
4812 \fi
4813 \ignorespaces}
4814 \def\bbl@many@lang{%
4815 \ifnum\bbl@last>\@ne
4816 \bbl@info{Non-standard hyphenation setup}%
4817 \fi

```

```

4818 \let\bbl@manylang\relax}
4819 \def\bbl@process@language#1#2#3{%
4820 \ifcase\count@
4821 \ifundefined{zth@#1}{\count@tw@}{\count@ne}%
4822 \or
4823 \count@tw@
4824 \fi
4825 \ifnum\count@=\tw@
4826 \expandafter\addlanguage\csname l@#1\endcsname
4827 \language\allocationnumber
4828 \chardef\bbl@last\allocationnumber
4829 \bbl@manylang
4830 \let\bbl@elt\relax
4831 \xdef\bbl@languages{%
4832 \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
4833 \fi
4834 \the\toks@
4835 \toks@{}}
4836 \def\bbl@process@synonym@aux#1#2{%
4837 \global\expandafter\chardef\csname l@#1\endcsname#2\relax
4838 \let\bbl@elt\relax
4839 \xdef\bbl@languages{%
4840 \bbl@languages\bbl@elt{#1}{#2}{}}}%
4841 \def\bbl@process@synonym#1{%
4842 \ifcase\count@
4843 \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
4844 \or
4845 \ifundefined{zth@#1}{\bbl@process@synonym@aux{#1}{0}}}%
4846 \else
4847 \bbl@process@synonym@aux{#1}{\the\bbl@last}%
4848 \fi}
4849 \ifx\bbl@languages\undefined % Just a (sensible?) guess
4850 \chardef\l@english\z@
4851 \chardef\l@USenglish\z@
4852 \chardef\bbl@last\z@
4853 \global\@namedef{bbl@hyphendata@0}{\hyphen.tex}{}
4854 \gdef\bbl@languages{%
4855 \bbl@elt{english}{0}{\hyphen.tex}{}%
4856 \bbl@elt{USenglish}{0}{}}%
4857 \else
4858 \global\let\bbl@languages@format\bbl@languages
4859 \def\bbl@elt#1#2#3#4{% Remove all except language 0
4860 \ifnum#2>\z@ \else
4861 \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
4862 \fi}%
4863 \xdef\bbl@languages{\bbl@languages}%
4864 \fi
4865 \def\bbl@elt#1#2#3#4{\@namedef{zth@#1}{}} % Define flags
4866 \bbl@languages
4867 \openin\bbl@readstream=language.dat
4868 \ifeof\bbl@readstream
4869 \bbl@warning{I couldn't find language.dat. No additional\\
4870 patterns loaded. Reported}%
4871 \else
4872 \loop
4873 \endlinechar\m@ne
4874 \read\bbl@readstream to \bbl@line
4875 \endlinechar\^^M
4876 \if T\ifeof\bbl@readstream F\fi T\relax
4877 \ifx\bbl@line\empty\else
4878 \edef\bbl@line{\bbl@line\space\space\space}%
4879 \expandafter\bbl@process@line\bbl@line\relax
4880 \fi

```

```

4881 \repeat
4882 \fi
4883 \endgroup
4884 \bbl@trace{Macros for reading patterns files}
4885 \def\bbl@get@enc#1:#2:#3\@@@{\def\bbl@hyph@enc{#2}}
4886 \ifx\babelcatcodetablenum\undefined
4887 \ifx\newcatcodetable\undefined
4888 \def\babelcatcodetablenum{5211}
4889 \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4890 \else
4891 \newcatcodetable\babelcatcodetablenum
4892 \newcatcodetable\bbl@pattcodes
4893 \fi
4894 \else
4895 \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4896 \fi
4897 \def\bbl@luapatterns#1#2{%
4898 \bbl@get@enc#1::\@@@
4899 \setbox\z@\hbox\bgroup
4900 \begingroup
4901 \savecatcodetable\babelcatcodetablenum\relax
4902 \initcatcodetable\bbl@pattcodes\relax
4903 \catcodetable\bbl@pattcodes\relax
4904 \catcode\#=6 \catcode\$_=3 \catcode\&=4 \catcode\^=7
4905 \catcode\_ =8 \catcode\{=1 \catcode\}=2 \catcode\~=13
4906 \catcode\@=11 \catcode\^^I=10 \catcode\^^J=12
4907 \catcode\<=12 \catcode\>=12 \catcode\*=12 \catcode\.=12
4908 \catcode\-=12 \catcode\/=12 \catcode\[=12 \catcode\]=12
4909 \catcode\'=12 \catcode\'=12 \catcode\'=12
4910 \input #1\relax
4911 \catcodetable\babelcatcodetablenum\relax
4912 \endgroup
4913 \def\bbl@tempa{#2}%
4914 \ifx\bbl@tempa\@empty\else
4915 \input #2\relax
4916 \fi
4917 \egroup}%
4918 \def\bbl@patterns@lua#1{%
4919 \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
4920 \csname l@#1\endcsname
4921 \edef\bbl@tempa{#1}%
4922 \else
4923 \csname l@#1:\f@encoding\endcsname
4924 \edef\bbl@tempa{#1:\f@encoding}%
4925 \fi\relax
4926 \@namedef{lu@texhyphen@loaded@the\language}{}% Temp
4927 \@ifundefined{bbl@hyphendata@the\language}%
4928 {\def\bbl@elt##1##2##3##4{%
4929 \ifnum##2=\csname l@bbl@tempa\endcsname % #2=spanish, dutch:OT1...
4930 \def\bbl@tempb{##3}%
4931 \ifx\bbl@tempb\@empty\else % if not a synonymous
4932 \def\bbl@tempc{##3}{##4}}%
4933 \fi
4934 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
4935 \fi}%
4936 \bbl@languages
4937 \@ifundefined{bbl@hyphendata@the\language}%
4938 {\bbl@info{No hyphenation patterns were set for\the
4939 language '\bbl@tempa'. Reported}}%
4940 {\expandafter\expandafter\expandafter\bbl@luapatterns
4941 \csname bbl@hyphendata@the\language\endcsname}}}%
4942 \endinput\fi
4943 % Here ends \ifx\AddBabelHook\undefined

```

```

4944 % A few lines are only read by hyphen.cfg
4945 \ifx\DisableBabelHook\@undefined
4946 \AddBabelHook{luatex}{everylanguage}{%
4947   \def\process@language##1##2##3{%
4948     \def\process@line#####1#####2 #####3 #####4 {}}}
4949 \AddBabelHook{luatex}{loadpatterns}{%
4950   \input #1\relax
4951   \expandafter\gdef\csname bbl@hyphendata@the\language\endcsname
4952     {{#1}}}}
4953 \AddBabelHook{luatex}{loadexceptions}{%
4954   \input #1\relax
4955   \def\bbl@tempb##1##2{{##1}{#1}}%
4956   \expandafter\xdef\csname bbl@hyphendata@the\language\endcsname
4957     {\expandafter\expandafter\expandafter\bbl@tempb
4958       \csname bbl@hyphendata@the\language\endcsname}}
4959 \endinput\fi
4960 % Here stops reading code for hyphen.cfg
4961 % The following is read the 2nd time it's loaded
4962 \begingroup % TODO - to a lua file
4963 \catcode`\%=12
4964 \catcode`\'=12
4965 \catcode`\=12
4966 \catcode`\:=12
4967 \directlua{
4968   Babel = Babel or {}
4969   function Babel.bytes(line)
4970     return line:gsub("(.)",
4971       function (chr) return unicode.utf8.char(string.byte(chr)) end)
4972   end
4973   function Babel.begin_process_input()
4974     if luatexbase and luatexbase.add_to_callback then
4975       luatexbase.add_to_callback('process_input_buffer',
4976         Babel.bytes, 'Babel.bytes')
4977     else
4978       Babel.callback = callback.find('process_input_buffer')
4979       callback.register('process_input_buffer', Babel.bytes)
4980     end
4981   end
4982   function Babel.end_process_input ()
4983     if luatexbase and luatexbase.remove_from_callback then
4984       luatexbase.remove_from_callback('process_input_buffer', 'Babel.bytes')
4985     else
4986       callback.register('process_input_buffer', Babel.callback)
4987     end
4988   end
4989   function Babel.addpatterns(pp, lg)
4990     local lg = lang.new(lg)
4991     local pats = lang.patterns(lg) or ''
4992     lang.clear_patterns(lg)
4993     for p in pp:gmatch('[^%s]+') do
4994       ss = ''
4995       for i in string.utfcharacters(p:gsub('%d', '')) do
4996         ss = ss .. '%d?' .. i
4997       end
4998       ss = ss:gsub('^%%d%?%. ', '%%.') .. '%d?'
4999       ss = ss:gsub('%%.%%d%?$', '%%.')
5000       pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
5001       if n == 0 then
5002         tex.sprint(
5003           [[\string\csname\space bbl@info\endcsname{New pattern: }]]
5004           .. p .. [[{}]])
5005       pats = pats .. ' ' .. p
5006     else

```

```

5007         tex.sprint(
5008             [[\string\csname\space bbl@info\endcsname{Renew pattern: }]
5009             .. p .. [{}]])
5010     end
5011 end
5012 lang.patterns(lg, pats)
5013 end
5014 function Babel.hlist_has_bidi(head)
5015     local has_bidi = false
5016     for item in node.traverse(head) do
5017         if item.id == node.id'glyph' then
5018             local itemchar = item.char
5019             local chardata = Babel.characters[itemchar]
5020             local dir = chardata and chardata.d or nil
5021             if not dir then
5022                 for nn, et in ipairs(Babel.ranges) do
5023                     if itemchar < et[1] then
5024                         break
5025                     elseif itemchar <= et[2] then
5026                         dir = et[3]
5027                         break
5028                     end
5029                 end
5030             end
5031             if dir and (dir == 'al' or dir == 'r') then
5032                 has_bidi = true
5033             end
5034         end
5035     end
5036     return has_bidi
5037 end
5038 function Babel.set_chranges_b (script, chrng)
5039     if chrng == '' then return end
5040     texio.write('Replacing ' .. script .. ' script ranges')
5041     Babel.script_blocks[script] = {}
5042     for s, e in string.gmatch(chrng..' ', '(.-%).%(.-%)%s') do
5043         table.insert(
5044             Babel.script_blocks[script], {tonumber(s,16), tonumber(e,16)})
5045     end
5046 end
5047 }
5048 \endgroup
5049 \ifx\newattribute\undefined\else
5050 \newattribute\bbl@attr@locale
5051 \directlua{ Babel.attr_locale = luatexbase.registernumber'bbl@attr@locale' }
5052 \AddBabelHook{luatex}{beforeextras}{%
5053     \setattribute\bbl@attr@locale\localeid}
5054 \fi
5055 \def\BabelStringsDefault{unicode}
5056 \let\luabbl@stop\relax
5057 \AddBabelHook{luatex}{encodedcommands}{%
5058     \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
5059     \ifx\bbl@tempa\bbl@tempb\else
5060         \directlua{Babel.begin_process_input()}%
5061         \def\luabbl@stop{%
5062             \directlua{Babel.end_process_input()}}%
5063     \fi}%
5064 \AddBabelHook{luatex}{stopcommands}{%
5065     \luabbl@stop
5066     \let\luabbl@stop\relax}
5067 \AddBabelHook{luatex}{patterns}{%
5068     \@ifundefined{bbl@hyphendata@the\language}%
5069     {\def\bbl@elt##1##2##3##4{%

```

```

5070 \ifnum##2=\csname l@#2\endcsname % #2=spanish, dutch:OT1...
5071 \def\bbl@tempb{##3}%
5072 \ifx\bbl@tempb\@empty\else % if not a synonymous
5073 \def\bbl@tempc{##3}{##4}}%
5074 \fi
5075 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
5076 \fi}%
5077 \bbl@languages
5078 \@ifundefined{bbl@hyphendata@the\language}%
5079 {\bbl@info{No hyphenation patterns were set for\%
5080 language '#2'. Reported}}%
5081 {\expandafter\expandafter\expandafter\bbl@luapatterns
5082 \csname bbl@hyphendata@the\language\endcsname}}}%
5083 \@ifundefined{bbl@patterns@}{}%
5084 \begingroup
5085 \bbl@xin@{\number\language,}{,\bbl@pttnlist}%
5086 \ifin@
5087 \ifx\bbl@patterns@\@empty\else
5088 \directlua{ Babel.addpatterns(
5089 [[\bbl@patterns@]], \number\language) }%
5090 \fi
5091 \@ifundefined{bbl@patterns@#1}%
5092 \@empty
5093 {\directlua{ Babel.addpatterns(
5094 [[\space\csname bbl@patterns@#1\endcsname]],
5095 \number\language) }}%
5096 \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
5097 \fi
5098 \endgroup}%
5099 \bbl@exp{%
5100 \bbl@ifunset{bbl@prehc@\languagename}}}%
5101 {\bbl@ifblank{\bbl@cs{prehc@\languagename}}}%
5102 {\prehyphenchar=\bbl@c1{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.

```

5103 \@onlypreamble\babelpatterns
5104 \AtEndOfPackage{%
5105 \newcommand\babelpatterns[2][\@empty]{%
5106 \ifx\bbl@patterns@\relax
5107 \let\bbl@patterns@\@empty
5108 \fi
5109 \ifx\bbl@pttnlist@\@empty\else
5110 \bbl@warning{%
5111 You must not intermingle \string\selectlanguage\space and\%
5112 \string\babelpatterns\space or some patterns will not\%
5113 be taken into account. Reported}%
5114 \fi
5115 \ifx\@empty#1%
5116 \protected@edef\bbl@patterns@{\bbl@patterns@\space#2}%
5117 \else
5118 \edef\bbl@tempb{\zap@space#1 \@empty}%
5119 \bbl@for\bbl@tempa\bbl@tempb{%
5120 \bbl@fixname\bbl@tempa
5121 \bbl@iflanguage\bbl@tempa{%
5122 \bbl@csarg\protected@edef{patterns@\bbl@tempa}{%
5123 \@ifundefined{bbl@patterns@\bbl@tempa}%
5124 \@empty
5125 {\csname bbl@patterns@\bbl@tempa\endcsname\space}%
5126 #2}}}%
5127 \fi}}

```

## 12.4 Southeast Asian scripts

First, some general code for line breaking, used by `\babelposthyphenation`.

Replace regular (ie, implicit) discretionaries by spaceships, 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.

```
5128% TODO - to a lua file
5129 \directlua{
5130   Babel = Babel or {}
5131   Babel.linebreaking = Babel.linebreaking or {}
5132   Babel.linebreaking.before = {}
5133   Babel.linebreaking.after = {}
5134   Babel.locale = {} % Free to use, indexed by \localeid
5135   function Babel.linebreaking.add_before(func)
5136     tex.print([[noexpand\csname bbl@luahyphenate\endcsname]])
5137     table.insert(Babel.linebreaking.before, func)
5138   end
5139   function Babel.linebreaking.add_after(func)
5140     tex.print([[noexpand\csname bbl@luahyphenate\endcsname]])
5141     table.insert(Babel.linebreaking.after, func)
5142   end
5143 }
5144 \def\bbl@intraspace#1 #2 #3\@{%
5145   \directlua{
5146     Babel = Babel or {}
5147     Babel.intraspaces = Babel.intraspaces or {}
5148     Babel.intraspaces['\csname bbl@sbc@language\endcsname'] = %
5149       {b = #1, p = #2, m = #3}
5150     Babel.locale_props[\the\localeid].intraspace = %
5151       {b = #1, p = #2, m = #3}
5152   }}
5153 \def\bbl@intrapenalty#1\@{%
5154   \directlua{
5155     Babel = Babel or {}
5156     Babel.intrapenalties = Babel.intrapenalties or {}
5157     Babel.intrapenalties['\csname bbl@sbc@language\endcsname'] = #1
5158     Babel.locale_props[\the\localeid].intrapenalty = #1
5159   }}
5160 \begingroup
5161 \catcode`\%=12
5162 \catcode`\^=14
5163 \catcode`\'=12
5164 \catcode`\~=12
5165 \gdef\bbl@seaintraspace{^
5166   \let\bbl@seaintraspace\relax
5167   \directlua{
5168     Babel = Babel or {}
5169     Babel.sea_enabled = true
5170     Babel.sea_ranges = Babel.sea_ranges or {}
5171     function Babel.set_chrngs (script, chrng)
5172       local c = 0
5173       for s, e in string.gmatch(chrng..' ', '(.-%.(-)%s') do
5174         Babel.sea_ranges[script..c]={tonumber(s,16), tonumber(e,16)}
5175         c = c + 1
5176       end
5177     end
5178     function Babel.sea_disc_to_space (head)
5179       local sea_ranges = Babel.sea_ranges
5180       local last_char = nil
5181       local quad = 655360 ^% 10 pt = 655360 = 10 * 65536
5182       for item in node.traverse(head) do
5183         local i = item.id
5184         if i == node.id'glyph' then
```

```

5185         last_char = item
5186     elseif i == 7 and item.subtype == 3 and last_char
5187         and last_char.char > 0x0C99 then
5188         quad = font.getfont(last_char.font).size
5189         for lg, rg in pairs(sea_ranges) do
5190             if last_char.char > rg[1] and last_char.char < rg[2] then
5191                 lg = lg:sub(1, 4)  ^% Remove trailing number of, eg, Cyril1
5192                 local intraspace = Babel.intraspaces[lg]
5193                 local intrapenalty = Babel.intrapenalties[lg]
5194                 local n
5195                 if intrapenalty ~= 0 then
5196                     n = node.new(14, 0)  ^% penalty
5197                     n.penalty = intrapenalty
5198                     node.insert_before(head, item, n)
5199                 end
5200                 n = node.new(12, 13)  ^% (glue, spaceskip)
5201                 node.setglue(n, intraspace.b * quad,
5202                             intraspace.p * quad,
5203                             intraspace.m * quad)
5204                 node.insert_before(head, item, n)
5205                 node.remove(head, item)
5206             end
5207         end
5208     end
5209 end
5210 end
5211 }^^
5212 \bbl@luahyphenate}

```

## 12.5 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.

```

5213 \catcode`\%=14
5214 \gdef\bbl@cjkintraspaces{%
5215   \let\bbl@cjkintraspaces\relax
5216   \directlua{
5217     Babel = Babel or {}
5218     require('babel-data-cjk.lua')
5219     Babel.cjk_enabled = true
5220     function Babel.cjk_linebreak(head)
5221       local GLYPH = node.id'glyph'
5222       local last_char = nil
5223       local quad = 655360      % 10 pt = 655360 = 10 * 65536
5224       local last_class = nil
5225       local last_lang = nil
5226
5227       for item in node.traverse(head) do
5228         if item.id == GLYPH then
5229
5230           local lang = item.lang
5231
5232           local LOCALE = node.get_attribute(item,
5233             Babel.attr_locale)
5234           local props = Babel.locale_props[LOCALE]
5235
5236           local class = Babel.cjk_class[item.char].c
5237
5238           if props.cjk_quotes and props.cjk_quotes[item.char] then

```



```

5239         class = props.cjk_quotes[item.char]
5240     end
5241
5242     if class == 'cp' then class = 'cl' end % ]] as CL
5243     if class == 'id' then class = 'I' end
5244
5245     local br = 0
5246     if class and last_class and Babel.cjk_breaks[last_class][class] then
5247         br = Babel.cjk_breaks[last_class][class]
5248     end
5249
5250     if br == 1 and props.linebreak == 'c' and
5251         lang ~= \the\l@nohyphenation\space and
5252         last_lang ~= \the\l@nohyphenation then
5253         local intrapenalty = props.intrapenalty
5254         if intrapenalty ~= 0 then
5255             local n = node.new(14, 0)      % penalty
5256             n.penalty = intrapenalty
5257             node.insert_before(head, item, n)
5258         end
5259         local intraspace = props.intraspace
5260         local n = node.new(12, 13)        % (glue, spaceskip)
5261         node.setglue(n, intraspace.b * quad,
5262             intraspace.p * quad,
5263             intraspace.m * quad)
5264         node.insert_before(head, item, n)
5265     end
5266
5267     if font.getfont(item.font) then
5268         quad = font.getfont(item.font).size
5269     end
5270     last_class = class
5271     last_lang = lang
5272     else % if penalty, glue or anything else
5273         last_class = nil
5274     end
5275 end
5276 lang.hyphenate(head)
5277 end
5278 }%
5279 \bbl@luahyphenate}
5280 \gdef\bbl@luahyphenate{%
5281 \let\bbl@luahyphenate\relax
5282 \directlua{
5283     luatexbase.add_to_callback('hyphenate',
5284     function (head, tail)
5285         if Babel.linebreaking.before then
5286             for k, func in ipairs(Babel.linebreaking.before) do
5287                 func(head)
5288             end
5289         end
5290         if Babel.cjk_enabled then
5291             Babel.cjk_linebreak(head)
5292         end
5293         lang.hyphenate(head)
5294         if Babel.linebreaking.after then
5295             for k, func in ipairs(Babel.linebreaking.after) do
5296                 func(head)
5297             end
5298         end
5299         if Babel.sea_enabled then
5300             Babel.sea_disc_to_space(head)
5301         end

```

```

5302     end,
5303     'Babel.hyphenate')
5304 }
5305 }
5306 \endgroup
5307 \def\bbl@provide@intraspace{%
5308   \bbl@ifunset\bbl@intsp@{\languagename}{}%
5309   {\expandafter\ifx\csname bbl@intsp@\languagename\endcsname\empty\else
5310     \bbl@xin@{/c}{\bbl@cl{lnbrk}}}%
5311     \ifin@           % cjk
5312     \bbl@cjk@intraspace
5313     \directlua{
5314       Babel = Babel or {}
5315       Babel.locale_props = Babel.locale_props or {}
5316       Babel.locale_props[\the\localeid].linebreak = 'c'
5317     }%
5318     \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}\@{}%
5319     \ifx\bbl@KVP@intrapenalty\@nil
5320       \bbl@intrapenalty0\@{}
5321     \fi
5322   \else           % sea
5323     \bbl@sea@intraspace
5324     \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}\@{}%
5325     \directlua{
5326       Babel = Babel or {}
5327       Babel.sea_ranges = Babel.sea_ranges or {}
5328       Babel.set_chranges('bbl@cl{sbc}',
5329                           'bbl@cl{chrng}')
5330     }%
5331     \ifx\bbl@KVP@intrapenalty\@nil
5332       \bbl@intrapenalty0\@{}
5333     \fi
5334   \fi
5335 \fi
5336 \ifx\bbl@KVP@intrapenalty\@nil\else
5337   \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@{}
5338 \fi}}

```

## 12.6 Arabic justification

```

5339 \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
5340 \def\bblar@chars{%
5341   0628,0629,062A,062B,062C,062D,062E,062F,0630,0631,0632,0633,%
5342   0634,0635,0636,0637,0638,0639,063A,063B,063C,063D,063E,063F,%
5343   0640,0641,0642,0643,0644,0645,0646,0647,0649}
5344 \def\bblar@elongated{%
5345   0626,0628,062A,062B,0633,0634,0635,0636,063B,%
5346   063C,063D,063E,063F,0641,0642,0643,0644,0646,%
5347   0649,064A}
5348 \begin{group}
5349   \catcode\_ =11 \catcode\`:=11
5350   \gdef\bblar@nofswarn{\gdef\msg_warning:nx##1##2##3{}}
5351 \end{group}
5352 \gdef\bbl@arabicjust{%
5353   \let\bbl@arabicjust\relax
5354   \newattribute\bblar@kashida
5355   \directlua{ Babel.attr_kashida = luatexbase.registernumber'bblar@kashida' }%
5356   \bblar@kashida=\z@
5357   \bbl@patchfont{\bbl@parsejalt}}%
5358 \directlua{
5359   Babel.arabic.elong_map = Babel.arabic.elong_map or {}
5360   Babel.arabic.elong_map[\the\localeid] = {}
5361   luatexbase.add_to_callback('post_linebreak_filter',

```

```

5362     Babel.arabic.justify, 'Babel.arabic.justify')
5363     luatexbase.add_to_callback('hpack_filter',
5364     Babel.arabic.justify_hbox, 'Babel.arabic.justify_hbox')
5365 } }%
5366 % Save both node lists to make replacement. TODO. Save also widths to
5367 % make computations
5368 \def\bblar@fetchjalt#1#2#3#4{%
5369   \bbl@exp{\bbl@foreach{#1}}{%
5370     \bbl@ifunset\bblar@JE@##1}%
5371     {\setbox\z@\hbox{^^^200d\char"##1#2}}%
5372     {\setbox\z@\hbox{^^^200d\char"\@nameuse\bblar@JE@##1#2}}%
5373   \directlua{%
5374     local last = nil
5375     for item in node.traverse(tex.box[0].head) do
5376       if item.id == node.id'glyph' and item.char > 0x600 and
5377       not (item.char == 0x200D) then
5378         last = item
5379       end
5380     end
5381     Babel.arabic.#3['##1#4'] = last.char
5382   } } }
5383 % Brute force. No rules at all, yet. The ideal: look at jalt table. And
5384 % perhaps other tables (falt?, csw?). What about kaf? And diacritic
5385 % positioning?
5386 \gdef\bbl@parsejalt{%
5387   \ifx\addfontfeature\@undefined\else
5388     \bbl@xin@{/e}{\bbl@c1{lnbrk}}%
5389     \ifin@
5390       \directlua{%
5391         if Babel.arabic.elong_map[\the\localeid][\fontid\font] == nil then
5392           Babel.arabic.elong_map[\the\localeid][\fontid\font] = {}
5393           tex.print([\string\csname\space\bbl@parsejalti\endcsname])
5394         end
5395       }%
5396     \fi
5397   \fi}
5398 \gdef\bbl@parsejalti{%
5399   \begingroup
5400     \let\bbl@parsejalt\relax % To avoid infinite loop
5401     \edef\bbl@tempb{\fontid\font}%
5402     \bblar@nofswarn
5403     \bblar@fetchjalt\bblar@elongated{}{from}{}%
5404     \bblar@fetchjalt\bblar@chars{^^^064a}{from}{a}% Alef maksura
5405     \bblar@fetchjalt\bblar@chars{^^^0649}{from}{y}% Yeh
5406     \addfontfeature{RawFeature+=jalt}%
5407     % \@namedef\bblar@JE@0643{06AA}% todo: catch medial kaf
5408     \bblar@fetchjalt\bblar@elongated{}{dest}{}%
5409     \bblar@fetchjalt\bblar@chars{^^^064a}{dest}{a}%
5410     \bblar@fetchjalt\bblar@chars{^^^0649}{dest}{y}%
5411     \directlua{%
5412       for k, v in pairs(Babel.arabic.from) do
5413         if Babel.arabic.dest[k] and
5414         not (Babel.arabic.from[k] == Babel.arabic.dest[k]) then
5415           Babel.arabic.elong_map[\the\localeid][\bbl@tempb]
5416           [Babel.arabic.from[k]] = Babel.arabic.dest[k]
5417         end
5418       end
5419     }%
5420   \endgroup}
5421 %
5422 \begingroup
5423 \catcode`#=11
5424 \catcode`~=11

```

```

5425 \directlua{
5426
5427 Babel.arabic = Babel.arabic or {}
5428 Babel.arabic.from = {}
5429 Babel.arabic.dest = {}
5430 Babel.arabic.justify_factor = 0.95
5431 Babel.arabic.justify_enabled = true
5432
5433 function Babel.arabic.justify(head)
5434   if not Babel.arabic.justify_enabled then return head end
5435   for line in node.traverse_id(node.id'hlist', head) do
5436     Babel.arabic.justify_hlist(head, line)
5437   end
5438   return head
5439 end
5440
5441 function Babel.arabic.justify_hbox(head, gc, size, pack)
5442   local has_inf = false
5443   if Babel.arabic.justify_enabled and pack == 'exactly' then
5444     for n in node.traverse_id(12, head) do
5445       if n.stretch_order > 0 then has_inf = true end
5446     end
5447     if not has_inf then
5448       Babel.arabic.justify_hlist(head, nil, gc, size, pack)
5449     end
5450   end
5451   return head
5452 end
5453
5454 function Babel.arabic.justify_hlist(head, line, gc, size, pack)
5455   local d, new
5456   local k_list, k_item, pos_inline
5457   local width, width_new, full, k_curr, wt_pos, goal, shift
5458   local subst_done = false
5459   local elong_map = Babel.arabic.elong_map
5460   local last_line
5461   local GLYPH = node.id'glyph'
5462   local KASHIDA = Babel.attr_kashida
5463   local LOCALE = Babel.attr_locale
5464
5465   if line == nil then
5466     line = {}
5467     line.glue_sign = 1
5468     line.glue_order = 0
5469     line.head = head
5470     line.shift = 0
5471     line.width = size
5472   end
5473
5474   % Exclude last line. todo. But-- it discards one-word lines, too!
5475   % ? Look for glue = 12:15
5476   if (line.glue_sign == 1 and line.glue_order == 0) then
5477     elongs = {} % Stores elongated candidates of each line
5478     k_list = {} % And all letters with kashida
5479     pos_inline = 0 % Not yet used
5480
5481     for n in node.traverse_id(GLYPH, line.head) do
5482       pos_inline = pos_inline + 1 % To find where it is. Not used.
5483
5484       % Elongated glyphs
5485       if elong_map then
5486         local locale = node.get_attribute(n, LOCALE)
5487         if elong_map[locale] and elong_map[locale][n.font] and

```

```

5488         elong_map[locale][n.font][n.char] then
5489             table.insert(elongs, {node = n, locale = locale} )
5490             node.set_attribute(n.prev, KASHIDA, 0)
5491         end
5492     end
5493
5494     % Tatwil
5495     if Babel.kashida_wts then
5496         local k_wt = node.get_attribute(n, KASHIDA)
5497         if k_wt > 0 then % todo. parameter for multi inserts
5498             table.insert(k_list, {node = n, weight = k_wt, pos = pos_inline})
5499         end
5500     end
5501
5502     end % of node.traverse_id
5503
5504     if #elongs == 0 and #k_list == 0 then goto next_line end
5505     full = line.width
5506     shift = line.shift
5507     goal = full * Babel.arabic.justify_factor % A bit crude
5508     width = node.dimensions(line.head) % The 'natural' width
5509
5510     % == Elongated ==
5511     % Original idea taken from 'chickenize'
5512     while (#elongs > 0 and width < goal) do
5513         subst_done = true
5514         local x = #elongs
5515         local curr = elongs[x].node
5516         local oldchar = curr.char
5517         curr.char = elong_map[elongs[x].locale][curr.font][curr.char]
5518         width = node.dimensions(line.head) % Check if the line is too wide
5519         % Substitute back if the line would be too wide and break:
5520         if width > goal then
5521             curr.char = oldchar
5522             break
5523         end
5524         % If continue, pop the just substituted node from the list:
5525         table.remove(elongs, x)
5526     end
5527
5528     % == Tatwil ==
5529     if #k_list == 0 then goto next_line end
5530
5531     width = node.dimensions(line.head) % The 'natural' width
5532     k_curr = #k_list
5533     wt_pos = 1
5534
5535     while width < goal do
5536         subst_done = true
5537         k_item = k_list[k_curr].node
5538         if k_list[k_curr].weight == Babel.kashida_wts[wt_pos] then
5539             d = node.copy(k_item)
5540             d.char = 0x0640
5541             line.head, new = node.insert_after(line.head, k_item, d)
5542             width_new = node.dimensions(line.head)
5543             if width > goal or width == width_new then
5544                 node.remove(line.head, new) % Better compute before
5545                 break
5546             end
5547             width = width_new
5548         end
5549         if k_curr == 1 then
5550             k_curr = #k_list

```

```

5551      wt_pos = (wt_pos >= table.getn(Babel.kashida_wts)) and 1 or wt_pos+1
5552    else
5553      k_curr = k_curr - 1
5554    end
5555  end
5556
5557  ::next_line::
5558
5559  % Must take into account marks and ins, see luatex manual.
5560  % Have to be executed only if there are changes. Investigate
5561  % what's going on exactly.
5562  if subst_done and not gc then
5563    d = node.hpack(line.head, full, 'exactly')
5564    d.shift = shift
5565    node.insert_before(head, line, d)
5566    node.remove(head, line)
5567  end
5568  end % if process line
5569 end
5570 }
5571 \endgroup
5572 \fi\fi % Arabic just block

```

## 12.7 Common stuff

```

5573 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
5574 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@ckeckstdfonts}
5575 \DisableBabelHook{babel-fontspec}
5576 <<Font selection>>

```

## 12.8 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.

```

5577 % TODO - to a lua file
5578 \directlua{
5579 Babel.script_blocks = {
5580   ['dflt'] = {},
5581   ['Arab'] = {{0x0600, 0x06FF}, {0x08A0, 0x08FF}, {0x0750, 0x077F},
5582              {0xFE70, 0xFEFF}, {0xFB50, 0xFDFF}, {0x1EE00, 0x1EEFF}},
5583   ['Armn'] = {{0x0530, 0x058F}},
5584   ['Beng'] = {{0x0980, 0x09FF}},
5585   ['Cher'] = {{0x13A0, 0x13FF}, {0xAB70, 0xABBF}},
5586   ['Copt'] = {{0x03E2, 0x03EF}, {0x2C80, 0x2CFF}, {0x102E0, 0x102FF}},
5587   ['Cyr1'] = {{0x0400, 0x04FF}, {0x0500, 0x052F}, {0x1C80, 0x1C8F},
5588              {0x2DE0, 0x2DFF}, {0xA640, 0xA69F}},
5589   ['Deva'] = {{0x0900, 0x097F}, {0xA8E0, 0xA8FF}},
5590   ['Ethi'] = {{0x1200, 0x137F}, {0x1380, 0x139F}, {0x2D80, 0x2DDF},
5591              {0xAB00, 0xAB2F}},
5592   ['Geor'] = {{0x10A0, 0x10FF}, {0x2D00, 0x2D2F}},
5593   % Don't follow strictly Unicode, which places some Coptic letters in
5594   % the 'Greek and Coptic' block
5595   ['Grek'] = {{0x0370, 0x03E1}, {0x03F0, 0x03FF}, {0x1F00, 0x1FFF}},
5596   ['Hans'] = {{0x2E80, 0x2EFF}, {0x3000, 0x303F}, {0x31C0, 0x31EF},
5597              {0x3300, 0x33FF}, {0x3400, 0x4DBF}, {0x4E00, 0x9FFF},
5598              {0xF900, 0xFAFF}, {0xFE30, 0xFE4F}, {0xFF00, 0xFFEF},
5599              {0x20000, 0x2A6DF}, {0x2A700, 0x2B73F},
5600              {0x2B740, 0x2B81F}, {0x2B820, 0x2CEAF},
5601              {0x2CEB0, 0x2EBEF}, {0x2F800, 0x2FA1F}},

```

```

5602 ['Hebr'] = {{0x0590, 0x05FF}},
5603 ['Jpan'] = {{0x3000, 0x303F}, {0x3040, 0x309F}, {0x30A0, 0x30FF},
5604             {0x4E00, 0x9FAF}, {0xFF00, 0xFFEF}},
5605 ['Khmr'] = {{0x1780, 0x17FF}, {0x19E0, 0x19FF}},
5606 ['Knda'] = {{0x0C80, 0x0CFF}},
5607 ['Kore'] = {{0x1100, 0x11FF}, {0x3000, 0x303F}, {0x3130, 0x318F},
5608             {0x4E00, 0x9FAF}, {0xA960, 0xA97F}, {0xAC00, 0xD7AF},
5609             {0xD7B0, 0xD7FF}, {0xFF00, 0xFFEF}},
5610 ['Laoo'] = {{0x0E80, 0x0EFF}},
5611 ['Latn'] = {{0x0000, 0x007F}, {0x0080, 0x00FF}, {0x0100, 0x017F},
5612             {0x0180, 0x024F}, {0x1E00, 0x1EFF}, {0x2C60, 0x2C7F},
5613             {0xA720, 0xA7FF}, {0xAB30, 0xAB6F}},
5614 ['Mahj'] = {{0x11150, 0x1117F}},
5615 ['Mlym'] = {{0x0D00, 0x0D7F}},
5616 ['Mymr'] = {{0x1000, 0x109F}, {0xAA60, 0xAA7F}, {0xA9E0, 0xA9FF}},
5617 ['Orya'] = {{0x0B00, 0x0B7F}},
5618 ['Sinh'] = {{0x0D80, 0x0DFF}, {0x111E0, 0x111FF}},
5619 ['Sycr'] = {{0x0700, 0x074F}, {0x0860, 0x086F}},
5620 ['Taml'] = {{0x0B80, 0x0BFF}},
5621 ['Telu'] = {{0x0C00, 0x0C7F}},
5622 ['Tfng'] = {{0x2D30, 0x2D7F}},
5623 ['Thai'] = {{0x0E00, 0x0E7F}},
5624 ['Tibt'] = {{0x0F00, 0x0FFF}},
5625 ['Vaii'] = {{0xA500, 0xA63F}},
5626 ['Yiii'] = {{0xA000, 0xA48F}, {0xA490, 0xA4CF}}
5627 }
5628
5629 Babel.script_blocks.Cyrs = Babel.script_blocks.Cyrl
5630 Babel.script_blocks.Hant = Babel.script_blocks.Hans
5631 Babel.script_blocks.Kana = Babel.script_blocks.Jpan
5632
5633 function Babel.locale_map(head)
5634   if not Babel.locale_mapped then return head end
5635
5636   local LOCALE = Babel.attr_locale
5637   local GLYPH = node.id('glyph')
5638   local inmath = false
5639   local toloc_save
5640   for item in node.traverse(head) do
5641     local toloc
5642     if not inmath and item.id == GLYPH then
5643       % Optimization: build a table with the chars found
5644       if Babel.chr_to_loc[item.char] then
5645         toloc = Babel.chr_to_loc[item.char]
5646       else
5647         for lc, maps in pairs(Babel.loc_to_scr) do
5648           for _, rg in pairs(maps) do
5649             if item.char >= rg[1] and item.char <= rg[2] then
5650               Babel.chr_to_loc[item.char] = lc
5651               toloc = lc
5652               break
5653             end
5654           end
5655         end
5656       end
5657       % Now, take action, but treat composite chars in a different
5658       % fashion, because they 'inherit' the previous locale. Not yet
5659       % optimized.
5660       if not toloc and
5661         (item.char >= 0x0300 and item.char <= 0x036F) or
5662         (item.char >= 0x1AB0 and item.char <= 0x1AFF) or
5663         (item.char >= 0x1DC0 and item.char <= 0x1DFF) then
5664         toloc = toloc_save

```

```

5665     end
5666     if toloc and toloc > -1 then
5667         if Babel.locale_props[toloc].lg then
5668             item.lang = Babel.locale_props[toloc].lg
5669             node.set_attribute(item, LOCALE, toloc)
5670         end
5671         if Babel.locale_props[toloc]['/'..item.font] then
5672             item.font = Babel.locale_props[toloc]['/'..item.font]
5673         end
5674         toloc_save = toloc
5675     end
5676     elseif not inmath and item.id == 7 then
5677         item.replace = item.replace and Babel.locale_map(item.replace)
5678         item.pre      = item.pre and Babel.locale_map(item.pre)
5679         item.post      = item.post and Babel.locale_map(item.post)
5680     elseif item.id == node.id'math' then
5681         inmath = (item.subtype == 0)
5682     end
5683 end
5684 return head
5685 end
5686 }

```

The code for `\babelcharproperty` is straightforward. Just note the modified lua table can be different.

```

5687 \newcommand\babelcharproperty[1]{%
5688   \count@=#1\relax
5689   \ifvmode
5690     \expandafter\babel@chprop
5691   \else
5692     \babel@error{\string\babelcharproperty\space can be used only in\%
5693       vertical mode (preamble or between paragraphs)}%
5694     {See the manual for futher info}%
5695   \fi}
5696 \newcommand\babel@chprop[3][\the\count@]{%
5697   \@tempcnta=#1\relax
5698   \babel@ifunset{\babel@chprop@#2}%
5699   {\babel@error{No property named '#2'. Allowed values are\%
5700     direction (bc), mirror (bmg), and linebreak (lb)}%
5701     {See the manual for futher info}}%
5702   }%
5703   \loop
5704     \babel@cs{\babel@chprop@#2}{#3}%
5705     \ifnum\count@<\@tempcnta
5706       \advance\count@\@ne
5707     \repeat}
5708 \def\babel@chprop@direction#1{%
5709   \directlua{
5710     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
5711     Babel.characters[\the\count@]['d'] = '#1'
5712   }}
5713 \let\babel@chprop@bc\babel@chprop@direction
5714 \def\babel@chprop@mirror#1{%
5715   \directlua{
5716     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
5717     Babel.characters[\the\count@]['m'] = '\number#1'
5718   }}
5719 \let\babel@chprop@bmg\babel@chprop@mirror
5720 \def\babel@chprop@linebreak#1{%
5721   \directlua{
5722     Babel.cjk_characters[\the\count@] = Babel.cjk_characters[\the\count@] or {}
5723     Babel.cjk_characters[\the\count@]['c'] = '#1'
5724   }}

```



```

5725 \let\bbl@chprop@lb\bbl@chprop@linebreak
5726 \def\bbl@chprop@locale#1{%
5727   \directlua{
5728     Babel.chr_to_loc = Babel.chr_to_loc or {}
5729     Babel.chr_to_loc[\the\count@] =
5730       \bbl@ifblank{#1}{-1000}{\the\bbl@cs{id@#1}}\space
5731   }}

```

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.

```

5732 \directlua{
5733   Babel.nohyphenation = \the\l@nohyphenation
5734 }

```

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  $\text{function}(m) \text{ return } \text{Babel.capt\_map}(m[1],1) \text{ end}$ , 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  $@$ , we just avoid this character in macro names (which explains the internal group, too).

```

5735 \begingroup
5736 \catcode`\~ = 12
5737 \catcode`\% = 12
5738 \catcode`\& = 14
5739 \catcode`\| = 12
5740 \gdef\babelprehyphenation{%&
5741   \@ifnextchar[{\bbl@settransform{0}}{\bbl@settransform{0}}{}]}
5742 \gdef\babelposthyphenation{%&
5743   \@ifnextchar[{\bbl@settransform{1}}{\bbl@settransform{1}}{}]}
5744 \gdef\bbl@settransform#1[#2]#3#4#5{%&
5745   \ifcase#1
5746     \bbl@activateprehyphen
5747   \else
5748     \bbl@activateposthyphen
5749   \fi
5750   \begingroup
5751     \def\babeltempa{\bbl@add@list\babeltempb}%&
5752     \let\babeltempb\@empty
5753     \def\bbl@tempa{#5}%&
5754     \bbl@replace\bbl@tempa{,}{,}%& TODO. Ugly trick to preserve {}
5755     \expandafter\bbl@foreach\expandafter{\bbl@tempa}{%&
5756       \bbl@ifsamestring{##1}{remove}%&
5757       {\bbl@add@list\babeltempb{nil}}}%&
5758     {\directlua{
5759       local rep = {[#1]}=
5760       rep = rep:gsub('^%s*(remove)%s*$', 'remove = true')
5761       rep = rep:gsub('^%s*(insert)%s*', 'insert = true, ')
5762       rep = rep:gsub('(string)%s*=%s*([^\s,]*)', Babel.capture_func)
5763       if #1 == 0 then
5764         rep = rep:gsub('(space)%s*=%s*([%d%.]+)%s+([%d%.]+)%s+([%d%.]+)',
5765           'space = {' .. '%2, %3, %4' .. '}')
5766         rep = rep:gsub('(spacefactor)%s*=%s*([%d%.]+)%s+([%d%.]+)%s+([%d%.]+)',
5767           'spacefactor = {' .. '%2, %3, %4' .. '}')
5768         rep = rep:gsub('(kashida)%s*=%s*([^\s,]*)', Babel.capture_kashida)
5769       else
5770         rep = rep:gsub(' (no)%s*=%s*([^\s,]*)', Babel.capture_func)
5771         rep = rep:gsub(' (pre)%s*=%s*([^\s,]*)', Babel.capture_func)
5772         rep = rep:gsub(' (post)%s*=%s*([^\s,]*)', Babel.capture_func)
5773       end
5774       tex.print([[string\babeltempa{[]} .. rep .. [{}]])
5775     }}}%&

```

```

5776 \let\bbl@kv@attribute\relax
5777 \let\bbl@kv@label\relax
5778 \bbl@forkv{#2}{\bbl@csarg\edef{kv@##1}{##2}}&%
5779 \ifx\bbl@kv@attribute\relax\else
5780 \edef\bbl@kv@attribute{\expandafter\bbl@stripslash\bbl@kv@attribute}&%
5781 \fi
5782 \directlua{
5783   local lbkr = Babel.linebreaking.replacements[#1]
5784   local u = unicode.utf8
5785   local id, attr, label
5786   if #1 == 0 then
5787     id = \the\csname bbl@id@#3\endcsname\space
5788   else
5789     id = \the\csname l@#3\endcsname\space
5790   end
5791   \ifx\bbl@kv@attribute\relax
5792     attr = -1
5793   \else
5794     attr = luatexbase.registernumber'\bbl@kv@attribute'
5795   \fi
5796   \ifx\bbl@kv@label\relax\else &% Same refs:
5797     label = [==[\bbl@kv@label]==]
5798   \fi
5799   &% Convert pattern:
5800   local patt = string.gsub([==[#4]==], '%s', '')
5801   if #1 == 0 then
5802     patt = string.gsub(patt, '|', ' ')
5803   end
5804   if not u.find(patt, '()', nil, true) then
5805     patt = '()' .. patt .. '()'
5806   end
5807   if #1 == 1 then
5808     patt = string.gsub(patt, '%(%)%^', '^()')
5809     patt = string.gsub(patt, '%$%(%)', '()$')
5810   end
5811   patt = u.gsub(patt, '{(.)}',
5812     function (n)
5813       return '%' .. (tonumber(n) and (tonumber(n)+1) or n)
5814     end)
5815   patt = u.gsub(patt, '{(%x%x%x%x+)}',
5816     function (n)
5817       return u.gsub(u.char(tonumber(n, 16)), '(%p)', '%%1')
5818     end)
5819   lbkr[id] = lbkr[id] or {}
5820   table.insert(lbkr[id],
5821     { label=label, attr=attr, pattern=patt, replace={\babeltempb} })
5822   }&%
5823 \endgroup}
5824 \endgroup
5825 \def\bbl@activateposthyphen{%
5826 \let\bbl@activateposthyphen\relax
5827 \directlua{
5828   require('babel-transforms.lua')
5829   Babel.linebreaking.add_after(Babel.post_hyphenate_replace)
5830 }}
5831 \def\bbl@activateprehyphen{%
5832 \let\bbl@activateprehyphen\relax
5833 \directlua{
5834   require('babel-transforms.lua')
5835   Babel.linebreaking.add_before(Babel.pre_hyphenate_replace)
5836 }}

```

## 12.9 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 L<sup>A</sup>T<sub>E</sub>X. Just in case, consider the possibility it has not been loaded.

```

5837 \def\bbl@activate@preotf{%
5838   \let\bbl@activate@preotf\relax % only once
5839   \directlua{
5840     Babel = Babel or {}
5841     %
5842     function Babel.pre_otfload_v(head)
5843       if Babel.numbers and Babel.digits_mapped then
5844         head = Babel.numbers(head)
5845       end
5846       if Babel.bidi_enabled then
5847         head = Babel.bidi(head, false, dir)
5848       end
5849       return head
5850     end
5851     %
5852     function Babel.pre_otfload_h(head, gc, sz, pt, dir)
5853       if Babel.numbers and Babel.digits_mapped then
5854         head = Babel.numbers(head)
5855       end
5856       if Babel.bidi_enabled then
5857         head = Babel.bidi(head, false, dir)
5858       end
5859       return head
5860     end
5861     %
5862     luatexbase.add_to_callback('pre_linebreak_filter',
5863       Babel.pre_otfload_v,
5864       'Babel.pre_otfload_v',
5865       luatexbase.priority_in_callback('pre_linebreak_filter',
5866         'luaotfload.node_processor') or nil)
5867     %
5868     luatexbase.add_to_callback('hpack_filter',
5869       Babel.pre_otfload_h,
5870       'Babel.pre_otfload_h',
5871       luatexbase.priority_in_callback('hpack_filter',
5872         'luaotfload.node_processor') or nil)
5873   }}

```

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=.

```

5874 \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
5875   \let\bbl@beforeforeign\leavevmode
5876   \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
5877   \RequirePackage{luatexbase}
5878   \bbl@activate@preotf
5879   \directlua{
5880     require('babel-data-bidi.lua')
5881     \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
5882       require('babel-bidi-basic.lua')
5883     \or
5884       require('babel-bidi-basic-r.lua')
5885     \fi}
5886   % TODO - to locale_props, not as separate attribute
5887   \newattribute\bbl@attr@dir
5888   \directlua{ Babel.attr_dir = luatexbase.registernumber'bbl@attr@dir' }
5889   % TODO. I don't like it, hackish:
5890   \bbl@exp{\output{\bodydir\pagedir\the\output}}

```

```

5891 \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
5892 \fi\fi
5893 \chardef\bbl@thetextdir\z@
5894 \chardef\bbl@thepardir\z@
5895 \def\bbl@getluadir#1{%
5896   \directlua{
5897     if tex.#1dir == 'TLT' then
5898       tex.sprint('0')
5899     elseif tex.#1dir == 'TRT' then
5900       tex.sprint('1')
5901     end}}
5902 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\textdir.. 3=0 lr/1 rl
5903   \ifcase#3\relax
5904     \ifcase\bbl@getluadir{#1}\relax\else
5905       #2 TLT\relax
5906     \fi
5907   \else
5908     \ifcase\bbl@getluadir{#1}\relax
5909       #2 TRT\relax
5910     \fi
5911   \fi}
5912 \def\bbl@thedir{0}
5913 \def\bbl@textdir#1{%
5914   \bbl@setluadir{text}\textdir{#1}%
5915   \chardef\bbl@thetextdir#1\relax
5916   \edef\bbl@thedir{\the\numexpr\bbl@thepardir*3+#1}%
5917   \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*3+#1}}
5918 \def\bbl@pardir#1{%
5919   \bbl@setluadir{par}\pardir{#1}%
5920   \chardef\bbl@thepardir#1\relax}
5921 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}
5922 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}
5923 \def\bbl@dirparastext{\pardir\the\textdir\relax}%   %%%
5924 %
5925 \ifnum\bbl@bidimode>\z@
5926   \def\bbl@insidemath{0}%
5927   \def\bbl@everymath{\def\bbl@insidemath{1}}
5928   \def\bbl@everydisplay{\def\bbl@insidemath{2}}
5929   \frozen@everymath\expandafter{%
5930     \expandafter\bbl@everymath\the\frozen@everymath}
5931   \frozen@everydisplay\expandafter{%
5932     \expandafter\bbl@everydisplay\the\frozen@everydisplay}
5933   \AtBeginDocument{
5934     \directlua{
5935       function Babel.math_box_dir(head)
5936         if not (token.get_macro('bbl@insidemath') == '0') then
5937           if Babel.hlist_has_bidi(head) then
5938             local d = node.new(node.id'dir')
5939             d.dir = '+TRT'
5940             node.insert_before(head, node.has_glyph(head), d)
5941             for item in node.traverse(head) do
5942               node.set_attribute(item,
5943                 Babel.attr_dir, token.get_macro('bbl@thedir'))
5944             end
5945           end
5946         end
5947         return head
5948       end
5949       luatexbase.add_to_callback("hpack_filter", Babel.math_box_dir,
5950         "Babel.math_box_dir", 0)
5951     }}%
5952 \fi

```

## 12.10 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, dcolumn still fails.

```
5953 \bbl@trace{Redefinitions for bidi layout}
5954 %
5955 <(*More package options)> ≡
5956 \chardef\bbl@eqnpos\z@
5957 \DeclareOption{leqno}{\chardef\bbl@eqnpos\@ne}
5958 \DeclareOption{fleqn}{\chardef\bbl@eqnpos\tw@}
5959 <(/More package options)>
5960 %
5961 \def\BabelNoAMSMath{\let\bbl@noamsmath\relax}
5962 \ifnum\bbl@bidimode>\z@
5963   \ifx\matheqdirmode\@undefined\else
5964     \matheqdirmode\@ne
5965   \fi
5966   \let\bbl@eqnodir\relax
5967   \def\bbl@eqdel{()}
5968   \def\bbl@eqnum{%
5969     {\normalfont\normalcolor
5970       \expandafter\@firstoftwo\bbl@eqdel
5971       \theequation
5972       \expandafter\@secondoftwo\bbl@eqdel}}
5973   \def\bbl@puteqno#1{\eqno\hbox{#1}}
5974   \def\bbl@putleqno#1{\leqno\hbox{#1}}
5975   \def\bbl@eqno@flip#1{%
5976     \ifdim\predisplaysize=-\maxdimen
5977       \eqno
5978       \hb@xt@.01pt{\hb@xt@\displaywidth{\hss{#1}}\hss}%
5979     \else
5980       \leqno\hbox{#1}%
5981     \fi}
5982   \def\bbl@leqno@flip#1{%
5983     \ifdim\predisplaysize=-\maxdimen
5984       \leqno
5985       \hb@xt@.01pt{\hss\hb@xt@\displaywidth{#1}\hss}%
5986     \else
5987       \eqno\hbox{#1}%
5988     \fi}
5989   \AtBeginDocument{%
5990     \ifx\maketag@@@\@undefined % Normal equation, eqnarray
5991       \AddToHook{env/equation/begin}{%
5992         \ifnum\bbl@thetextdir>\z@
5993           \let\@eqnnum\bbl@eqnum
5994           \edef\bbl@eqnodir{\noexpand\bbl@textdir{\the\bbl@thetextdir}}%
5995           \chardef\bbl@thetextdir\z@
5996           \bbl@add\normalfont{\bbl@eqnodir}%
5997           \ifcase\bbl@eqnpos
5998             \let\bbl@puteqno\bbl@eqno@flip
5999           \or
6000             \let\bbl@puteqno\bbl@leqno@flip
6001           \fi
```

```

6002     \fi}%
6003 \ifnum\bb1@eqnpos=\tw@ \else
6004     \def\endequation{\bb1@puteqno{\@eqnnum}$$\@ignoretrue}%
6005 \fi
6006 \AddToHook{env/eqnarray/begin}{%
6007     \ifnum\bb1@thetextdir>\z@
6008         \edef\bb1@eqnodir{\noexpand\bb1@textdir{\the\bb1@thetextdir}}%
6009         \chardef\bb1@thetextdir\z@
6010         \bb1@add\normalfont{\bb1@eqnodir}%
6011         \ifnum\bb1@eqnpos=\@ne
6012             \def\@eqnnum{%
6013                 \setbox\z@\hbox{\bb1@eqnum}%
6014                 \hbox to 0.01pt{\hss\hbox to\displaywidth{\box\z@\hss}}}%
6015             \else
6016                 \let\@eqnnum\bb1@eqnum
6017             \fi
6018         \fi}
6019 % Hack. YA luatex bug?:
6020 \expandafter\bb1@sreplace\csname] \endcsname{${$}\eqno\kern.001pt${$}%
6021 \else % amstex
6022     \ifx\bb1@noamsmath\undefined
6023         \ifnum\bb1@eqnpos=\@ne
6024             \let\bb1@ams@lap\hbox
6025         \else
6026             \let\bb1@ams@lap\llap
6027         \fi
6028         \ExplSyntaxOn
6029         \bb1@sreplace\intertext@{\normalbaselines}%
6030             {\normalbaselines
6031             \ifx\bb1@eqnodir\relax\else\bb1@pardir\@ne\bb1@eqnodir\fi}%
6032         \ExplSyntaxOff
6033         \def\bb1@ams@tagbox#1#2{#1{\bb1@eqnodir#2}}% #1=hbox|lap|flip
6034         \ifx\bb1@ams@lap\hbox % leqno
6035             \def\bb1@ams@flip#1{%
6036                 \hbox to 0.01pt{\hss\hbox to\displaywidth{\#1}\hss}}%
6037         \else % eqno
6038             \def\bb1@ams@flip#1{%
6039                 \hbox to 0.01pt{\hbox to\displaywidth{\hss{\#1}\hss}}%
6040             \fi
6041         \def\bb1@ams@preset#1{%
6042             \ifnum\bb1@thetextdir>\z@
6043                 \edef\bb1@eqnodir{\noexpand\bb1@textdir{\the\bb1@thetextdir}}%
6044                 \bb1@sreplace\textdef@{\hbox}{\bb1@ams@tagbox\hbox}%
6045                 \bb1@sreplace\maketag@@@{\hbox}{\bb1@ams@tagbox#1}%
6046             \fi}%
6047         \ifnum\bb1@eqnpos=\tw@ \else
6048             \def\bb1@ams@equation{%
6049                 \ifnum\bb1@thetextdir>\z@
6050                     \edef\bb1@eqnodir{\noexpand\bb1@textdir{\the\bb1@thetextdir}}%
6051                     \chardef\bb1@thetextdir\z@
6052                     \bb1@add\normalfont{\bb1@eqnodir}%
6053                     \ifcase\bb1@eqnpos
6054                         \def\veqno##1##2{\bb1@eqno@flip{##1##2}}%
6055                     \or
6056                         \def\veqno##1##2{\bb1@leqno@flip{##1##2}}%
6057                     \fi
6058                 \fi}%
6059             \AddToHook{env/equation/begin}{\bb1@ams@equation}%
6060             \AddToHook{env/equation*/begin}{\bb1@ams@equation}%
6061         \fi
6062         \AddToHook{env/cases/begin}{\bb1@ams@preset\bb1@ams@lap}%
6063         \AddToHook{env/multline/begin}{\bb1@ams@preset\hbox}%
6064         \AddToHook{env/gather/begin}{\bb1@ams@preset\bb1@ams@lap}%

```

```

6065 \AddToHook{env/gather*/begin}{\bbl@ams@preset\bbl@ams@lap}%
6066 \AddToHook{env/align/begin}{\bbl@ams@preset\bbl@ams@lap}%
6067 \AddToHook{env/align*/begin}{\bbl@ams@preset\bbl@ams@lap}%
6068 \AddToHook{env/eqnalign/begin}{\bbl@ams@preset\hbox}%
6069 % Hackish, for proper alignment. Don't ask me why it works!:
6070 \bbl@exp{% Avoid a 'visible' conditional
6071 \\\AddToHook{env/align*/end}{\<iftag@>\<else>\\tag*{}>\<fi>}}%
6072 \AddToHook{env/flalign/begin}{\bbl@ams@preset\hbox}%
6073 \AddToHook{env/split/before}{%
6074 \ifnum\bbl@thetextdir>\z@
6075 \bbl@ifsamestring\@currentenv{equation}%
6076 {\ifx\bbl@ams@lap\hbox % leqno
6077 \def\bbl@ams@flip#1{%
6078 \hbox to 0.01pt{\hbox to\displaywidth{{#1}\hss}\hss}}%
6079 \else
6080 \def\bbl@ams@flip#1{%
6081 \hbox to 0.01pt{\hss\hbox to\displaywidth{\hss{#1}}}%
6082 \fi}%
6083 }%
6084 \fi}%
6085 \fi
6086 \fi}
6087 \fi
6088 \ifx\bbl@opt@layout\@nnil\endinput\fi % if no layout
6089 \ifnum\bbl@bidimode>\z@
6090 \def\bbl@nextfake#1{% non-local changes, use always inside a group!
6091 \bbl@exp{%
6092 \def\\bbl@insidemath{0}%
6093 \mathdir\the\bodydir
6094 #1% Once entered in math, set boxes to restore values
6095 \<ifmmode>%
6096 \everyvbox{%
6097 \the\everyvbox
6098 \bodydir\the\bodydir
6099 \mathdir\the\mathdir
6100 \everyhbox{\the\everyhbox}%
6101 \everyvbox{\the\everyvbox}}%
6102 \everyhbox{%
6103 \the\everyhbox
6104 \bodydir\the\bodydir
6105 \mathdir\the\mathdir
6106 \everyhbox{\the\everyhbox}%
6107 \everyvbox{\the\everyvbox}}%
6108 \<fi>}}%
6109 \def\@hangfrom#1{%
6110 \setbox\@tempboxa\hbox{{#1}}%
6111 \hangindent\wd\@tempboxa
6112 \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
6113 \shapemode\@ne
6114 \fi
6115 \noindent\box\@tempboxa}
6116 \fi
6117 \IfBabelLayout{tabular}
6118 {\let\bbl@OL@tabular\@tabular
6119 \bbl@replace\@tabular{$}{\bbl@nextfake$}%
6120 \let\bbl@NL@tabular\@tabular
6121 \AtBeginDocument{%
6122 \ifx\bbl@NL@tabular\@tabular\else
6123 \bbl@replace\@tabular{$}{\bbl@nextfake$}%
6124 \let\bbl@NL@tabular\@tabular
6125 \fi}}
6126 {}
6127 \IfBabelLayout{lists}

```

```

6128 {\let\bbl@OL@list\list
6129 \bbl@sreplace\list{\parshape}{\bbl@listparshape}%
6130 \let\bbl@NL@list\list
6131 \def\bbl@listparshape#1#2#3{%
6132 \parshape #1 #2 #3 %
6133 \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
6134 \shapemode\tw@
6135 \fi}}
6136 {}
6137 \IfBabelLayout{graphics}
6138 {\let\bbl@pictresetdir\relax
6139 \def\bbl@pictsetdir#1{%
6140 \ifcase\bbl@thetextdir
6141 \let\bbl@pictresetdir\relax
6142 \else
6143 \ifcase#1\bodydir TLT % Remember this sets the inner boxes
6144 \or\textdir TLT
6145 \else\bodydir TLT \textdir TLT
6146 \fi
6147 % \(\text|par)dir required in pgf:
6148 \def\bbl@pictresetdir{\bodydir TRT\pardir TRT\textdir TRT\relax}%
6149 \fi}%
6150 \AddToHook{env/picture/begin}{\bbl@pictsetdir\tw@}%
6151 \directlua{
6152 Babel.get_picture_dir = true
6153 Babel.picture_has_bidi = 0
6154 %
6155 function Babel.picture_dir (head)
6156 if not Babel.get_picture_dir then return head end
6157 if Babel.hlist_has_bidi(head) then
6158 Babel.picture_has_bidi = 1
6159 end
6160 return head
6161 end
6162 luatexbase.add_to_callback("hpack_filter", Babel.picture_dir,
6163 "Babel.picture_dir")
6164 }%
6165 \AtBeginDocument{%
6166 \long\def\put(#1,#2)#3{%
6167 \@killglue
6168 % Try:
6169 \ifx\bbl@pictresetdir\relax
6170 \def\bbl@tempc{0}%
6171 \else
6172 \directlua{
6173 Babel.get_picture_dir = true
6174 Babel.picture_has_bidi = 0
6175 }%
6176 \setbox\z@\hb@xt@\z@{%
6177 \@defaultunitsset\@tempdimc{#1}\unitlength
6178 \kern\@tempdimc
6179 #3\hss}% TODO: #3 executed twice (below). That's bad.
6180 \edef\bbl@tempc{\directlua{tex.print(Babel.picture_has_bidi)}}}%
6181 \fi
6182 % Do:
6183 \@defaultunitsset\@tempdimc{#2}\unitlength
6184 \raise\@tempdimc\hb@xt@\z@{%
6185 \@defaultunitsset\@tempdimc{#1}\unitlength
6186 \kern\@tempdimc
6187 {\ifnum\bbl@tempc>\z@\bbl@pictresetdir\fi#3}\hss}%
6188 \ignorespaces}%
6189 \MakeRobust\put}%
6190 \AtBeginDocument

```



```

6191      {\AddToHook{cmd/diagbox@pict/before}{\let\bbl@pictsetdir\@gobble}%
6192      \ifx\pgfpicture\@undefined\else % TODO. Allow deactivate?
6193        \AddToHook{env/pgfpicture/begin}{\bbl@pictsetdir\@ne}%
6194        \bbl@add\pgfinterruptpicture{\bbl@pictresetdir}%
6195        \bbl@add\pgfsys@beginpicture{\bbl@pictsetdir\z@}%
6196      \fi
6197      \ifx\tikzpicture\@undefined\else
6198        \AddToHook{env/tikzpicture/begin}{\bbl@pictsetdir\z@}%
6199        \bbl@add\tikz@atbegin@node{\bbl@pictresetdir}%
6200        \bbl@sreplace\tikz{\begingroup}{\begingroup\bbl@pictsetdir\tw@}%
6201      \fi
6202      \ifx\tcolorbox\@undefined\else
6203        \AddToHook{env/tcolorbox/begin}{\bbl@pictsetdir\@ne}%
6204        \bbl@sreplace\tcb@savebox
6205          {\ignorespaces}{\ignorespaces\bbl@pictresetdir}%
6206        \ifx\tikzpicture\tcb@hooked\@undefined\else
6207          \bbl@sreplace\tikzpicture\tcb@hooked{\noexpand\tikzpicture}%
6208          {\textdir TLT\noexpand\tikzpicture}%
6209        \fi
6210      \fi
6211    }}
6212  {}

```

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`.

```

6213 \IfBabelLayout{counters}%
6214   {\let\bbl@OL@@textsuperscript\@textsuperscript
6215    \bbl@sreplace\@textsuperscript{\m@th}{\m@th\mathdir\pagedir}%
6216    \let\bbl@latinarabic=\@arabic
6217    \let\bbl@OL@@arabic\@arabic
6218    \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
6219    \@ifpackagewith{babel}{bidi=default}%
6220    {\let\bbl@asciroman=\@roman
6221     \let\bbl@OL@@roman\@roman
6222     \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%
6223     \let\bbl@asciRoman=\@Roman
6224     \let\bbl@OL@@roman\@Roman
6225     \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciRoman#1}}}%
6226     \let\bbl@OL@labelenumii\labelenumii
6227     \def\labelenumii{}\theenumii}%
6228     \let\bbl@OL@p@enumiii\p@enumiii
6229     \def\p@enumiii{\p@enumii}\theenumii{}\{}\{}\}
6230 \langle\langle Footnote changes\rangle\rangle
6231 \IfBabelLayout{footnotes}%
6232   {\let\bbl@OL@footnote\footnote
6233    \BabelFootnote\footnote\language\name{}\{}\}%
6234    \BabelFootnote\localfootnote\language\name{}\{}\}%
6235    \BabelFootnote\mainfootnote{}\{}\{}\}
6236   {}

```

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.

```

6237 \IfBabelLayout{extras}%
6238   {\let\bbl@OL@underline\underline
6239    \bbl@sreplace\underline{\$ \@underline}{\bbl@nextfake$\@underline}%
6240    \let\bbl@OL@LaTeX2e\LaTeX2e
6241    \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
6242     \if b\expandafter\@car\@series\@nil\boldmath\fi
6243     \babelsublr{%
6244       \LaTeX\kern.15em2\bbl@nextfake$_{\textstyle\varepsilon}$}}}%
6245   {}
6246 \langle/luatex\rangle

```

## 12.11 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.

```
6247 (*transforms)
6248 Babel.linebreaking.replacements = {}
6249 Babel.linebreaking.replacements[0] = {} -- pre
6250 Babel.linebreaking.replacements[1] = {} -- post
6251
6252 -- Discretionaries contain strings as nodes
6253 function Babel.str_to_nodes(fn, matches, base)
6254   local n, head, last
6255   if fn == nil then return nil end
6256   for s in string.utfvalues(fn(matches)) do
6257     if base.id == 7 then
6258       base = base.replace
6259     end
6260     n = node.copy(base)
6261     n.char = s
6262     if not head then
6263       head = n
6264     else
6265       last.next = n
6266     end
6267     last = n
6268   end
6269   return head
6270 end
6271
6272 Babel.fetch_subtext = {}
6273
6274 Babel.ignore_pre_char = function(node)
6275   return (node.lang == Babel.nohyphenation)
6276 end
6277
6278 -- Merging both functions doesn't seem feasible, because there are too
6279 -- many differences.
6280 Babel.fetch_subtext[0] = function(head)
6281   local word_string = ''
6282   local word_nodes = {}
6283   local lang
6284   local item = head
6285   local inmath = false
6286
6287   while item do
6288     if item.id == 11 then
6289       inmath = (item.subtype == 0)
6290     end
6291
6292     if inmath then
6293       -- pass
6294     elseif item.id == 29 then
```

```

6297     local locale = node.get_attribute(item, Babel.attr_locale)
6298
6299     if lang == locale or lang == nil then
6300         lang = lang or locale
6301         if Babel.ignore_pre_char(item) then
6302             word_string = word_string .. Babel.us_char
6303         else
6304             word_string = word_string .. unicode.utf8.char(item.char)
6305         end
6306         word_nodes[#word_nodes+1] = item
6307     else
6308         break
6309     end
6310
6311     elseif item.id == 12 and item.subtype == 13 then
6312         word_string = word_string .. ' '
6313         word_nodes[#word_nodes+1] = item
6314
6315     -- Ignore leading unrecognized nodes, too.
6316     elseif word_string ~= '' then
6317         word_string = word_string .. Babel.us_char
6318         word_nodes[#word_nodes+1] = item -- Will be ignored
6319     end
6320
6321     item = item.next
6322 end
6323
6324 -- Here and above we remove some trailing chars but not the
6325 -- corresponding nodes. But they aren't accessed.
6326 if word_string:sub(-1) == ' ' then
6327     word_string = word_string:sub(1,-2)
6328 end
6329 word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
6330 return word_string, word_nodes, item, lang
6331 end
6332
6333 Babel.fetch_subtext[1] = function(head)
6334     local word_string = ''
6335     local word_nodes = {}
6336     local lang
6337     local item = head
6338     local inmath = false
6339
6340     while item do
6341
6342         if item.id == 11 then
6343             inmath = (item.subtype == 0)
6344         end
6345
6346         if inmath then
6347             -- pass
6348
6349         elseif item.id == 29 then
6350             if item.lang == lang or lang == nil then
6351                 if (item.char ~= 124) and (item.char ~= 61) then -- not =, not |
6352                     lang = lang or item.lang
6353                     word_string = word_string .. unicode.utf8.char(item.char)
6354                     word_nodes[#word_nodes+1] = item
6355                 end
6356             else
6357                 break
6358             end
6359

```

```

6360     elseif item.id == 7 and item.subtype == 2 then
6361         word_string = word_string .. '='
6362         word_nodes[#word_nodes+1] = item
6363
6364     elseif item.id == 7 and item.subtype == 3 then
6365         word_string = word_string .. '|'
6366         word_nodes[#word_nodes+1] = item
6367
6368     -- (1) Go to next word if nothing was found, and (2) implicitly
6369     -- remove leading USs.
6370     elseif word_string == '' then
6371         -- pass
6372
6373     -- This is the responsible for splitting by words.
6374     elseif (item.id == 12 and item.subtype == 13) then
6375         break
6376
6377     else
6378         word_string = word_string .. Babel.us_char
6379         word_nodes[#word_nodes+1] = item -- Will be ignored
6380     end
6381
6382     item = item.next
6383 end
6384
6385 word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
6386 return word_string, word_nodes, item, lang
6387 end
6388
6389 function Babel.pre_hyphenate_replace(head)
6390     Babel.hyphenate_replace(head, 0)
6391 end
6392
6393 function Babel.post_hyphenate_replace(head)
6394     Babel.hyphenate_replace(head, 1)
6395 end
6396
6397 Babel.us_char = string.char(31)
6398
6399 function Babel.hyphenate_replace(head, mode)
6400     local u = unicode.utf8
6401     local lbkr = Babel.linebreaking.replacements[mode]
6402
6403     local word_head = head
6404
6405     while true do -- for each subtext block
6406
6407         local w, w_nodes, nw, lang = Babel.fetch_subtext[mode](word_head)
6408
6409         if Babel.debug then
6410             print()
6411             print((mode == 0) and '@@@<' or '@@@>', w)
6412         end
6413
6414         if nw == nil and w == '' then break end
6415
6416         if not lang then goto next end
6417         if not lbkr[lang] then goto next end
6418
6419         -- For each saved (pre|post)hyphenation. TODO. Reconsider how
6420         -- loops are nested.
6421         for k=1, #lbkr[lang] do
6422             local p = lbkr[lang][k].pattern

```

```

6423     local r = lbkr[lang][k].replace
6424     local attr = lbkr[lang][k].attr or -1
6425
6426     if Babel.debug then
6427         print('*****', p, mode)
6428     end
6429
6430     -- This variable is set in some cases below to the first *byte*
6431     -- after the match, either as found by u.match (faster) or the
6432     -- computed position based on sc if w has changed.
6433     local last_match = 0
6434     local step = 0
6435
6436     -- For every match.
6437     while true do
6438         if Babel.debug then
6439             print('====')
6440         end
6441         local new -- used when inserting and removing nodes
6442
6443         local matches = { u.match(w, p, last_match) }
6444
6445         if #matches < 2 then break end
6446
6447         -- Get and remove empty captures (with ()'s, which return a
6448         -- number with the position), and keep actual captures
6449         -- (from (...)), if any, in matches.
6450         local first = table.remove(matches, 1)
6451         local last = table.remove(matches, #matches)
6452         -- Non re-fetched substrings may contain \31, which separates
6453         -- subsubstrings.
6454         if string.find(w:sub(first, last-1), Babel.us_char) then break end
6455
6456         local save_last = last -- with A()BC()D, points to D
6457
6458         -- Fix offsets, from bytes to unicode. Explained above.
6459         first = u.len(w:sub(1, first-1)) + 1
6460         last = u.len(w:sub(1, last-1)) -- now last points to C
6461
6462         -- This loop stores in a small table the nodes
6463         -- corresponding to the pattern. Used by 'data' to provide a
6464         -- predictable behavior with 'insert' (w_nodes is modified on
6465         -- the fly), and also access to 'remove'd nodes.
6466         local sc = first-1 -- Used below, too
6467         local data_nodes = {}
6468
6469         local enabled = true
6470         for q = 1, last-first+1 do
6471             data_nodes[q] = w_nodes[sc+q]
6472             if enabled
6473                 and attr > -1
6474                 and not node.has_attribute(data_nodes[q], attr)
6475             then
6476                 enabled = false
6477             end
6478         end
6479
6480         -- This loop traverses the matched substring and takes the
6481         -- corresponding action stored in the replacement list.
6482         -- sc = the position in substr nodes / string
6483         -- rc = the replacement table index
6484         local rc = 0
6485

```

```

6486 while rc < last-first+1 do -- for each replacement
6487     if Babel.debug then
6488         print('.....', rc + 1)
6489     end
6490     sc = sc + 1
6491     rc = rc + 1
6492
6493     if Babel.debug then
6494         Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6495         local ss = ''
6496         for itt in node.traverse(head) do
6497             if itt.id == 29 then
6498                 ss = ss .. unicode.utf8.char(itt.char)
6499             else
6500                 ss = ss .. '{' .. itt.id .. '}'
6501             end
6502         end
6503         print('*****', ss)
6504
6505     end
6506
6507     local crep = r[rc]
6508     local item = w_nodes[sc]
6509     local item_base = item
6510     local placeholder = Babel.us_char
6511     local d
6512
6513     if crep and crep.data then
6514         item_base = data_nodes[crep.data]
6515     end
6516
6517     if crep then
6518         step = crep.step or 0
6519     end
6520
6521     if (not enabled) or (crep and next(crep) == nil) then -- = {}
6522         last_match = save_last -- Optimization
6523         goto next
6524
6525     elseif crep == nil or crep.remove then
6526         node.remove(head, item)
6527         table.remove(w_nodes, sc)
6528         w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
6529         sc = sc - 1 -- Nothing has been inserted.
6530         last_match = utf8.offset(w, sc+1+step)
6531         goto next
6532
6533     elseif crep and crep.kashida then -- Experimental
6534         node.set_attribute(item,
6535             Babel.attr_kashida,
6536             crep.kashida)
6537         last_match = utf8.offset(w, sc+1+step)
6538         goto next
6539
6540     elseif crep and crep.string then
6541         local str = crep.string(matches)
6542         if str == '' then -- Gather with nil
6543             node.remove(head, item)
6544             table.remove(w_nodes, sc)
6545             w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
6546             sc = sc - 1 -- Nothing has been inserted.
6547         else
6548             local loop_first = true

```

```

6549         for s in string.utfvalues(str) do
6550             d = node.copy(item_base)
6551             d.char = s
6552             if loop_first then
6553                 loop_first = false
6554                 head, new = node.insert_before(head, item, d)
6555                 if sc == 1 then
6556                     word_head = head
6557                 end
6558                 w_nodes[sc] = d
6559                 w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc+1)
6560             else
6561                 sc = sc + 1
6562                 head, new = node.insert_before(head, item, d)
6563                 table.insert(w_nodes, sc, new)
6564                 w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc)
6565             end
6566             if Babel.debug then
6567                 print('.....', 'str')
6568                 Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6569             end
6570             end -- for
6571             node.remove(head, item)
6572         end -- if ''
6573         last_match = utf8.offset(w, sc+1+step)
6574         goto next
6575
6576     elseif mode == 1 and crep and (crep.pre or crep.no or crep.post) then
6577         d = node.new(7, 0) -- (disc, discretionary)
6578         d.pre = Babel.str_to_nodes(crep.pre, matches, item_base)
6579         d.post = Babel.str_to_nodes(crep.post, matches, item_base)
6580         d.replace = Babel.str_to_nodes(crep.no, matches, item_base)
6581         d.attr = item_base.attr
6582         if crep.pre == nil then -- TeXbook p96
6583             d.penalty = crep.penalty or tex.hyphenpenalty
6584         else
6585             d.penalty = crep.penalty or tex.exhyphenpenalty
6586         end
6587         placeholder = '|'
6588         head, new = node.insert_before(head, item, d)
6589
6590     elseif mode == 0 and crep and (crep.pre or crep.no or crep.post) then
6591         -- ERROR
6592
6593     elseif crep and crep.penalty then
6594         d = node.new(14, 0) -- (penalty, userpenalty)
6595         d.attr = item_base.attr
6596         d.penalty = crep.penalty
6597         head, new = node.insert_before(head, item, d)
6598
6599     elseif crep and crep.space then
6600         -- 655360 = 10 pt = 10 * 65536 sp
6601         d = node.new(12, 13) -- (glue, spaceskip)
6602         local quad = font.getfont(item_base.font).size or 655360
6603         node.setglue(d, crep.space[1] * quad,
6604                     crep.space[2] * quad,
6605                     crep.space[3] * quad)
6606         if mode == 0 then
6607             placeholder = ' '
6608         end
6609         head, new = node.insert_before(head, item, d)
6610
6611     elseif crep and crep.spacefactor then

```

```

6612         d = node.new(12, 13)      -- (glue, spaceskip)
6613         local base_font = font.getfont(item_base.font)
6614         node.setglue(d,
6615             crep.spacefactor[1] * base_font.parameters['space'],
6616             crep.spacefactor[2] * base_font.parameters['space_stretch'],
6617             crep.spacefactor[3] * base_font.parameters['space_shrink'])
6618         if mode == 0 then
6619             placeholder = ' '
6620         end
6621         head, new = node.insert_before(head, item, d)
6622
6623     elseif mode == 0 and crep and crep.space then
6624         -- ERROR
6625
6626     end -- ie replacement cases
6627
6628     -- Shared by disc, space and penalty.
6629     if sc == 1 then
6630         word_head = head
6631     end
6632     if crep.insert then
6633         w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc)
6634         table.insert(w_nodes, sc, new)
6635         last = last + 1
6636     else
6637         w_nodes[sc] = d
6638         node.remove(head, item)
6639         w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc+1)
6640     end
6641
6642     last_match = utf8.offset(w, sc+1+step)
6643
6644     ::next::
6645
6646     end -- for each replacement
6647
6648     if Babel.debug then
6649         print('.....', '/')
6650         Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6651     end
6652
6653     end -- for match
6654
6655     end -- for patterns
6656
6657     ::next::
6658     word_head = nw
6659 end -- for substring
6660 return head
6661 end
6662
6663 -- This table stores capture maps, numbered consecutively
6664 Babel.capture_maps = {}
6665
6666 -- The following functions belong to the next macro
6667 function Babel.capture_func(key, cap)
6668     local ret = "[" .. cap:gsub('{{[0-9]}}', "]]..m[%1]..[") .. "]"
6669     local cnt
6670     local u = unicode.utf8
6671     ret, cnt = ret:gsub('{{[0-9]}|([^\]]+)|(.-)}', Babel.capture_func_map)
6672     if cnt == 0 then
6673         ret = u.gsub(ret, '{(%x%x%x%x+)}',
6674             function (n)

```



```

6675         return u.char(tonumber(n, 16))
6676     end)
6677 end
6678 ret = ret:gsub("%[%[%]]%.", '')
6679 ret = ret:gsub("%.%.%[%[%]]%", '')
6680 return key .. [[=function(m) return ]] .. ret .. [[ end]]
6681 end
6682
6683 function Babel.capt_map(from, mapno)
6684     return Babel.capture_maps[mapno][from] or from
6685 end
6686
6687 -- Handle the {n|abc|ABC} syntax in captures
6688 function Babel.capture_func_map(capno, from, to)
6689     local u = unicode.utf8
6690     from = u.gsub(from, '{(%x%x%x%x+)}',
6691         function (n)
6692             return u.char(tonumber(n, 16))
6693         end)
6694     to = u.gsub(to, '{(%x%x%x%x+)}',
6695         function (n)
6696             return u.char(tonumber(n, 16))
6697         end)
6698     local froms = {}
6699     for s in string.utfcharacters(from) do
6700         table.insert(froms, s)
6701     end
6702     local cnt = 1
6703     table.insert(Babel.capture_maps, {})
6704     local mlen = table.getn(Babel.capture_maps)
6705     for s in string.utfcharacters(to) do
6706         Babel.capture_maps[mlen][froms[cnt]] = s
6707         cnt = cnt + 1
6708     end
6709     return "]"..Babel.capt_map(m[" .. capno .. "], " ..
6710         (mlen) .. ").." .. "["
6711 end
6712
6713 -- Create/Extend reversed sorted list of kashida weights:
6714 function Babel.capture_kashida(key, wt)
6715     wt = tonumber(wt)
6716     if Babel.kashida_wts then
6717         for p, q in ipairs(Babel.kashida_wts) do
6718             if wt == q then
6719                 break
6720             elseif wt > q then
6721                 table.insert(Babel.kashida_wts, p, wt)
6722                 break
6723             elseif table.getn(Babel.kashida_wts) == p then
6724                 table.insert(Babel.kashida_wts, wt)
6725             end
6726         end
6727     else
6728         Babel.kashida_wts = { wt }
6729     end
6730     return 'kashida = ' .. wt
6731 end
6732 </transforms>

```

## 12.12 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):

Arrrrgh!! 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.

```
6733 <*basic-r>
6734 Babel = Babel or {}
6735
6736 Babel.bidi_enabled = true
6737
6738 require('babel-data-bidi.lua')
6739
6740 local characters = Babel.characters
6741 local ranges = Babel.ranges
6742
6743 local DIR = node.id("dir")
6744
6745 local function dir_mark(head, from, to, outer)
6746   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
6747   local d = node.new(DIR)
6748   d.dir = '+' .. dir
6749   node.insert_before(head, from, d)
6750   d = node.new(DIR)
6751   d.dir = '-' .. dir
6752   node.insert_after(head, to, d)
6753 end
6754
6755 function Babel.bidi(head, ispar)
6756   local first_n, last_n          -- first and last char with nums
6757   local last_es                  -- an auxiliary 'last' used with nums
6758   local first_d, last_d          -- first and last char in L/R block
6759   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):

```

6760 local strong = ('TRT' == tex.pardir) and 'r' or 'l'
6761 local strong_lr = (strong == 'l') and 'l' or 'r'
6762 local outer = strong
6763
6764 local new_dir = false
6765 local first_dir = false
6766 local inmath = false
6767
6768 local last_lr
6769
6770 local type_n = ''
6771
6772 for item in node.traverse(head) do
6773
6774   -- three cases: glyph, dir, otherwise
6775   if item.id == node.id'glyph'
6776     or (item.id == 7 and item.subtype == 2) then
6777
6778     local itemchar
6779     if item.id == 7 and item.subtype == 2 then
6780       itemchar = item.replace.char
6781     else
6782       itemchar = item.char
6783     end
6784     local chardata = characters[itemchar]
6785     dir = chardata and chardata.d or nil
6786     if not dir then
6787       for nn, et in ipairs(ranges) do
6788         if itemchar < et[1] then
6789           break
6790         elseif itemchar <= et[2] then
6791           dir = et[3]
6792           break
6793         end
6794       end
6795     end
6796     dir = dir or 'l'
6797     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).

```

6798   if new_dir then
6799     attr_dir = 0
6800     for at in node.traverse(item.attr) do
6801       if at.number == Babel.attr_dir then
6802         attr_dir = at.value % 3
6803       end
6804     end
6805     if attr_dir == 1 then
6806       strong = 'r'
6807     elseif attr_dir == 2 then
6808       strong = 'al'
6809     else
6810       strong = 'l'
6811     end
6812     strong_lr = (strong == 'l') and 'l' or 'r'
6813     outer = strong_lr
6814     new_dir = false
6815   end
6816

```

```
6817     if dir == 'nsm' then dir = strong end           -- W1
```

**Numbers.** The dual <al>/<r> system for R is somewhat cumbersome.

```
6818     dir_real = dir           -- We need dir_real to set strong below
6819     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:

```
6820     if strong == 'al' then
6821         if dir == 'en' then dir = 'an' end           -- W2
6822         if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
6823         strong_lr = 'r'                               -- W3
6824     end
```

Once finished the basic setup for glyphs, consider the two other cases: dir node and the rest.

```
6825     elseif item.id == node.id'dir' and not inmath then
6826         new_dir = true
6827         dir = nil
6828     elseif item.id == node.id'math' then
6829         inmath = (item.subtype == 0)
6830     else
6831         dir = nil           -- Not a char
6832     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>.

```
6833     if dir == 'en' or dir == 'an' or dir == 'et' then
6834         if dir ~= 'et' then
6835             type_n = dir
6836         end
6837         first_n = first_n or item
6838         last_n = last_es or item
6839         last_es = nil
6840     elseif dir == 'es' and last_n then -- W3+W6
6841         last_es = item
6842     elseif dir == 'cs' then           -- it's right - do nothing
6843     elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
6844         if strong_lr == 'r' and type_n ~= '' then
6845             dir_mark(head, first_n, last_n, 'r')
6846         elseif strong_lr == 'l' and first_d and type_n == 'an' then
6847             dir_mark(head, first_n, last_n, 'r')
6848             dir_mark(head, first_d, last_d, outer)
6849             first_d, last_d = nil, nil
6850         elseif strong_lr == 'l' and type_n ~= '' then
6851             last_d = last_n
6852         end
6853         type_n = ''
6854         first_n, last_n = nil, nil
6855     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:

```
6856     if dir == 'l' or dir == 'r' then
6857         if dir ~= outer then
6858             first_d = first_d or item
6859             last_d = item
6860         elseif first_d and dir ~= strong_lr then
6861             dir_mark(head, first_d, last_d, outer)
6862             first_d, last_d = nil, nil
```

```

6863     end
6864 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>, resptly, 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.

```

6865     if dir and not last_lr and dir ~= 'l' and outer == 'r' then
6866         item.char = characters[item.char] and
6867             characters[item.char].m or item.char
6868     elseif (dir or new_dir) and last_lr ~= item then
6869         local mir = outer .. strong_lr .. (dir or outer)
6870         if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
6871             for ch in node.traverse(node.next(last_lr)) do
6872                 if ch == item then break end
6873                 if ch.id == node.id'glyph' and characters[ch.char] then
6874                     ch.char = characters[ch.char].m or ch.char
6875             end
6876         end
6877     end
6878 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).

```

6879     if dir == 'l' or dir == 'r' then
6880         last_lr = item
6881         strong = dir_real          -- Don't search back - best save now
6882         strong_lr = (strong == 'l') and 'l' or 'r'
6883     elseif new_dir then
6884         last_lr = nil
6885     end
6886 end

```

Mirror the last chars if they are no directed. And make sure any open block is closed, too.

```

6887 if last_lr and outer == 'r' then
6888     for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
6889         if characters[ch.char] then
6890             ch.char = characters[ch.char].m or ch.char
6891         end
6892     end
6893 end
6894 if first_n then
6895     dir_mark(head, first_n, last_n, outer)
6896 end
6897 if first_d then
6898     dir_mark(head, first_d, last_d, outer)
6899 end

```

In boxes, the dir node could be added before the original head, so the actual head is the previous node.

```

6900 return node.prev(head) or head
6901 end
6902 </basic-r>

```

And here the Lua code for bidi=basic:

```

6903 <*basic>
6904 Babel = Babel or {}
6905
6906 -- eg, Babel.fontmap[1][<prefontid>]=<dirfontid>
6907
6908 Babel.fontmap = Babel.fontmap or {}
6909 Babel.fontmap[0] = {}          -- l
6910 Babel.fontmap[1] = {}          -- r

```

```

6911 Babel.fontmap[2] = {}      -- al/an
6912
6913 Babel.bidi_enabled = true
6914 Babel.mirroring_enabled = true
6915
6916 require('babel-data-bidi.lua')
6917
6918 local characters = Babel.characters
6919 local ranges = Babel.ranges
6920
6921 local DIR = node.id('dir')
6922 local GLYPH = node.id('glyph')
6923
6924 local function insert_implicit(head, state, outer)
6925   local new_state = state
6926   if state.sim and state.eim and state.sim ~= state.eim then
6927     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
6928     local d = node.new(DIR)
6929     d.dir = '+' .. dir
6930     node.insert_before(head, state.sim, d)
6931     local d = node.new(DIR)
6932     d.dir = '-' .. dir
6933     node.insert_after(head, state.eim, d)
6934   end
6935   new_state.sim, new_state.eim = nil, nil
6936   return head, new_state
6937 end
6938
6939 local function insert_numeric(head, state)
6940   local new
6941   local new_state = state
6942   if state.san and state.ean and state.san ~= state.ean then
6943     local d = node.new(DIR)
6944     d.dir = '+TLT'
6945     _, new = node.insert_before(head, state.san, d)
6946     if state.san == state.sim then state.sim = new end
6947     local d = node.new(DIR)
6948     d.dir = '-TLT'
6949     _, new = node.insert_after(head, state.ean, d)
6950     if state.ean == state.eim then state.eim = new end
6951   end
6952   new_state.san, new_state.ean = nil, nil
6953   return head, new_state
6954 end
6955
6956 -- TODO - \hbox with an explicit dir can lead to wrong results
6957 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>. A small attempt
6958 -- was s made to improve the situation, but the problem is the 3-dir
6959 -- model in babel/Unicode and the 2-dir model in LuaTeX don't fit
6960 -- well.
6961
6962 function Babel.bidi(head, ispar, hdir)
6963   local d      -- d is used mainly for computations in a loop
6964   local prev_d = ''
6965   local new_d = false
6966
6967   local nodes = {}
6968   local outer_first = nil
6969   local inmath = false
6970
6971   local glue_d = nil
6972   local glue_i = nil
6973

```

```

6974 local has_en = false
6975 local first_et = nil
6976
6977 local ATDIR = Babel.attr_dir
6978
6979 local save_outer
6980 local temp = node.get_attribute(head, ATDIR)
6981 if temp then
6982     temp = temp % 3
6983     save_outer = (temp == 0 and 'l') or
6984                 (temp == 1 and 'r') or
6985                 (temp == 2 and 'al')
6986 elseif ispar then -- Or error? Shouldn't happen
6987     save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
6988 else -- Or error? Shouldn't happen
6989     save_outer = ('TRT' == hdir) and 'r' or 'l'
6990 end
6991 -- when the callback is called, we are just _after_ the box,
6992 -- and the texdir is that of the surrounding text
6993 -- if not ispar and hdir ~= tex.texdir then
6994 --     save_outer = ('TRT' == hdir) and 'r' or 'l'
6995 -- end
6996 local outer = save_outer
6997 local last = outer
6998 -- 'al' is only taken into account in the first, current loop
6999 if save_outer == 'al' then save_outer = 'r' end
7000
7001 local fontmap = Babel.fontmap
7002
7003 for item in node.traverse(head) do
7004
7005     -- In what follows, #node is the last (previous) node, because the
7006     -- current one is not added until we start processing the neutrals.
7007
7008     -- three cases: glyph, dir, otherwise
7009     if item.id == GLYPH
7010         or (item.id == 7 and item.subtype == 2) then
7011
7012         local d_font = nil
7013         local item_r
7014         if item.id == 7 and item.subtype == 2 then
7015             item_r = item.replace -- automatic discs have just 1 glyph
7016         else
7017             item_r = item
7018         end
7019         local chardata = characters[item_r.char]
7020         d = chardata and chardata.d or nil
7021         if not d or d == 'nsm' then
7022             for nn, et in ipairs(ranges) do
7023                 if item_r.char < et[1] then
7024                     break
7025                 elseif item_r.char <= et[2] then
7026                     if not d then d = et[3]
7027                     elseif d == 'nsm' then d_font = et[3]
7028                     end
7029                     break
7030                 end
7031             end
7032         end
7033         d = d or 'l'
7034
7035         -- A short 'pause' in bidi for mapfont
7036         d_font = d_font or d

```

```

7037     d_font = (d_font == 'l' and 0) or
7038               (d_font == 'nsm' and 0) or
7039               (d_font == 'r' and 1) or
7040               (d_font == 'al' and 2) or
7041               (d_font == 'an' and 2) or nil
7042   if d_font and fontmap and fontmap[d_font][item_r.font] then
7043     item_r.font = fontmap[d_font][item_r.font]
7044   end
7045
7046   if new_d then
7047     table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
7048     if inmath then
7049       attr_d = 0
7050     else
7051       attr_d = node.get_attribute(item, ATDIR)
7052       attr_d = attr_d % 3
7053     end
7054     if attr_d == 1 then
7055       outer_first = 'r'
7056       last = 'r'
7057     elseif attr_d == 2 then
7058       outer_first = 'r'
7059       last = 'al'
7060     else
7061       outer_first = 'l'
7062       last = 'l'
7063     end
7064     outer = last
7065     has_en = false
7066     first_et = nil
7067     new_d = false
7068   end
7069
7070   if glue_d then
7071     if (d == 'l' and 'l' or 'r') ~= glue_d then
7072       table.insert(nodes, {glue_i, 'on', nil})
7073     end
7074     glue_d = nil
7075     glue_i = nil
7076   end
7077
7078   elseif item.id == DIR then
7079     d = nil
7080     if head ~= item then new_d = true end
7081
7082   elseif item.id == node.id'glue' and item.subtype == 13 then
7083     glue_d = d
7084     glue_i = item
7085     d = nil
7086
7087   elseif item.id == node.id'math' then
7088     inmath = (item.subtype == 0)
7089
7090   else
7091     d = nil
7092   end
7093
7094   -- AL <= EN/ET/ES      -- W2 + W3 + W6
7095   if last == 'al' and d == 'en' then
7096     d = 'an'            -- W3
7097   elseif last == 'al' and (d == 'et' or d == 'es') then
7098     d = 'on'            -- W6
7099   end

```



```

7100
7101 -- EN + CS/ES + EN      -- W4
7102 if d == 'en' and #nodes >= 2 then
7103     if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
7104         and nodes[#nodes-1][2] == 'en' then
7105         nodes[#nodes][2] = 'en'
7106     end
7107 end
7108
7109 -- AN + CS + AN          -- W4 too, because uax9 mixes both cases
7110 if d == 'an' and #nodes >= 2 then
7111     if (nodes[#nodes][2] == 'cs')
7112         and nodes[#nodes-1][2] == 'an' then
7113         nodes[#nodes][2] = 'an'
7114     end
7115 end
7116
7117 -- ET/EN                  -- W5 + W7->l / W6->on
7118 if d == 'et' then
7119     first_et = first_et or (#nodes + 1)
7120 elseif d == 'en' then
7121     has_en = true
7122     first_et = first_et or (#nodes + 1)
7123 elseif first_et then      -- d may be nil here !
7124     if has_en then
7125         if last == 'l' then
7126             temp = 'l'    -- W7
7127         else
7128             temp = 'en'   -- W5
7129         end
7130     else
7131         temp = 'on'      -- W6
7132     end
7133     for e = first_et, #nodes do
7134         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
7135     end
7136     first_et = nil
7137     has_en = false
7138 end
7139
7140 -- Force mathdir in math if ON (currently works as expected only
7141 -- with 'l')
7142 if inmath and d == 'on' then
7143     d = ('TRT' == tex.mathdir) and 'r' or 'l'
7144 end
7145
7146 if d then
7147     if d == 'al' then
7148         d = 'r'
7149         last = 'al'
7150     elseif d == 'l' or d == 'r' then
7151         last = d
7152     end
7153     prev_d = d
7154     table.insert(nodes, {item, d, outer_first})
7155 end
7156
7157 outer_first = nil
7158
7159 end
7160
7161 -- TODO -- repeated here in case EN/ET is the last node. Find a
7162 -- better way of doing things:

```

```

7163 if first_et then          -- dir may be nil here !
7164   if has_en then
7165     if last == 'l' then
7166       temp = 'l'          -- W7
7167     else
7168       temp = 'en'         -- W5
7169     end
7170   else
7171     temp = 'on'           -- W6
7172   end
7173   for e = first_et, #nodes do
7174     if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
7175   end
7176 end
7177
7178 -- dummy node, to close things
7179 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
7180
7181 ----- NEUTRAL -----
7182
7183 outer = save_outer
7184 last = outer
7185
7186 local first_on = nil
7187
7188 for q = 1, #nodes do
7189   local item
7190
7191   local outer_first = nodes[q][3]
7192   outer = outer_first or outer
7193   last = outer_first or last
7194
7195   local d = nodes[q][2]
7196   if d == 'an' or d == 'en' then d = 'r' end
7197   if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
7198
7199   if d == 'on' then
7200     first_on = first_on or q
7201   elseif first_on then
7202     if last == d then
7203       temp = d
7204     else
7205       temp = outer
7206     end
7207     for r = first_on, q - 1 do
7208       nodes[r][2] = temp
7209       item = nodes[r][1]          -- MIRRORING
7210       if Babel.mirroring_enabled and item.id == GLYPH
7211         and temp == 'r' and characters[item.char] then
7212         local font_mode = ''
7213         if font.fonts[item.font].properties then
7214           font_mode = font.fonts[item.font].properties.mode
7215         end
7216         if font_mode ~= 'harf' and font_mode ~= 'plug' then
7217           item.char = characters[item.char].m or item.char
7218         end
7219       end
7220     end
7221     first_on = nil
7222   end
7223
7224   if d == 'r' or d == 'l' then last = d end
7225 end

```

```

7226
7227 ----- IMPLICIT, REORDER -----
7228
7229 outer = save_outer
7230 last = outer
7231
7232 local state = {}
7233 state.has_r = false
7234
7235 for q = 1, #nodes do
7236
7237     local item = nodes[q][1]
7238
7239     outer = nodes[q][3] or outer
7240
7241     local d = nodes[q][2]
7242
7243     if d == 'nsm' then d = last end          -- W1
7244     if d == 'en' then d = 'an' end
7245     local isdir = (d == 'r' or d == 'l')
7246
7247     if outer == 'l' and d == 'an' then
7248         state.san = state.san or item
7249         state.ean = item
7250     elseif state.san then
7251         head, state = insert_numeric(head, state)
7252     end
7253
7254     if outer == 'l' then
7255         if d == 'an' or d == 'r' then      -- im -> implicit
7256             if d == 'r' then state.has_r = true end
7257             state.sim = state.sim or item
7258             state.eim = item
7259         elseif d == 'l' and state.sim and state.has_r then
7260             head, state = insert_implicit(head, state, outer)
7261         elseif d == 'l' then
7262             state.sim, state.eim, state.has_r = nil, nil, false
7263         end
7264     else
7265         if d == 'an' or d == 'l' then
7266             if nodes[q][3] then -- nil except after an explicit dir
7267                 state.sim = item -- so we move sim 'inside' the group
7268             else
7269                 state.sim = state.sim or item
7270             end
7271             state.eim = item
7272         elseif d == 'r' and state.sim then
7273             head, state = insert_implicit(head, state, outer)
7274         elseif d == 'r' then
7275             state.sim, state.eim = nil, nil
7276         end
7277     end
7278
7279     if isdir then
7280         last = d          -- Don't search back - best save now
7281     elseif d == 'on' and state.san then
7282         state.san = state.san or item
7283         state.ean = item
7284     end
7285
7286 end
7287
7288 return node.prev(head) or head

```

```
7289 end
7290 </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.

```
7291 <*nil>
7292 \ProvidesLanguage{nil}[<<date>> <<version>> Nil language]
7293 \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.

```
7294 \ifx\l@nil\@undefined
7295   \newlanguage\l@nil
7296   \namedef{bbl@hyphendata@the\l@nil}{%}% Remove warning
7297   \let\bbl@elt\relax
7298   \edef\bbl@languages{% Add it to the list of languages
7299     \bbl@languages\bbl@elt{nil}{the\l@nil}{%}%
7300 \fi
```

This macro is used to store the values of the hyphenation parameters `\lefthyphenmin` and `\righthyphenmin`.

```
7301 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}
```

The next step consists of defining commands to switch to (and from) the ‘nil’ language.

```
\captionnil
\datenil
7302 \let\captionnil\@empty
7303 \let\datenil\@empty
```

There is no locale file for this pseudo-language, so the corresponding fields are defined here.

```
7304 \def\bbl@inidata@nil{%
7305   \bbl@elt{identification}{tag.ini}{und}%
7306   \bbl@elt{identification}{load.level}{0}%
7307   \bbl@elt{identification}{charset}{utf8}%
7308   \bbl@elt{identification}{version}{1.0}%
7309   \bbl@elt{identification}{date}{2022-05-16}%
7310   \bbl@elt{identification}{name.local}{nil}%
7311   \bbl@elt{identification}{name.english}{nil}%
7312   \bbl@elt{identification}{name.babel}{nil}%
7313   \bbl@elt{identification}{tag.bcp47}{und}%
7314   \bbl@elt{identification}{language.tag.bcp47}{und}%
7315   \bbl@elt{identification}{tag.opentype}{dflt}%
7316   \bbl@elt{identification}{script.name}{Latin}%
7317   \bbl@elt{identification}{script.tag.bcp47}{Latn}%
```

```

7318 \bbl@elt{identification}{script.tag.opentype}{DFLT}%
7319 \bbl@elt{identification}{level}{1}%
7320 \bbl@elt{identification}{encodings}{}%
7321 \bbl@elt{identification}{derivate}{no}
7322 \@namedef{bbl@tbc@nil}{und}
7323 \@namedef{bbl@lbc@nil}{und}
7324 \@namedef{bbl@lotf@nil}{dflt}
7325 \@namedef{bbl@elname@nil}{nil}
7326 \@namedef{bbl@lname@nil}{nil}
7327 \@namedef{bbl@esname@nil}{Latin}
7328 \@namedef{bbl@sname@nil}{Latin}
7329 \@namedef{bbl@sbc@nil}{Latn}
7330 \@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.

```

7331 \ldf@finish{nil}
7332 /nil

```

## 15 Support for Plain T<sub>E</sub>X (plain.def)

### 15.1 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`.

```

7333 < *bplain | blplain >
7334 \catcode\{=1 % left brace is begin-group character
7335 \catcode\}=2 % right brace is end-group character
7336 \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).

```

7337 \openin 0 hyphen.cfg
7338 \ifeof0
7339 \else
7340 \let\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.

```

7341 \def\input #1 {%
7342 \let\input\input
7343 \a hyphen.cfg
7344 \let\input\undefined
7345 }
7346 \fi
7347 < /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`.

```
7348 \bplain\la plain.tex
7349 \bplain\la 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.

```
7350 \bplain\def\fmtname{babel-plain}
7351 \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.

## 15.2 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).

```
7352 \langle\langle *Emulate LaTeX \rangle\rangle \equiv
7353 \def\@empty{}
7354 \def\loadlocalcfg#1{%
7355   \openin0#1.cfg
7356   \ifeof0
7357     \closein0
7358   \else
7359     \closein0
7360     {\immediate\write16{*****}%
7361      \immediate\write16{* Local config file #1.cfg used}%
7362      \immediate\write16{*}%
7363     }
7364     \input #1.cfg\relax
7365   \fi
7366   \@endofldf}
```

## 15.3 General tools

A number of  $\text{\LaTeX}$  macro's that are needed later on.

```
7367 \long\def\@firstofone#1{#1}
7368 \long\def\@firstoftwo#1#2{#1}
7369 \long\def\@secondoftwo#1#2{#2}
7370 \def\@nnil{\nil}
7371 \def\@gobbletwo#1#2{}
7372 \def\@ifstar#1{\ifnextchar *{\@firstoftwo{#1}}}
7373 \def\@star@or@long#1{%
7374   \@ifstar
7375   {\let\l@ngrel@x\relax#1}%
7376   {\let\l@ngrel@x\long#1}}
7377 \let\l@ngrel@x\relax
7378 \def\@car#1#2\@nil{#1}
7379 \def\@cdr#1#2\@nil{#2}
7380 \let\@typeset@protect\relax
7381 \let\protected@edef\edef
7382 \long\def\@gobble#1{}
7383 \edef\@backslashchar{\expandafter\@gobble\string\}
7384 \def\strip@prefix#1>{}
7385 \def\g@addto@macro#1#2{{%
7386   \toks@\expandafter{#1#2}%
7387   \xdef#1{\the\toks@}}}
7388 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
7389 \def\@nameuse#1{\csname #1\endcsname}
```

```

7390 \def\@ifundefined#1{%
7391   \expandafter\ifx\csname#1\endcsname\relax
7392     \expandafter\@firstoftwo
7393   \else
7394     \expandafter\@secondoftwo
7395   \fi}
7396 \def\@expandtwoargs#1#2#3{%
7397   \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
7398 \def\zap@space#1 #2{%
7399   #1%
7400   \ifx#2\@empty\else\expandafter\zap@space\fi
7401   #2}
7402 \let\bbl@trace\@gobble
7403 \def\bbl@error#1#2{%
7404   \begingroup
7405     \newlinechar=`^^J
7406     \def\{^^J(babel) }%
7407     \errhelp{#2}\errmessage{\#1}%
7408   \endgroup}
7409 \def\bbl@warning#1{%
7410   \begingroup
7411     \newlinechar=`^^J
7412     \def\{^^J(babel) }%
7413     \message{\#1}%
7414   \endgroup}
7415 \let\bbl@infowarn\bbl@warning
7416 \def\bbl@info#1{%
7417   \begingroup
7418     \newlinechar=`^^J
7419     \def\{^^J}%
7420     \wlog{#1}%
7421   \endgroup}

```

$\text{\LaTeX}$  has the command `\@onlypreamble` which adds commands to a list of commands that are no longer needed after `\begin{document}`.

```

7422 \ifx\@preamblecmds\@undefined
7423   \def\@preamblecmds{}
7424 \fi
7425 \def\@onlypreamble#1{%
7426   \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
7427     \@preamblecmds\do#1}}
7428 \@onlypreamble\@onlypreamble

```

Mimick  $\text{\LaTeX}$ 's `\AtBeginDocument`; for this to work the user needs to add `\begin{document}` to his file.

```

7429 \def\begin{document}{%
7430   \@begin{document}hook
7431   \global\let\@begin{document}hook\@undefined
7432   \def\do##1{\global\let##1\@undefined}%
7433   \@preamblecmds
7434   \global\let\do\noexpand}
7435 \ifx\@begin{document}hook\@undefined
7436   \def\@begin{document}hook{}
7437 \fi
7438 \@onlypreamble\@begin{document}hook
7439 \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`.

```

7440 \def\AtEndOfPackage#1{\g@addto@macro\@endofldf{#1}}
7441 \@onlypreamble\AtEndOfPackage
7442 \def\@endofldf{}
7443 \@onlypreamble\@endofldf
7444 \let\bbl@afterlang\@empty
7445 \chardef\bbl@opt@hyphenmap\z@

```

$\LaTeX$  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.

```

7446 \catcode`\&=\z@
7447 \ifx&\if@filesw\@undefined
7448   \expandafter\let\csname if@filesw\expandafter\endcsname
7449     \csname iffalse\endcsname
7450 \fi
7451 \catcode`\&=4

  Mimick  $\LaTeX$ 's commands to define control sequences.

7452 \def\newcommand{\@star@or@long\new@command}
7453 \def\new@command#1{%
7454   \@testopt{\@newcommand#1}0}
7455 \def\@newcommand#1[#2]{%
7456   \@ifnextchar [{\@xargdef#1[#2]}%
7457     {\@argdef#1[#2]}}
7458 \long\def\@argdef#1[#2]#3{%
7459   \@yargdef#1\@ne{#2}{#3}}
7460 \long\def\@xargdef#1[#2][#3]#4{%
7461   \expandafter\def\expandafter#1\expandafter{%
7462     \expandafter\@protected@testopt\expandafter #1%
7463     \csname\string#1\expandafter\endcsname{#3}}%
7464   \expandafter\@yargdef \csname\string#1\endcsname
7465   \tw@{#2}{#4}}
7466 \long\def\@yargdef#1#2#3{%
7467   \@tempcnta#3\relax
7468   \advance \@tempcnta \@ne
7469   \let\@hash@\relax
7470   \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
7471   \@tempcntb #2%
7472   \@whilenum\@tempcntb <\@tempcnta
7473   \do{%
7474     \edef\reserved@a{\reserved@a\@hash@\the\@tempcntb}%
7475     \advance\@tempcntb \@ne}%
7476   \let\@hash@##%
7477   \l@ngrel@\x\expandafter\def\expandafter#1\reserved@a}
7478 \def\providecommand{\@star@or@long\provide@command}
7479 \def\provide@command#1{%
7480   \begingroup
7481     \escapechar\m@ne\xdef\@gtempa{\string#1}%
7482   \endgroup
7483   \expandafter\@ifundefined\@gtempa
7484     {\def\reserved@a{\new@command#1}}%
7485     {\let\reserved@a\relax
7486     \def\reserved@a{\new@command\reserved@a}}%
7487   \reserved@a}%

7488 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
7489 \def\declare@robustcommand#1{%
7490   \edef\reserved@a{\string#1}%
7491   \def\reserved@b{#1}%
7492   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
7493   \edef#1{%
7494     \ifx\reserved@a\reserved@b
7495       \noexpand\x@protect
7496       \noexpand#1%
7497     \fi
7498     \noexpand\protect
7499     \expandafter\noexpand\csname
7500       \expandafter\@gobble\string#1 \endcsname
7501   }%
7502   \expandafter\new@command\csname
7503     \expandafter\@gobble\string#1 \endcsname

```



```

7504 }
7505 \def\x@protect#1{%
7506   \ifx\protect\@typeset@protect\else
7507     \x@protect#1%
7508   \fi
7509 }
7510 \catcode`\&=\z@ % Trick to hide conditionals
7511 \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`.

```

7512 \def\bbl@tempa{\csname newif\endcsname&ifin@}
7513 \catcode`\&=4
7514 \ifx\in@\@undefined
7515   \def\in@#1#2{%
7516     \def\in@##1#1##2##3\in@{%
7517       \ifx\in@##2\in@false\else\in@true\fi}%
7518     \in@##2#1\in@\in@@}
7519 \else
7520   \let\bbl@tempa\@empty
7521 \fi
7522 \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).

```

7523 \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.

```

7524 \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.

```

7525 \ifx\@tempcnta\@undefined
7526   \csname newcount\endcsname\@tempcnta\relax
7527 \fi
7528 \ifx\@tempcntb\@undefined
7529   \csname newcount\endcsname\@tempcntb\relax
7530 \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`).

```

7531 \ifx\bye\@undefined
7532   \advance\count10 by -2\relax
7533 \fi
7534 \ifx\@ifnextchar\@undefined
7535   \def\@ifnextchar#1#2#3{%
7536     \let\reserved@d=#1%
7537     \def\reserved@a{#2}\def\reserved@b{#3}%
7538     \futurelet\@let@token\@ifnch}
7539   \def\@ifnch{%
7540     \ifx\@let@token\@sptoken
7541       \let\reserved@c\@xifnch
7542     \else
7543       \ifx\@let@token\reserved@d
7544         \let\reserved@c\reserved@a
7545       \else
7546         \let\reserved@c\reserved@b
7547     \fi

```

```

7548 \fi
7549 \reserved@c}
7550 \def\:\let\sptoken= }\: % this makes \sptoken a space token
7551 \def\:\@xifnch\expandafter\def\:\futurelet\@let@token\@ifnch}
7552 \fi
7553 \def\@testopt#1#2{%
7554 \@ifnextchar[{\#1}{\#1[\#2]}}
7555 \def\@protected@testopt#1{%
7556 \ifx\protect\@typeset@protect
7557 \expandafter\@testopt
7558 \else
7559 \@x@protect#1%
7560 \fi}
7561 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
7562 #2\relax}\fi}
7563 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
7564 \else\expandafter\@gobble\fi{#1}}

```

## 15.4 Encoding related macros

Code from `ltoutenc.dtx`, adapted for use in the plain  $\TeX$  environment.

```

7565 \def\DeclareTextCommand{%
7566 \@dec@text@cmd\providecommand
7567 }
7568 \def\ProvideTextCommand{%
7569 \@dec@text@cmd\providecommand
7570 }
7571 \def\DeclareTextSymbol#1#2#3{%
7572 \@dec@text@cmd\chardef#1{#2}#3\relax
7573 }
7574 \def\@dec@text@cmd#1#2#3{%
7575 \expandafter\def\expandafter#2%
7576 \expandafter{%
7577 \csname#3-cmd\expandafter\endcsname
7578 \expandafter#2%
7579 \csname#3-string#2\endcsname
7580 }%
7581 % \let\@ifdefinable\rc@ifdefinable
7582 \expandafter#1\csname#3-string#2\endcsname
7583 }
7584 \def\@current@cmd#1{%
7585 \ifx\protect\@typeset@protect\else
7586 \noexpand#1\expandafter\@gobble
7587 \fi
7588 }
7589 \def\@changed@cmd#1#2{%
7590 \ifx\protect\@typeset@protect
7591 \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
7592 \expandafter\ifx\csname ?\string#1\endcsname\relax
7593 \expandafter\def\csname ?\string#1\endcsname{%
7594 \@changed@x@err{#1}%
7595 }%
7596 \fi
7597 \global\expandafter\let
7598 \csname\cf@encoding\string#1\expandafter\endcsname
7599 \csname ?\string#1\endcsname
7600 \fi
7601 \csname\cf@encoding\string#1%
7602 \expandafter\endcsname
7603 \else
7604 \noexpand#1%
7605 \fi
7606 }

```

```

7607 \def\@changed@x@err#1{%
7608     \errhelp{Your command will be ignored, type <return> to proceed}%
7609     \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
7610 \def\DeclareTextCommandDefault#1{%
7611     \DeclareTextCommand#1?%
7612 }
7613 \def\ProvideTextCommandDefault#1{%
7614     \ProvideTextCommand#1?%
7615 }
7616 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
7617 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
7618 \def\DeclareTextAccent#1#2#3{%
7619     \DeclareTextCommand#1{#2}[1]{\accent#3 ##1}
7620 }
7621 \def\DeclareTextCompositeCommand#1#2#3#4{%
7622     \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
7623     \edef\reserved@b{\string##1}%
7624     \edef\reserved@c{%
7625         \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
7626     \ifx\reserved@b\reserved@c
7627         \expandafter\expandafter\expandafter\ifx
7628             \expandafter\@car\reserved@a\relax\relax\@nil
7629             \@text@composite
7630     \else
7631         \edef\reserved@b##1{%
7632             \def\expandafter\noexpand
7633                 \csname#2\string#1\endcsname###1{%
7634                     \noexpand\@text@composite
7635                     \expandafter\noexpand\csname#2\string#1\endcsname
7636                     ###1\noexpand\@empty\noexpand\@text@composite
7637                     {##1}%
7638             }%
7639         }%
7640         \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
7641     \fi
7642     \expandafter\def\csname\expandafter\string\csname
7643         #2\endcsname\string#1-\string#3\endcsname{#4}
7644 \else
7645     \errhelp{Your command will be ignored, type <return> to proceed}%
7646     \errmessage{\string\DeclareTextCompositeCommand\space used on
7647         inappropriate command \protect#1}
7648 \fi
7649 }
7650 \def\@text@composite#1#2#3\@text@composite{%
7651     \expandafter\@text@composite@x
7652     \csname\string#1-\string#2\endcsname
7653 }
7654 \def\@text@composite@x#1#2{%
7655     \ifx#1\relax
7656         #2%
7657     \else
7658         #1%
7659     \fi
7660 }
7661 %
7662 \def\@strip@args#1:#2-#3\@strip@args{#2}
7663 \def\DeclareTextComposite#1#2#3#4{%
7664     \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
7665     \bgroup
7666         \lccode`\@=#4%
7667         \lowercase{%
7668     \egroup
7669     \reserved@a @%

```

```

7670 }%
7671 }
7672 %
7673 \def\UseTextSymbol#1#2{#2}
7674 \def\UseTextAccent#1#2#3{
7675 \def\@use@text@encoding#1{
7676 \def\DeclareTextSymbolDefault#1#2{%
7677 \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
7678 }
7679 \def\DeclareTextAccentDefault#1#2{%
7680 \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
7681 }
7682 \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.

```

7683 \DeclareTextAccent{"}{OT1}{127}
7684 \DeclareTextAccent{'}{OT1}{19}
7685 \DeclareTextAccent{^}{OT1}{94}
7686 \DeclareTextAccent{`}{OT1}{18}
7687 \DeclareTextAccent{~}{OT1}{126}

```

The following control sequences are used in `babel.def` but are not defined for PLAIN  $\text{\TeX}$ .

```

7688 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
7689 \DeclareTextSymbol{\textquotedblright}{OT1}{`"}
7690 \DeclareTextSymbol{\textquoteleft}{OT1}{``}
7691 \DeclareTextSymbol{\textquoteright}{OT1}{' '}
7692 \DeclareTextSymbol{\i}{OT1}{16}
7693 \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`.

```

7694 \ifx\scriptsize\undefined
7695 \let\scriptsize\sevenrm
7696 \fi

```

And a few more “dummy” definitions.

```

7697 \def\language{english}%
7698 \let\bbl@opt@shorthands\@nnil
7699 \def\bbl@ifshorthand#1#2#3{#2}%
7700 \let\bbl@language@opts\@empty
7701 \ifx\babeloptionstrings\undefined
7702 \let\bbl@opt@strings\@nnil
7703 \else
7704 \let\bbl@opt@strings\babeloptionstrings
7705 \fi
7706 \def\BabelStringsDefault{generic}
7707 \def\bbl@tempa{normal}
7708 \ifx\babeloptionmath\bbl@tempa
7709 \def\bbl@mathnormal{\noexpand\textormath}
7710 \fi
7711 \def\AfterBabelLanguage#1#2{}
7712 \ifx\BabelModifiers\undefined\let\BabelModifiers\relax\fi
7713 \let\bbl@afterlang\relax
7714 \def\bbl@opt@safe{BR}
7715 \ifx\@uclclist\undefined\let\@uclclist\@empty\fi
7716 \ifx\bbl@trace\undefined\def\bbl@trace#1{}\fi
7717 \expandafter\newif\csname ifbbl@single\endcsname
7718 \chardef\bbl@bidimode\z@
7719 </Emulate LaTeX>

```

A proxy file:

```

7720 < *plain>
7721 \input babel.def
7722 < /plain>

```

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## References

- [1] Huda Smitshuijzen Abifares, *Arabic Typography*, Saqi, 2001.
- [2] Johannes Braams, Victor Eijkhout and Nico Poppelier, *The development of national  $\text{\LaTeX}$  styles*, *TUGboat* 10 (1989) #3, p. 401–406.
- [3] Yannis Haralambous, *Fonts & Encodings*, O'Reilly, 2007.
- [4] Donald E. Knuth, *The  $\text{\TeX}$ book*, Addison-Wesley, 1986.
- [5] Jukka K. Korpela, *Unicode Explained*, O'Reilly, 2006.
- [6] Leslie Lamport,  *$\text{\LaTeX}$ , A document preparation System*, Addison-Wesley, 1986.
- [7] Leslie Lamport, in:  $\text{\TeX}$ hax Digest, Volume 89, #13, 17 February 1989.
- [8] Ken Lunde, *CJKV Information Processing*, O'Reilly, 2nd ed., 2009.
- [9] Hubert Partl, *German  $\text{\TeX}$* , *TUGboat* 9 (1988) #1, p. 70–72.
- [10] Joachim Schrod, *International  $\text{\LaTeX}$  is ready to use*, *TUGboat* 11 (1990) #1, p. 87–90.
- [11] Apostolos Syropoulos, Antonis Tsolomitis and Nick Sofroniu, *Digital typography using  $\text{\LaTeX}$* , Springer, 2002, p. 301–373.
- [12] K.F. Treebus. *Tekstwijzer, een gids voor het grafisch verwerken van tekst*, SDU Uitgeverij (s-Gravenhage, 1988).