Babel

The standard distribution of LaTeX contains a number of document classes that are meant to be used, but also serve as examples for other users to create their own document classes. These document classes have become very popular among LaTeX users. But it should be kept in mind that they were designed for American tastes and typography. At one time they even contained a number of hard-wired texts.

This manual describes babel, a package that makes use of the capabilities of TeX version 3 and, to some extent, xetex and luatex, to provide an environment in which documents can be typeset in a language other than US English, or in more than one language or script.

Current development is focused on Unicode engines (XeTeX and LuaTeX) and the so-called *complex scripts*. New features related to font selection, bidi writing and the like will be added incrementally.

Babel provides support (total or partial) for about 200 languages, either as a "classical" package option or as an `ini` file. Furthermore, new languages can be created from scratch easily.

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User guide

- This user guide focuses on LaTeX. There are also some notes on its use with Plain TeX.

- Changes and new features with relation to version 3.8 are highlighted with New X.XX . The most recent features could be still unstable. Please, report any issues you find on `https://github.com/latex3/latex2e/issues`, and note just complaining on an e-mail list or a web forum is usually of little help.

- If you are interested in the TeX multilingual support, please join the kadingira list on `http://tug.org/mailman/listinfo/kadingira`. You can follow the development of babel on `https://github.com/latex3/latex2e/tree/master/required/babel` (which provides some sample files, too).

- See section 3.1 for contributing a language.

- The first sections describe the traditional way of loading a language (with `ldf` files). The alternative way based on `ini` files, which complements the previous one (it will *not* replace it), is described below.

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 standand mechanism for this purpose, namely, passing that language as an optional argument. In addition, you may want to set the font and input encodings.

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 (however, the package inputenc may be omitted with LaTeX $\geq$ 2018-04-01 if the encoding is UTF-8):

```
\documentclass{article}

\usepackage[T1]{fontenc}
\usepackage[utf8]{inputenc}

\usepackage[french]{babel}

\begin{document}

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

\end{document}
```

TROUBLESHOOTING A common source of trouble is a wrong setting of the input encoding. Very often you will get the following somewhat cryptic error:

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

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

Another approach is making the language (french in the example) a global option in order to let other packages detect and use it:

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

In this last example, the package `varioref` will also see the option and will be able to use it.

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

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

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

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

1.2 Multilingual documents

In multilingual documents, just use several options. The last one is considered the main language, activated by default. Sometimes, the main language changes the document layout (eg, `spanish` and `french`).

EXAMPLE In LaTeX, the preamble of the document:

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

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

You can also set the main language explicitly:

```
\documentclass{article}
\usepackage[main=english,dutch]{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 \languagename (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, decribed below in detail:
\selectlanguage is used for blocks of text, while \foreignlanguage is for chunks of text
inside paragraphs.

EXAMPLE A full bilingual document follows. The main language is french, which is
activated when the document begins. The package inputenc may be omitted with LaTeX
≥ 2018-04-01 if the encoding is UTF-8.

```
    \documentclass{article}

    \usepackage[T1]{fontenc}
    \usepackage[utf8]{inputenc}

    \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}
```

1.3 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 accept
them). An example is (spaces are not significant and they can be added or removed):[1]

```
  \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 is a more general mechanism.

1.4 xelatex and lualatex

Many languages are compatible with xetex and luatex. With them you can use babel to
localize the documents.
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.

---

[1]No predefined "axis" for modifiers are provided because languages and their scripts have quite different needs.

EXAMPLE 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.

```
\documentclass{article}

\usepackage[vietnamese,danish]{babel}

\begin{document}

\prefacename{} -- \alsoname{} -- \today

\selectlanguage{vietnamese}

\prefacename{} -- \alsoname{} -- \today

\end{document}
```

EXAMPLE Here is a simple monolingual document in Russian (text from the Wikipedia). 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).

```
\documentclass{article}

\usepackage[russian]{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}
```

1.5 Troubleshooting

- Loading directly sty files in LaTeX (ie, \usepackage{⟨*language*⟩}) is deprecated and you will get the error:[2]

```
! 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:[3]

---

[2]In old versions the error read "You have used an old interface to call babel", not very helpful.
[3]In old versions the error read "You haven't loaded the language LANG yet".

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

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

1.6 Plain

In 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 Plain.[4]

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   {⟨*language*⟩}

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.

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

---

[4]Even in the babel kernel there were some macros not compatible with plain. Hopefully these issues will be fixed soon.

```
{\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.

\foreignlanguage   {⟨*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).

1.8   Auxiliary language selectors

\begin{otherlanguage}   {⟨*language*⟩}   ...   \end{otherlanguage}

The environment otherlanguage does basically the same as \selectlanguage, except the 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*}   {⟨*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.

\begin{hyphenrules}   {⟨*language*⟩}   ...   \end{hyphenrules}

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

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.

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 russian, 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{russian}{text \foreignlanguage{polish}{\seename} text}
```

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

```
\babelensure{polish}
```

By default only the basic captions and `\today` are redefined, but you can add further macros with the key `include` in the optional argument (without commas). Macros not to be modified are listed in `exclude`. You can also enforce a font encoding with `fontenc`.[5] A couple of examples:

---

[5]With it encoded string may not work as expected.

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

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

1.10 Shorthands

A *shorthand* is a sequence of one or two characters that expands to arbitrary TeX code. Shorthands can be used for different kinds of things, as for example: (1) in some languages shorthands such as "a are defined to be able to hyphenate the word if the encoding is OT1; (2) in some languages shorthands such as ! are used to insert the right amount of white space; (3) several kinds of discretionaries and breaks can be inserted easily with "-, "=, etc. The package inputenc as well as xetex an 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 \knbccode, and luatex can manipulate the glyph list. Tools for point 3 can be still very useful in general.
There are three levels of shorthands: *user*, *language*, and *system* (by order of precedence). Version 3.9 introduces the *language user* level on top of the user level, as described below. In most cases, you will use only shorthands provided by languages.

NOTE Note 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) 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 it is deactivated with, eg, `string`).

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. If a character is not known to be a shorthand character its category code will be left unchanged.

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.

\useshorthands *{⟨*char*⟩}

The command \useshorthands 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 \useshorthands*{⟨*char*⟩} is provided, which makes sure shorthands are always activated.

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

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

The command \defineshorthand takes two arguments: the first is a one- or two-character shorthand sequence, and the second is the code the shorthand should expand to. New 3.9a An optional argument allows to (re)define language and system shorthands (some languages do not activate shorthands, so you may want to add \languageshorthands{⟨*lang*⟩} to the corresponding \extras⟨*lang*⟩, as explained below). By default, user shorthands are (re)defined.

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

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

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

However, 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 could then set:

```
\defineshorthand[*polish,*portugese]{"-}{\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 overriden 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.

\aliasshorthand {⟨*original*⟩}{⟨*alias*⟩}

The command \aliasshorthand can be used to let another character perform the same functions as the default shorthand character. If one prefers for example to use the character / over " in typing Polish texts, this can be achieved by entering \aliasshorthand{"}{/}.

NOTE The substitute character must *not* have been declared before as shorthand (in such a case, \aliashorthands 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 if 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.

\languageshorthands {⟨*language*⟩}

The command \languageshorthands can be used to switch the shorthands on the language level. It takes one argument, the name of a language or none (the latter does what its name suggests).[6] Note that for this to work the language should have been specified as an option when loading the babel package. For example, you can use in english the shorthands defined by ngerman with

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

(You may also need to activate them with, for example, \useshorthands.)
Very often, this is a more convenient way to deactivate shorthands than \shorthandoff, as for example if you want to define a macro to easy typing phonetic characters with tipa:

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

\babelshorthand {⟨*shorthand*⟩}

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 you own user shorthands provided they do not ovelap.)
For your records, here is a list of shorthands, but you must double check them, as they may change:[7]

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

---

[6]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.

[7]Thanks to Enrico Gregorio

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.[8]

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 availabe 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 LaTeX 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

---

[8]This declaration serves to nothing, but it is preserved for backward compatibility.

Some LaTeX 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 – of course, in such a case you cannot use shorthands in these macros, but this is not a real problem (just use "allowed" characters).

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 any more.

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.[9]

strings= generic | unicode | encoded | ⟨*label*⟩ | ⟨*font encoding*⟩

Selects the encoding of strings in languages supporting this feature. Predefined labels are generic (for traditional TeX, 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 \MakeUppercase and the like (this feature misuses some internal LaTeX tools, so use it only as a last resort).

hyphenmap= off | main | select | other | other*

---

[9]You can use alternatively the package silence.

New 3.9g Sets the behavior of case mapping for hyphenation, provided the language defines it.[10] 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;[11]

select sets it only at \selectlanguage;

other also sets it at otherlanguage;

other* also sets it at otherlanguage* 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.[12]

bidi=

New 3.14 Selects the bidi algorithm to be used in luatex and xetex. See sec. 1.21.

layout=

New 3.16 Selects which layout elements are adapted in bidi documents. See sec. 1.21.

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 hyphenations 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 hyphenations 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
```

---

[10]Turned off in plain.

[11]Duplicated options count as several ones.

[12]Providing foreign is pointless, because the case mapping applied is that at the end of 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.

```
    \let\macro\relax}
  \usepackage[foo,bar]{babel}
```

1.13   `ini` **files**

An alternative approach to define a language is by means of an `ini` file. Currently babel provides about 200 of these files containing the basic data required for a language. 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 currently (by means of \babelprovide), but a higher interface, based on package options, in under development (in other words, \babelprovide is mainly intended for auxiliary tasks).

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

```
\documentclass{book}

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

\babelfont{rm}{DejaVu Sans}

\begin{document}

\tableofcontents

\chapter{სამზარეულო და სუფრის ტრადიციები}

ქართული ტრადიციული სამზარეულო ერთ-ერთი უმდიდრესია მთელ მსოფლიოში.

\end{document}
```

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

af	Afrikaans[ul]	bem	Bemba
agq	Aghem	bez	Bena
ak	Akan	bg	Bulgarian[ul]
am	Amharic[ul]	bm	Bambara
ar	Arabic[ul]	bn	Bangla[ul]
ar-DZ	Arabic[ul]	bo	Tibetan[u]
ar-MA	Arabic[ul]	brx	Bodo
ar-SY	Arabic[ul]	bs-Cyrl	Bosnian
as	Assamese	bs-Latn	Bosnian[ul]
asa	Asu	bs	Bosnian[ul]
ast	Asturian[ul]	ca	Catalan[ul]
az-Cyrl	Azerbaijani	ce	Chechen
az-Latn	Azerbaijani	cgg	Chiga
az	Azerbaijani[ul]	chr	Cherokee
bas	Basaa	ckb	Central Kurdish
be	Belarusian[ul]	cs	Czech[ul]

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cy	Welsh[ul]		hy	Armenian
da	Danish[ul]		ia	Interlingua[ul]
dav	Taita		id	Indonesian[ul]
de-AT	German[ul]		ig	Igbo
de-CH	German[ul]		ii	Sichuan Yi
de	German[ul]		is	Icelandic[ul]
dje	Zarma		it	Italian[ul]
dsb	Lower Sorbian[ul]		ja	Japanese
dua	Duala		jgo	Ngomba
dyo	Jola-Fonyi		jmc	Machame
dz	Dzongkha		ka	Georgian[ul]
ebu	Embu		kab	Kabyle
ee	Ewe		kam	Kamba
el	Greek[ul]		kde	Makonde
en-AU	English[ul]		kea	Kabuverdianu
en-CA	English[ul]		khq	Koyra Chiini
en-GB	English[ul]		ki	Kikuyu
en-NZ	English[ul]		kk	Kazakh
en-US	English[ul]		kkj	Kako
en	English[ul]		kl	Kalaallisut
eo	Esperanto[ul]		kln	Kalenjin
es-MX	Spanish[ul]		km	Khmer
es	Spanish[ul]		kn	Kannada[ul]
et	Estonian[ul]		ko	Korean
eu	Basque[ul]		kok	Konkani
ewo	Ewondo		ks	Kashmiri
fa	Persian[ul]		ksb	Shambala
ff	Fulah		ksf	Bafia
fi	Finnish[ul]		ksh	Colognian
fil	Filipino		kw	Cornish
fo	Faroese		ky	Kyrgyz
fr	French[ul]		lag	Langi
fr-BE	French[ul]		lb	Luxembourgish
fr-CA	French[ul]		lg	Ganda
fr-CH	French[ul]		lkt	Lakota
fr-LU	French[ul]		ln	Lingala
fur	Friulian[ul]		lo	Lao[ul]
fy	Western Frisian		lrc	Northern Luri
ga	Irish[ul]		lt	Lithuanian[ul]
gd	Scottish Gaelic[ul]		lu	Luba-Katanga
gl	Galician[ul]		luo	Luo
gsw	Swiss German		luy	Luyia
gu	Gujarati		lv	Latvian[ul]
guz	Gusii		mas	Masai
gv	Manx		mer	Meru
ha-GH	Hausa		mfe	Morisyen
ha-NE	Hausa[l]		mg	Malagasy
ha	Hausa		mgh	Makhuwa-Meetto
haw	Hawaiian		mgo	Meta'
he	Hebrew[ul]		mk	Macedonian[ul]
hi	Hindi[u]		ml	Malayalam[ul]
hr	Croatian[ul]		mn	Mongolian
hsb	Upper Sorbian[ul]		mr	Marathi[ul]
hu	Hungarian[ul]		ms-BN	Malay[l]

ms-SG	Malay[l]	sl	Slovenian[ul]
ms	Malay[ul]	smn	Inari Sami
mt	Maltese	sn	Shona
mua	Mundang	so	Somali
my	Burmese	sq	Albanian[ul]
mzn	Mazanderani	sr-Cyrl-BA	Serbian[ul]
naq	Nama	sr-Cyrl-ME	Serbian[ul]
nb	Norwegian Bokmål[ul]	sr-Cyrl-XK	Serbian[ul]
nd	North Ndebele	sr-Cyrl	Serbian[ul]
ne	Nepali	sr-Latn-BA	Serbian[ul]
nl	Dutch[ul]	sr-Latn-ME	Serbian[ul]
nmg	Kwasio	sr-Latn-XK	Serbian[ul]
nn	Norwegian Nynorsk[ul]	sr-Latn	Serbian[ul]
nnh	Ngiemboon	sr	Serbian[ul]
nus	Nuer	sv	Swedish[ul]
nyn	Nyankole	sw	Swahili
om	Oromo	ta	Tamil[u]
or	Odia	te	Telugu[ul]
os	Ossetic	teo	Teso
pa-Arab	Punjabi	th	Thai[ul]
pa-Guru	Punjabi	ti	Tigrinya
pa	Punjabi	tk	Turkmen[ul]
pl	Polish[ul]	to	Tongan
pms	Piedmontese[ul]	tr	Turkish[ul]
ps	Pashto	twq	Tasawaq
pt-BR	Portuguese[ul]	tzm	Central Atlas Tamazight
pt-PT	Portuguese[ul]	ug	Uyghur
pt	Portuguese[ul]	uk	Ukrainian[ul]
qu	Quechua	ur	Urdu[ul]
rm	Romansh[ul]	uz-Arab	Uzbek
rn	Rundi	uz-Cyrl	Uzbek
ro	Romanian[ul]	uz-Latn	Uzbek
rof	Rombo	uz	Uzbek
ru	Russian[ul]	vai-Latn	Vai
rw	Kinyarwanda	vai-Vaii	Vai
rwk	Rwa	vai	Vai
sa-Beng	Sanskrit	vi	Vietnamese[ul]
sa-Deva	Sanskrit	vun	Vunjo
sa-Gujr	Sanskrit	wae	Walser
sa-Knda	Sanskrit	xog	Soga
sa-Mlym	Sanskrit	yav	Yangben
sa-Telu	Sanskrit	yi	Yiddish
sa	Sanskrit	yo	Yoruba
sah	Sakha	yue	Cantonese
saq	Samburu	zgh	Standard Moroccan Tamazight
sbp	Sangu		
se	Northern Sami[ul]	zh-Hans-HK	Chinese
seh	Sena	zh-Hans-MO	Chinese
ses	Koyraboro Senni	zh-Hans-SG	Chinese
sg	Sango	zh-Hans	Chinese
shi-Latn	Tachelhit	zh-Hant-HK	Chinese
shi-Tfng	Tachelhit	zh-Hant-MO	Chinese
shi	Tachelhit	zh-Hant	Chinese
si	Sinhala	zh	Chinese
sk	Slovak[ul]	zu	Zulu

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

aghem	centralatlastamazight
akan	centralkurdish
albanian	chechen
american	cherokee
amharic	chiga
arabic	chinese-hans-hk
arabic-algeria	chinese-hans-mo
arabic-DZ	chinese-hans-sg
arabic-morocco	chinese-hans
arabic-MA	chinese-hant-hk
arabic-syria	chinese-hant-mo
arabic-SY	chinese-hant
armenian	chinese-simplified-hongkongsarchina
assamese	chinese-simplified-macausarchina
asturian	chinese-simplified-singapore
asu	chinese-simplified
australian	chinese-traditional-hongkongsarchina
austrian	chinese-traditional-macausarchina
azerbaijani-cyrillic	chinese-traditional
azerbaijani-cyrl	chinese
azerbaijani-latin	colognian
azerbaijani-latn	cornish
azerbaijani	croatian
bafia	czech
bambara	danish
basaa	duala
basque	dutch
belarusian	dzongkha
bemba	embu
bena	english-au
bengali	english-australia
bodo	english-ca
bosnian-cyrillic	english-canada
bosnian-cyrl	english-gb
bosnian-latin	english-newzealand
bosnian-latn	english-nz
bosnian	english-unitedkingdom
brazilian	english-unitedstates
breton	english-us
british	english
bulgarian	esperanto
burmese	estonian
canadian	ewe
cantonese	ewondo
catalan	faroese

filipino
finnish
french-be
french-belgium
french-ca
french-canada
french-ch
french-lu
french-luxembourg
french-switzerland
french
friulian
fulah
galician
ganda
georgian
german-at
german-austria
german-ch
german-switzerland
german
greek
gujarati
gusii
hausa-gh
hausa-ghana
hausa-ne
hausa-niger
hausa
hawaiian
hebrew
hindi
hungarian
icelandic
igbo
inarisami
indonesian
interlingua
irish
italian
japanese
jolafonyi
kabuverdianu
kabyle
kako
kalaallisut
kalenjin
kamba
kannada
kashmiri
kazakh
khmer
kikuyu
kinyarwanda

konkani
korean
koyraborosenni
koyrachiini
kwasio
kyrgyz
lakota
langi
lao
latvian
lingala
lithuanian
lowersorbian
lsorbian
lubakatanga
luo
luxembourgish
luyia
macedonian
machame
makhuwameetto
makonde
malagasy
malay-bn
malay-brunei
malay-sg
malay-singapore
malay
malayalam
maltese
manx
marathi
masai
mazanderani
meru
meta
mexican
mongolian
morisyen
mundang
nama
nepali
newzealand
ngiemboon
ngomba
norsk
northernluri
northernsami
northndebele
norwegianbokmal
norwegiannynorsk
nswissgerman
nuer
nyankole

nynorsk
occitan
oriya
oromo
ossetic
pashto
persian
piedmontese
polish
portuguese-br
portuguese-brazil
portuguese-portugal
portuguese-pt
portuguese
punjabi-arab
punjabi-arabic
punjabi-gurmukhi
punjabi-guru
punjabi
quechua
romanian
romansh
rombo
rundi
russian
rwa
sakha
samburu
samin
sango
sangu
sanskrit-beng
sanskrit-bengali
sanskrit-deva
sanskrit-devanagari
sanskrit-gujarati
sanskrit-gujr
sanskrit-kannada
sanskrit-knda
sanskrit-malayalam
sanskrit-mlym
sanskrit-telu
sanskrit-telugu
sanskrit
scottishgaelic
sena
serbian-cyrillic-bosniaherzegovina
serbian-cyrillic-kosovo
serbian-cyrillic-montenegro
serbian-cyrillic
serbian-cyrl-ba
serbian-cyrl-me
serbian-cyrl-xk
serbian-cyrl

serbian-latin-bosniaherzegovina
serbian-latin-kosovo
serbian-latin-montenegro
serbian-latin
serbian-latn-ba
serbian-latn-me
serbian-latn-xk
serbian-latn
serbian
shambala
shona
sichuanyi
sinhala
slovak
slovene
slovenian
soga
somali
spanish-mexico
spanish-mx
spanish
standardmoroccantamazight
swahili
swedish
swissgerman
tachelhit-latin
tachelhit-latn
tachelhit-tfng
tachelhit-tifinagh
tachelhit
taita
tamil
tasawaq
telugu
teso
thai
tibetan
tigrinya
tongan
turkish
turkmen
ukenglish
ukrainian
uppersorbian
urdu
usenglish
usorbian
uyghur
uzbek-arab
uzbek-arabic
uzbek-cyrillic
uzbek-cyrl
uzbek-latin
uzbek-latn

uzbek	walser
vai-latin	welsh
vai-latn	westernfrisian
vai-vai	yangben
vai-vaii	yiddish
vai	yoruba
vietnam	zarma
vietnamese	zulu afrikaans
vunjo	

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.[13]

\babelfont   [⟨*language-list*⟩]{⟨*font-family*⟩}[⟨*font-options*⟩]{⟨*font-name*⟩}

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. Alternatively, you may set a font for a script – just precede its name (lowercase) with a star (eg, *devanagari). 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.

```
\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 could replace the red line above with, say:

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

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

---

[13]See also the package combofont for a complementary approach.

EXAMPLE Here is how to do it:

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

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

NOTE You may load fontspec explicitly. For example:

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

This makes sure the OpenType script for Devanagari is deva and not dev2 (luatex does not detect automatically the correct script[14]).

NOTE Directionality is a property affecting margins, intentation, column order, etc., not just text. Therefore, it is under the direct control of the language, which appplies both the script and the direction to the text. As a consequence, there is no need to set `Script` when declaring a font (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 are 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 could be problematic, and also 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 Do not use `\set`*xxxx*`font` and `\babelfont` at the same time. `\babelfont` follows the standard LaTeX conventions to set the basic families – define `\`*xx*`default`, and activate it with `\`*xx*`family`. On the other hand, `\set`*xxxx*`font` in fontspec takes a different approach, because `\`*xx*`family` is redefined with the family name hardcoded (so that `\`*xx*`default` becomes no-op). Of course, both methods are incompatible, and if you use `\set`*xxxx*`font`, font switching with `\babelfont` just does *not* work (nor the standard `\`*xx*`default`, for that matter).

1.15   Modifying a language

Modifying the behavior of a language (say, the chapter "caption"), is sometimes necessary, but not always trivial.

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

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

As of 3.15, there is no need to hide spaces with % (babel removes them), but it is advisable to do it.

---

[14]And even with the correct code some fonts could be rendered incorrectly by fontspec, so double check the results. xetex fares better, but some font are still problematic.

- 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}
```

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

```
\addto\extrasrussian{\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.

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.

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

Defines the internal structure of the language with some defaults: the hyphen rules, if not available, are set to the current ones, left and right hyphen mins are set to 2 and 3, but captions and date are not defined. Conveniently, babel warns you about what to do. Very likely you will find alerts like that in the log file:

```
Package babel Warning: \mylangchaptername not set. Please, define
(babel)                it in the preamble with something like:
(babel)                \renewcommand\maylangchaptername{..}
(babel)                Reported on input line 18.
```

In most cases, you will only need to define a few macros.

EXAMPLE If you need a language named arhinish:

```
\usepackage[danish]{babel}
\babelprovide{arhinish}
\renewcommand\arhinishchaptername{Chapitula}
\renewcommand\arhinishrefname{Refirenke}
\renewcommand\arhinishhyphenmins{22}
```

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, date, and hyphenmins. 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.

There are about 200 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 will show a warning about the current lack of suitability of the date format (hindi, french, breton, and occitan).

Besides \today, there is a \<language>date macro with three arguments: year, month and day numbers. In fact, \today calls \<language>today, which in turn calls \<language>date{\the\year}{\the\month}{\the\day}.

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 TeX 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 supresses hyphenation (because the pattern list is empty).

main This valueless option makes the language the main one. Only in newly defined languages.

script= ⟨*script-name*⟩

New 3.15 Sets the script name to be used by fontspec (eg, Devanagari). Overrides the value in the ini file. This value is particularly important because it sets the writing direction.

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⟨*language-name*⟩

New 3.15 Sets the language name to be used by fontspec (eg, Hindi). Overrides the value in the ini file. Not so important, but sometimes still relevant.

NOTE (1) If you need shorthands, you can use \useshorthands and \defineshorthand as described above. (2) Captions and \today are "ensured" with \babelensure (this is be the default in ini-based languages).

1.17 Digits

New 3.20 A few 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 option maparabic in \babelprovide, \arabic is redefined to produce the native digits (this is done *globally*, to avoid inconsistencies in, for example, page numbering).
For example:

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

Languages providing native digits in all or some variants are *ar, as, bn, bo, brx, ckb, dz, fa, gu, hi, km, kn, kok, ks, lo, lrc, ml, mr, my, mzn, ne, or, pa, ps, ta, te, th, ug, ur, uz, vai, yue, zh.*

1.18 Getting the current language name

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

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

\iflanguage {⟨*language*⟩}{⟨*true*⟩}{⟨*false*⟩}

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

WARNING The advice about \languagename also applies here – use iflang instead of \iflanguage if possible.

1.19 Hyphenation tools

\babelhyphen *{⟨*type*⟩}

\babelhyphen `*{⟨text⟩}`

New 3.9a It is customary to classify hyphens in two types: (1) *explicit* or *hard hyphens*, which in TeX are entered as `-`, and (2) *optional* or *soft hyphens*, which are entered as `\-`. Strictly, a *soft hyphen* is not a hyphen, but just a breaking oportunity or, in TeX terms, a "discretionary"; a *hard hyphen* is a hyphen with a breaking oportunity after it. A further type is a *non-breaking hyphen*, a hyphen without a breaking oportunity.

In TeX, `-` and `\-` forbid further breaking oportunities 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, Portugese, 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 oportunities in the rest of the word. Therefore, some macros are provide 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, Portugese and Spanish.

- `\babelhyphen{nobreak}` inserts a hard hyphen without a break after it (even if a space follows).

- `\babelhyphen{empty}` inserts a break oportunity 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 enabling it, there is a starred counterpart: `\babelhyphen*{soft}` (which in most cases is equivalent to the original `\-`), `\babelhyphen*{hard}`, etc.

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

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

\babelhyphenation `[⟨language⟩,⟨language⟩,...]{⟨exceptions⟩}`

New 3.9a Sets hyphenation exceptions for the languages given or, without the optional argument, for *all* languages (eg, proper nouns or common loan words, and of course monolingual documents). 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.

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\babelpatterns [⟨*language*⟩,⟨*language*⟩,...]{⟨*patterns*⟩}

New 3.9m *In luatex only*,[15] 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.

1.20 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.[16]

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 is 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.[17]

\ensureascii {⟨*text*⟩}

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

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

The foregoing rules (which are applied "at begin document") cover most of cases. No asumption 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.

1.21 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 could 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%).

---

[15]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.

[16]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.

[17]But still defined for backwards compatibility.

There are some package options controlling bidi writing.

`bidi=`   default | basic-r | basic

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 by 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.   New 3.19   Finally, `basic` suports both L and R text. (They are named `basic` mainly because they only consider the intrinsic direction of scripts and weak directionality.)

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-r` is available in luatex only.[18]

```
\documentclass{article}

\usepackage[bidi=basic-r]{babel}

\babelprovide[import, main]{arabic}

\babelfont{rm}{FreeSerif}

\begin{document}

      وقد عرفت شبه جزيرة العرب طيلة العصر الهيليني (الاغريقي) بــ
      Arabia أو Aravia (بالاغريقية Αραβία)، استخدم الرومان ثلاث
      بادئات بــ"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:

---

[18]At the time of this writing some Arabic fonts are not rendered correctly by the default luatex font loader, with misplaced kerns inside some words, so double check the resulting text. Have a look at the workaround available on GitHub, under `/required/babel/samples`

```
\documentclass{book}

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

\babelprovide[mapfont=direction]{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}
```

What `mapfont=direction` means is, 'when a character has the same direction as the script for the "provided" language (`arabic` in this case), then change its font to that set for this language' (here defined via `*arabic`, because Crimson does not provide Arabic letters). Note Hebrew and Arabic have different directions (internally 'r' and 'al', respectively).

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

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

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

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

New 3.16   *To be expanded.* Selects which layout elements are adapted in bidi documents, including some text elements. You may use several options with a comma-separated list (eg, `layout=counters.contents.sectioning`). This list will be expanded in future releases (tables, captions, etc.). Note not all options are required by all engines.

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

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

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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.[19]

lists required in xetex and pdftex, but only in multilingual documents in luatex.

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 multilingual documents in all engines; you may use alternatively \BabelFootnote described below (what this options 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 (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) New 3.18 ,

extras is used for miscelaneous readjustments which do not fit into the previous groups. Currently redefines in luatex \underline and LaTeX2e New 3.19 .

\babelsublr {⟨*lr-text*⟩}

Digits in pdftex must be marked up explicitly (unlike luatex with bidi=basic-r and, usually, xetex). 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 behaviour 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 explictly; for example:

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

\BabelPatchSection {⟨*section-name*⟩}

Mainly for bidi text, but it could 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*⟩}

---

[19]Next on the roadmap are counters and numeral systems in general. Expect some minor readjustments.

Something like:

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

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

```
\footnote{(\foreignlanguage{\languagename}{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}{\languagename}{}{}%
\BabelFootnote{\localfootnote}{\languagename}{}{}%
\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.

1.22   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 settting options are also used (eg, `\ProsodicMarksOn` in latin).

1.23   Hooks

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

\AddBabelHook {⟨*name*⟩}{⟨*event*⟩}{⟨*code*⟩}

The same name can be applied to several events. Hooks 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).

Current events are the following; in some of them you can use one to three TeX 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 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 loads switch.def. It can be used to load a different version of this files or to load nothing.

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

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

\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).

1.24 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 bahasa, indonesian, indon, bahasai
Interlingua interlingua
Irish Gaelic irish
Italian italian
Latin latin
Lower Sorbian lowersorbian
Malay bahasam, malay, melayu
North Sami samin
Norwegian norsk, nynorsk
Polish polish
Portuguese portuges, portuguese, brazilian, brazil
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). 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.

1.25   Some remarks on luatex support

Complex scripts require not only babel but also `fontspec`, which in turn relies on luaotfload. Unfortunately, at the time of this writing, there are some issues with the latter and its development seems stuck. Here is some remarks based on TeXLive as of June 2018:

abic, some internal kerns are misplaced...

- Hebrew works, except Niqqud marks, which sometimes are misplaced. (Interestingly, some fonts fail at this respect with xetex, too.)

- Most Devanagari fonts work, but you may need to set the OTF language to deva (default is dev2).

- Thai fonts works, too, but babel does not handle correctly line breaking (work in progress).

-

1.26   Tips, workarounds, know issues and notes

- If you use the document class book *and* you use `\ref` inside the argument of `\chapter` (or just use `\ref` inside `\MakeUppercase`), LaTeX will keep complaining about an undefined label. To prevent such problems, you could 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 hhline 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 hhline (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}}
```

(A recent version of inputenc is required.)

- For the hyphenation to work correctly, lccodes cannot change, because TeX only takes into account the values when the paragraph is hyphenated, i.e., when it has been finished.[20] So, if you write a chunk of French text with `\foreinglanguage`, the apostrophes might not be taken into account. This is a limitation of TeX, not of babel. Alternatively, you may use `\useshorthands` to activate `'` and `\defineshorthand`, 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 no known workaround.

- Babel does not take into account `\normalsfcodes` and (non-)French spacing is not always properly (un)set by languages. However, problems are unlikely to happen and therefore this part remains untouched in version 3.9 (but it is in the 'to do' list).

- Using a character mathematically active (ie, with math code `"8000`) as a shorthand can make TeX enter in an infinite loop in some rare cases. (Another issue in the 'to do' list, although there is a partial solution.)

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

csquotes Logical markup for quotes.
iflang Tests correctly the current language.
hyphsubst Selects a different set of patterns for a language.
translator An open platform for packages that need to be localized.
siunitx Typesetting of numbers and physical quantities.
biblatex Programmable bibliographies and citations.
bicaption Bilingual captions.
babelbib Multilingual bibliographies.
microtype Adjusts the typesetting according to some languages (kerning and spacing). Ligatures can be disabled.
substitutefont Combines fonts in several encodings.
mkpattern Generates hyphenation patterns.
tracklang Tracks which languages have been requested.
ucharclasses (xetex) Switches fonts when you switch from one Unicode block to another.
zhspacing Spacing for CJK documents in xetex.

1.27 Current and future work

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).
It is possible now to typeset Arabic or Hebrew with numbers and L text. Next on the roadmap are line breaking in Thai and the like, as well as "non-European" digits. Also on the roadmap are R layouts (lists, footnotes, tables, column order), page and section numbering, and maybe kashida justification.
As to Thai line breaking, here is the basic idea of what luatex can do for us, with the Thai patterns and a little script (the final version will not be so little, of course). It replaces each discretionary by the equivalent to ZWJ.

---

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

```
\documentclass{article}

\usepackage{babel}

\babelprovide[import, main]{thai}

\babelfont{rm}{FreeSerif}

\directlua{
local GLYF = node.id'glyph'
function insertsp (head)
  local size = 0
  for item in node.traverse(head) do
    local i = item.id
    if i == GLYF then
      f = font.getfont(item.font)
      size = f.size
    elseif i == 7 then
      local n = node.new(12, 0)
      node.setglue(n, 0, size * 1) % 1 is a factor
      node.insert_before(head, item, n)
      node.remove(head, item)
    end
  end
end

luatexbase.add_to_callback('hyphenate',
  function (head, tail)
    lang.hyphenate(head)
    insertsp(head)
  end, 'insertsp')
}

\begin{document}

(Thai text.)

\end{document}
```

Useful additions would be, for example, time, currency, addresses and personal names.[21].
But that is the easy part, because they don't require modifying the LaTeX internals.
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)-ból", in Spanish an item labelled "3.º" may be referred to as
either "ítem 3.º" or "3.er ítem", and so on.

1.28 Tentative and experimental code

Old stuff
A couple of tentative macros were provided by babel ($\geq$3.9g) with a partial solution for
"Unicode" fonts. These macros are now deprecated — use \babelfont. A short description
follows, for reference:

---

[21]See for example POSIX, ISO 14652 and the Unicode Common Locale Data Repository (CLDR). Those system,
however, have limited application to TeX because their aim is just to display information and not fine typesetting.

- \babelFSstore{⟨*babel-language*⟩} sets the current three basic families (rm, sf, tt) as the default for the language given.

- \babelFSdefault{⟨*babel-language*⟩}{⟨*fontspec-features*⟩} patches \fontspec so that the given features are always passed as the optional argument or added to it (not an ideal solution).

So, for example:

```
\setmainfont[Language=Turkish]{Minion Pro}
\babelFSstore{turkish}
\setmainfont{Minion Pro}
\babelFSfeatures{turkish}{Language=Turkish}
```

Bidi writing in luatex is under development, but a basic implementation is almost finished. On the other hand, in xetex it is taking its first steps. The latter engine poses quite different challenges. An option to manage document layout in luatex (lists, footnotes, etc.) is almost finished, but xetex required more work.

See the code section for \foreignlanguage* (a new starred version of \foreignlanguage). xetex relies on the font to properly handle these unmarked changes, so it is not under the control of TeX.

2 Loading languages with `language.dat`

TeX and most engines based on it (pdfTeX, xetex, ϵ-TeX, the main exception being luatex) require hyphenation patterns to be preloaded when a format is created (eg, LaTeX, XeLaTeX, pdfLaTeX). babel provides a tool which has become standand 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).[22] 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).[23]

2.1 Format

In that file the person who maintains a TeX environment has to record for which languages he has hyphenation patterns *and* in which files these are stored[24]. 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 LaTeX that the hyphenation patterns just processed have to be known under an alternative name. Here is an example:

---

[22]This feature was added to 3.9o, but it was buggy. Both 3.9o and 3.9p are deprecated.

[23]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`.

[24]This is because different operating systems sometimes use *very* different file-naming conventions.

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

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

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

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

With the previous settings, if the enconding 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 could 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 LATEX and plain TEX. The current format can be checked by looking at the value of the macro \fmtname.

- The common part of the babel system redefines a number of macros and environments (defined previously in the document style) to put in the names of macros that replace the previously hard-wired texts. These macros have to be defined in the language definition files.

- The language definition files must define five macros, used to activate and deactivate the language-specific definitions. These macros are \⟨*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 LATEX option that is to be used. These macros and their functions are

---

[25]This in not a new feature, but in former versions it didn't work correctly.

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 unknow language is selected, babel will attempt setting it after lowercasing its name.

- The semantics of modifiers is not defined (on purpose). In most cases, they will just be simple separated options (eg, spanish), but a language might require, say, a set of options organized as a tree with suboptions (in such a case, the recommended separator is /).

Some recommendations:

- The preferred shorthand is ", which is not used in LaTeX (quotes are entered as `` and ''). Other good choices are characters which are not used in a certain context (eg, = in an ancient language). Note however =, <, >, : and the like can be dangerous, because they may be used as part of the syntax of some elements (numeric expressions, key/value pairs, etc.).

- Captions should not contain shorthands or encoding dependent commands (the latter is not always possible, but should be clearly documented). They should be defined using the LICR. You may also use the new tools for encoded strings, described below.

- Avoid adding things to \noextras⟨*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.[26]

- 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

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.

---

[26]But not removed, for backward compatibility.

- 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: `http://www.texnia.com/incubator.html`. If your need further assistance and technical advice in the development of language styles, I am willing to help you. And of course, you can make any suggestion you like.

3.2 Basic macros

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

`\addlanguage` The macro `\addlanguage` is a non-outer version of the macro `\newlanguage`, defined in `plain.tex` version 3.x. For older versions of `plain.tex` and `lplain.tex` a substitute definition is used. Here "language" is used in the TeX sense of set of hyphenation patterns.

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

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

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

(Assigning `\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 (currenty, 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 TeX might be in after the execution of `\extras⟨lang⟩`, a macro that brings TeX 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 LaTeX 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, LaTeX 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 LaTeX to use a font from the second family when a font from the first family in the given encoding seems to be needed.

3.3 Skeleton

Here is the basic structure of an ldf file, with a language, a dialect and an attribute. Strings are best defined using the method explained in 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\monthiname{<name of first month>}
% More strings

\StartBabelCommands*{<dialect>}{captions}
\SetString\chaptername{<chapter name>}
```

```
% More strings

\StartBabelCommands*{<dialect>}{date}
\SetString\monthiname{<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>}
```

3.4 Support for active characters

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

\initiate@active@char The internal macro `\initiate@active@char` is used in language definition files to instruct LaTeX 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.

\bbl@activate The command `\bbl@activate` is used to change the way an active character expands. \bbl@deactivate `\bbl@activate` 'switches on' the active behavior of the character. `\bbl@deactivate` lets the active character expand to its former (mostly) non-active self.

\declare@shorthand The macro `\declare@shorthand` is used to define the various shorthands. It takes three arguments: the name for the collection of shorthands this definition belongs to; the character (sequence) that makes up the shorthand, i.e. ~ or "a; and the code to be executed when the shorthand is encountered. (It does *not* raise an error if the shorthand character has not been "initiated".)

\bbl@add@special The TeXbook states: "Plain TeX includes a macro called `\dospecials` that is essentially a set \bbl@remove@special macro, representing the set of all characters that have a special category code." [2, 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 `\dospecial`. LaTeX adds another macro called `\@sanitize` representing the same character set, but without the curly braces. The macros `\bbl@add@special`⟨*char*⟩ and `\bbl@remove@special`⟨*char*⟩ add and remove the character ⟨*char*⟩ to these two sets.

3.5 Support for saving macro definitions

Language definition files may want to *re*define 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[27].

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

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

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

---

[27]This mechanism was introduced by Bernd Raichle.

3.6   Support for extending macros

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

3.7   Macros common to a number of languages

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

\allowhyphens   Same as \bbl@allowhyphens, but does nothing if the encoding is T1. It is intended mainly
for characters provided as real glyphs by this encoding but constructed with \accent in
OT1.
Note the previous command (\bbl@allowhyphens) has different applications (hyphens and
discretionaries) than this one (composite chars). Note also prior to version 3.7,
\allowhyphens had the behavior of \bbl@allowhyphens.

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

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

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

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   {⟨*language-list*⟩}{⟨*category*⟩}[⟨*selector*⟩]

The ⟨*language-list*⟩ 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 take precedence (ie, it works much like `\providecommand`).

Encoding info is `charset=` followed by a charset, which if given sets how the strings should be traslated to the internal representation used by the engine, typically `utf8`, which is the only value supported currently (default is no traslations). 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 honoured (in a 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.[28] 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\monthiiiname{März}

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

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

\StartBabelCommands{german,austrian}{date}
  \SetString\monthiiname{Februar}
```

---

[28]In future releases further categories may be added.

```
    \SetString\monthiiiname{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 overriden, which means the old way to define strings still works and used by default (to be precise, is first set to undefined and then strings are added). However, when used in the preamble or in a package, new settings are added to the previous ones, if the language exists (in the babel sense, ie, if \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 appropiate.[29]

\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}
```

---

[29]This replaces in 3.9g a short-lived \UseStrings which has been removed because it did not work.

#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 be typically 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 intented for minor readjustments only. For example, as T1 is the default case mapping in LaTeX, we could set for Turkish:

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

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

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

\EndBabelCommands
```

(Note the mapping for OT1 is not complete.)

\SetHyphenMap {⟨*to-lower-macros*⟩}

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

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

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

- \BabelLowerMO{⟨*uccode-from*⟩}{⟨*uccode-to*⟩}{⟨*step*⟩}{⟨*lccode*⟩} loops 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}{"11F}{2}{"101}}
```

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

4   Changes

4.1   Changes in babel version 3.9

Most of changes in version 3.9 are related to bugs, either to fix them (there were lots), or to provide some alternatives. Even new features like \babelhyphen are intended to solve a certain problem (in this case, the lacking of a uniform syntax and behavior for shorthands across languages). These changes are described in this manual in the corresponding place. A selective list follows:

- \select@language did not set \languagename. This meant the language in force when auxiliary files were loaded was the one used in, for example, shorthands – if the language was german, a \select@language{spanish} had no effect.

- \foreignlanguage and otherlanguage* messed up \extras<language>. Scripts, encodings and many other things were not switched correctly.

- The :ENC mechanism for hyphenation patterns used the encoding of the *previous* language, not that of the language being selected.

- ' (with activeacute) had the original value when writing to an auxiliary file, and things like an infinite loop could happen. It worked incorrectly with ^ (if activated) and also if deactivated.

- Active chars where not reset at the end of language options, and that lead to incompatibilities between languages.

- \textormath raised and error with a conditional.

- \aliasshorthand didn't work (or only in a few and very specific cases).

- \l@english was defined incorrectly (using \let instead of \chardef).

- ldf files not bundled with babel were not recognized when called as global options.

4.2   Changes in babel version 3.7

In babel version 3.7 a number of bugs that were found in version 3.6 are fixed. Also a number of changes and additions have occurred:

- Shorthands are expandable again. The disadvantage is that one has to type '{}a when the acute accent is used as a shorthand character. The advantage is that a number of other problems (such as the breaking of ligatures, etc.) have vanished.

- Two new commands, \shorthandon and \shorthandoff have been introduced to enable to temporarily switch off one or more shorthands.

- Support for typesetting Hebrew (and potential support for typesetting other right-to-left written languages) is now available thanks to Rama Porrat and Boris Lavva.

- A language attribute has been added to the \mark... commands in order to make sure that a Greek header line comes out right on the last page before a language switch.

- Hyphenation pattern files are now read *inside a group*; therefore any changes a pattern file needs to make to lowercase codes, uppercase codes, and category codes are kept local to that group. If they are needed for the language, these changes will need to be repeated and stored in `\extras...`

- The concept of language attributes is introduced. It is intended to give the user some control over the features a language-definition file provides. Its first use is for the Greek language, where the user can choose the πολυτονικό ("polytonikó" or multi-accented) Greek way of typesetting texts.

- The environment `hyphenrules` is introduced.

- The syntax of the file `language.dat` has been extended to allow (optionally) specifying the font encoding to be used while processing the patterns file.

- The command `\providehyphenmins` should now be used in language definition files in order to be able to keep any settings provided by the pattern file.

Part II
The 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 on `http://tug.org/mailman/listinfo/kadingira`).

5   Identification and loading of required files

Code documentation is still under revision.
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 tow parts: a generic one and a second one only for LaTeX.
babel.sty is the LaTeX package, which set options and load 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. By default it also loads `switch.def`.

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

6   `locale` **directory**

A required component of babel is a set of `ini` files with basic definitions for about 200 languages. They are distributed as a separate `zip` file, not packed as `dtx`. With them, babel will fully support Unicode engines.
Most of them are essentially finished (except bugs and mistakes, of course). Some of them are still incomplete (but they will be usable), and there are some omissions (eg, Latin and

polytonic Greek, and there are no geographic areas in Spanish). Hindi, French, Occitan and Breton will show a warning related to dates. Not all include LICR variants.

This is a preliminary documentation.

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

Most keys are self-explanatory.

charset the encoding used in the ini file.

version of the ini file

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

encodings a descriptive list of font encodings.

[captions] section of captions in the file charset

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

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

Keys may be further qualified in a particular language with a suffix starting with a uppercase letter. It can be just a letter (eg, babel.name.A, babel.name.B) or a name (eg, date.long.Nominative, date.long.Formal, but no language is currently using the latter). Multi-letter qualifiers are forward compatible in the sense they won't conflict with new "global" keys (all lowercase).

7   Tools

```
1 ⟨⟨version=3.22.1358⟩⟩
2 ⟨⟨date=2018/08/04⟩⟩
```

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@loop#1#2#3{\bbl@@loop#1{#3}#2,\@nnil,}
14 \def\bbl@loopx#1#2{\expandafter\bbl@loop\expandafter#1\expandafter{#2}}
15 \def\bbl@@loop#1#2#3,{%
16   \ifx\@nnil#3\relax\else
17     \def#1{#3}#2\bbl@afterfi\bbl@@loop#1{#2}%
18   \fi}
19 \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.

```
20 \def\bbl@add@list#1#2{%
21   \edef#1{%
22     \bbl@ifunset{\bbl@stripslash#1}%
23       {}%
24       {\ifx#1\@empty\else#1,\fi}%
25     #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[30]. These macros will break if another \if...\fi statement appears in one of the arguments and it is not enclosed in braces.

```
26 \long\def\bbl@afterelse#1\else#2\fi{\fi#1}
27 \long\def\bbl@afterfi#1\fi{\fi#1}
```

\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.

```
28 \def\bbl@tempa#1{%
29   \long\def\bbl@trim##1##2{%
30     \futurelet\bbl@trim@a\bbl@trim@c##2\@nil\@nil##1\@nil\relax{##1}}%
31   \def\bbl@trim@c{%
32     \ifx\bbl@trim@a\@sptoken
33       \expandafter\bbl@trim@b
34     \else
35       \expandafter\bbl@trim@b\expandafter#1%
36     \fi}%
37   \long\def\bbl@trim@b#1##1 \@nil{\bbl@trim@i##1}}
38 \bbl@tempa{ }
39 \long\def\bbl@trim@i#1\@nil#2\relax#3{#3{#1}}
40 \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 ϵ-tex engine, it is based on \ifcsname, which is more efficient, and do not waste memory.

```
41 \def\bbl@ifunset#1{%
42   \expandafter\ifx\csname#1\endcsname\relax
43     \expandafter\@firstoftwo
44   \else
45     \expandafter\@secondoftwo
46   \fi}
47 \bbl@ifunset{ifcsname}%
48   {}%
49   {\def\bbl@ifunset#1{%
50     \ifcsname#1\endcsname
51       \expandafter\ifx\csname#1\endcsname\relax
52         \bbl@afterelse\expandafter\@firstoftwo
53       \else
54         \bbl@afterfi\expandafter\@secondoftwo
55       \fi
56     \else
57       \expandafter\@firstoftwo
58     \fi}}
```

[30]This code is based on code presented in TUGboat vol. 12, no2, June 1991 in "An expansion Power Lemma" by Sonja Maus.

\bbl@ifblank   A tool from url, by Donald Arseneau, which tests if a string is empty or space.

```
59 \def\bbl@ifblank#1{%
60   \bbl@ifblank@i#1\@nil\@nil\@secondoftwo\@firstoftwo\@nil}
61 \long\def\bbl@ifblank@i#1#2\@nil#3#4#5\@nil{#4}
```

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).

```
62 \def\bbl@forkv#1#2{%
63   \def\bbl@kvcmd##1##2##3{#2}%
64   \bbl@kvnext#1,\@nil,}
65 \def\bbl@kvnext#1,{%
66   \ifx\@nil#1\relax\else
67     \bbl@ifblank{#1}{}{\bbl@forkv@eq#1=\@empty=\@nil{#1}}%
68     \expandafter\bbl@kvnext
69   \fi}
70 \def\bbl@forkv@eq#1=#2=#3\@nil#4{%
71   \bbl@trim@def\bbl@forkv@a{#1}%
72   \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).

```
73 \def\bbl@vforeach#1#2{%
74   \def\bbl@forcmd##1{#2}%
75   \bbl@fornext#1,\@nil,}
76 \def\bbl@fornext#1,{%
77   \ifx\@nil#1\relax\else
78     \bbl@ifblank{#1}{}{\bbl@trim\bbl@forcmd{#1}}%
79     \expandafter\bbl@fornext
80   \fi}
81 \def\bbl@foreach#1{\expandafter\bbl@vforeach\expandafter{#1}}
```

\bbl@replace

```
82 \def\bbl@replace#1#2#3{% in #1 -> repl #2 by #3
83   \toks@{}%
84   \def\bbl@replace@aux##1#2##2#2{%
85     \ifx\bbl@nil##2%
86       \toks@\expandafter{\the\toks@##1}%
87     \else
88       \toks@\expandafter{\the\toks@##1#3}%
89       \bbl@afterfi
90       \bbl@replace@aux##2#2%
91     \fi}%
92   \expandafter\bbl@replace@aux#1#2\bbl@nil#2%
93   \edef#1{\the\toks@}}
```

\bbl@exp   Now, just syntactical sugar, but it makes partial expansion of some code a lot more simple and readable. Here \\ stands for \noexpand and \<..> for \noexpand applied to a built macro name (the latter does not define the macro if undefined to \relax, because it is created locally). The result may be followed by extra arguments, if necessary.

```
94 \def\bbl@exp#1{%
95   \begingroup
96     \let\\\noexpand
97     \def\<##1>{\expandafter\noexpand\csname##1\endcsname}%
98     \edef\bbl@exp@aux{\endgroup#1}%
99   \bbl@exp@aux}
```

Two further tools. \bbl@samestring 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 pdfTeX, 1 is luatex, and 2 is xetex. You may use the latter it in your language style if you want.

```
100 \def\bbl@ifsamestring#1#2{%
101   \begingroup
102     \protected@edef\bbl@tempb{#1}%
103     \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
104     \protected@edef\bbl@tempc{#2}%
105     \edef\bbl@tempc{\expandafter\strip@prefix\meaning\bbl@tempc}%
106     \ifx\bbl@tempb\bbl@tempc
107       \aftergroup\@firstoftwo
108     \else
109       \aftergroup\@secondoftwo
110     \fi
111   \endgroup}
112 \chardef\bbl@engine=%
113   \ifx\directlua\@undefined
114     \ifx\XeTeXinputencoding\@undefined
115       \z@
116     \else
117       \tw@
118     \fi
119   \else
120     \@ne
121   \fi
122 ⟨⟨/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.

```
123 ⟨⟨∗Make sure ProvidesFile is defined⟩⟩ ≡
124 \ifx\ProvidesFile\@undefined
125   \def\ProvidesFile#1[#2 #3 #4]{%
126     \wlog{File: #1 #4 #3 <#2>}%
127     \let\ProvidesFile\@undefined}
128 \fi
129 ⟨⟨/Make sure ProvidesFile is defined⟩⟩
```

The following code is used in babel.sty and babel.def, and loads (only once) the data in language.dat.

```
130 ⟨⟨∗Load patterns in luatex⟩⟩ ≡
131 \ifx\directlua\@undefined\else
132   \ifx\bbl@luapatterns\@undefined
133     \input luababel.def
134   \fi
135 \fi
136 ⟨⟨/Load patterns in luatex⟩⟩
```

The following code is used in babel.def and switch.def.

```
137 ⟨⟨∗Load macros for plain if not LaTeX⟩⟩ ≡
138 \ifx\AtBeginDocument\@undefined
139   \input plain.def\relax
140 \fi
141 ⟨⟨/Load macros for plain if not LaTeX⟩⟩
```

7.1 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 requires loading `switch.def` in the format.

```
142 ⟨*Define core switching macros⟩ ≡
143 \ifx\language\@undefined
144   \csname newcount\endcsname\language
145 \fi
146 ⟨/Define core switching macros⟩
```

\last@language Another counter is used to store the last language defined. For pre-3.0 formats an extra counter has to be allocated.

\addlanguage To add languages to TeX's memory plain TeX version 3.0 supplies \newlanguage, in a pre-3.0 environment a similar macro has to be provided. For both cases a new macro is defined here, because the original \newlanguage was defined to be \outer.
For a format based on plain version 2.x, the definition of \newlanguage can not be copied because \count 19 is used for other purposes in these formats. Therefore \addlanguage is defined using a definition based on the macros used to define \newlanguage in plain TeX version 3.0.
For formats based on plain version 3.0 the definition of \newlanguage can be simply copied, removing \outer. Plain TeX version 3.0 uses \count 19 for this purpose.

```
147 ⟨*Define core switching macros⟩ ≡
148 \ifx\newlanguage\@undefined
149   \csname newcount\endcsname\last@language
150   \def\addlanguage#1{%
151     \global\advance\last@language\@ne
152     \ifnum\last@language<\@cclvi
153     \else
154       \errmessage{No room for a new \string\language!}%
155     \fi
156     \global\chardef#1\last@language
157     \wlog{\string#1 = \string\language\the\last@language}}
158 \else
159   \countdef\last@language=19
160   \def\addlanguage{\alloc@9\language\chardef\@cclvi}
161 \fi
162 ⟨/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 or LaTeX2.09. 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.

8   The Package File (LaTeX, `babel.sty`)

In order to make use of the features of LaTeX 2ε, the babel system contains a package file, `babel.sty`. This file is loaded by the \usepackage command and defines all the language options whose name is different from that of the .ldf file (like variant spellings). It also takes care of a number of compatibility issues with other packages an defines a few aditional 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.

8.1 `base`

The first option to be processed is `base`, which set the hyphenation patterns then resets `ver@babel.sty` so that LATEXforgets about the first loading. After `switch.def` has been loaded (above) and `\AfterBabelLanguage` defined, exits.

```
163 ⟨*package⟩
164 \NeedsTeXFormat{LaTeX2e}[2005/12/01]
165 \ProvidesPackage{babel}[⟨⟨date⟩⟩ ⟨⟨version⟩⟩ The Babel package]
166 \@ifpackagewith{babel}{debug}
167   {\providecommand\bbl@trace[1]{\message{^^J[ #1 ]}}%
168    \let\bbl@debug\@firstofone}
169   {\providecommand\bbl@trace[1]{}%
170    \let\bbl@debug\@gobble}
171 \ifx\bbl@switchflag\@undefined % Prevent double input
172   \let\bbl@switchflag\relax
173   \input switch.def\relax
174 \fi
175 ⟨⟨Load patterns in luatex⟩⟩
176 ⟨⟨Basic macros⟩⟩
177 \def\AfterBabelLanguage#1{%
178   \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.

```
179 \ifx\bbl@languages\@undefined\else
180   \begingroup
181     \catcode`\^^I=12
182     \@ifpackagewith{babel}{showlanguages}{%
183       \begingroup
184         \def\bbl@elt#1#2#3#4{\wlog{#2^^I#1^^I#3^^I#4}}%
185         \wlog{<*languages>}%
186         \bbl@languages
187         \wlog{</languages>}%
188       \endgroup}{}
189   \endgroup
190   \def\bbl@elt#1#2#3#4{%
191     \ifnum#2=\z@
192       \gdef\bbl@nulllanguage{#1}%
193       \def\bbl@elt##1##2##3##4{}%
194     \fi}%
195   \bbl@languages
196 \fi
197 \ifodd\bbl@engine
198   \let\bbl@tempa\relax
199   \@ifpackagewith{babel}{bidi=basic}%
200     {\def\bbl@tempa{basic}}%
201     {\@ifpackagewith{babel}{bidi=basic-r}%
202       {\def\bbl@tempa{basic-r}}%
203       {}}
204   \ifx\bbl@tempa\relax\else
205     \let\bbl@beforeforeign\leavevmode
```

```
206    \AtEndOfPackage{\EnableBabelHook{babel-bidi}}%
207    \RequirePackage{luatexbase}%
208    \directlua{
209      require('babel-bidi.lua')
210      require('babel-bidi-\bbl@tempa.lua')
211      luatexbase.add_to_callback('pre_linebreak_filter',
212        Babel.pre_otfload_v,
213        'Babel.pre_otfload_v',
214        luatexbase.priority_in_callback('pre_linebreak_filter',
215          'luaotfload.node_processor') or nil)
216      luatexbase.add_to_callback('hpack_filter',
217        Babel.pre_otfload_h,
218        'Babel.pre_otfload_h',
219        luatexbase.priority_in_callback('hpack_filter',
220          'luaotfload.node_processor') or nil)
221    }
222  \fi
223 \fi
```

Now the base option. With it we can define (and load, with luatex) hyphenation patterns, even if we are not interesed in the rest of babel. Useful for old versions of polyglossia, too.

```
224 \bbl@trace{Defining option 'base'}
225 \@ifpackagewith{babel}{base}{%
226   \ifx\directlua\@undefined
227     \DeclareOption*{\bbl@patterns{\CurrentOption}}%
228   \else
229     \DeclareOption*{\bbl@patterns@lua{\CurrentOption}}%
230   \fi
231   \DeclareOption{base}{}%
232   \DeclareOption{showlanguages}{}%
233   \ProcessOptions
234   \global\expandafter\let\csname opt@babel.sty\endcsname\relax
235   \global\expandafter\let\csname ver@babel.sty\endcsname\relax
236   \global\let\@ifl@ter@@\@ifl@ter
237   \def\@ifl@ter#1#2#3#4#5{\global\let\@ifl@ter\@ifl@ter@@}%
238   \endinput}{}%
```

8.2 `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.

```
239 \bbl@trace{key=value and another general options}
240 \bbl@csarg\let{tempa\expandafter}\csname opt@babel.sty\endcsname
241 \def\bbl@tempb#1.#2{%
242   #1\ifx\@empty#2\else,\bbl@afterfi\bbl@tempb#2\fi}%
243 \def\bbl@tempd#1.#2\@nnil{%
244   \ifx\@empty#2%
245     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
246   \else
247     \in@{=}{#1}\ifin@
248       \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.#2}%
249     \else
250       \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
251       \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}%
252     \fi
```

```
253    \fi}
254 \let\bbl@tempc\@empty
255 \bbl@foreach\bbl@tempa{\bbl@tempd#1.\@empty\@nnil}
256 \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.

```
257 \DeclareOption{KeepShorthandsActive}{}
258 \DeclareOption{activeacute}{}
259 \DeclareOption{activegrave}{}
260 \DeclareOption{debug}{}
261 \DeclareOption{noconfigs}{}
262 \DeclareOption{showlanguages}{}
263 \DeclareOption{silent}{}
264 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
265 ⟨⟨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.

```
266 \let\bbl@opt@shorthands\@nnil
267 \let\bbl@opt@config\@nnil
268 \let\bbl@opt@main\@nnil
269 \let\bbl@opt@headfoot\@nnil
270 \let\bbl@opt@layout\@nnil
```

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

```
271 \def\bbl@tempa#1=#2\bbl@tempa{%
272   \bbl@csarg\ifx{opt@#1}\@nnil
273     \bbl@csarg\edef{opt@#1}{#2}%
274   \else
275     \bbl@error{%
276       Bad option `#1=#2'. Either you have misspelled the\\%
277       key or there is a previous setting of `#1'}{%
278       Valid keys are `shorthands', `config', `strings', `main',\\%
279       `headfoot', `safe', `math', among others.}
280   \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.

```
281 \let\bbl@language@opts\@empty
282 \DeclareOption*{%
283   \bbl@xin@{\string=}{\CurrentOption}%
284   \ifin@
285     \expandafter\bbl@tempa\CurrentOption\bbl@tempa
286   \else
287     \bbl@add@list\bbl@language@opts{\CurrentOption}%
288   \fi}
```

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

```
289 \ProcessOptions*
```

8.3 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@ifshorthands` is always true,
and it is always false if `shorthands` is empty. Also, some code makes sense only with
`shorthands=...`.

```
290 \bbl@trace{Conditional loading of shorthands}
291 \def\bbl@sh@string#1{%
292   \ifx#1\@empty\else
293     \ifx#1t\string~%
294     \else\ifx#1c\string,%
295     \else\string#1%
296     \fi\fi
297     \expandafter\bbl@sh@string
298   \fi}
299 \ifx\bbl@opt@shorthands\@nnil
300   \def\bbl@ifshorthand#1#2#3{#2}%
301 \else\ifx\bbl@opt@shorthands\@empty
302   \def\bbl@ifshorthand#1#2#3{#3}%
303 \else
```

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

```
304   \def\bbl@ifshorthand#1{%
305     \bbl@xin@{\string#1}{\bbl@opt@shorthands}%
306     \ifin@
307       \expandafter\@firstoftwo
308     \else
309       \expandafter\@secondoftwo
310     \fi}
```

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

```
311   \edef\bbl@opt@shorthands{%
312     \expandafter\bbl@sh@string\bbl@opt@shorthands\@empty}%
```

The following is ignored with `shorthands=off`, since it is intended to take some aditional
actions for certain chars.

```
313   \bbl@ifshorthand{'}%
314     {\PassOptionsToPackage{activeacute}{babel}}{}
315   \bbl@ifshorthand{`}%
316     {\PassOptionsToPackage{activegrave}{babel}}{}
317 \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.

```
318 \ifx\bbl@opt@headfoot\@nnil\else
319   \g@addto@macro\@resetactivechars{%
320     \set@typeset@protect
321     \expandafter\select@language@x\expandafter{\bbl@opt@headfoot}%
322     \let\protect\noexpand}
323 \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.

```
324 \ifx\bbl@opt@safe\@undefined
325   \def\bbl@opt@safe{BR}
```

```
326 \fi
327 \ifx\bbl@opt@main\@nnil\else
328   \edef\bbl@language@opts{%
329     \ifx\bbl@language@opts\@empty\else\bbl@language@opts,\fi
330       \bbl@opt@main}
331 \fi
```

For layout an auxiliary macro is provided, available for packages and language styles.

```
332 \bbl@trace{Defining IfBabelLayout}
333 \ifx\bbl@opt@layout\@nnil
334   \newcommand\IfBabelLayout[3]{#3}%
335 \else
336   \newcommand\IfBabelLayout[1]{%
337     \@expandtwoargs\in@{.#1.}{.\bbl@opt@layout.}%
338     \ifin@
339       \expandafter\@firstoftwo
340     \else
341       \expandafter\@secondoftwo
342     \fi}
343 \fi
```

8.4 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 catched).

```
344 \bbl@trace{Language options}
345 \let\bbl@afterlang\relax
346 \let\BabelModifiers\relax
347 \let\bbl@loaded\@empty
348 \def\bbl@load@language#1{%
349   \InputIfFileExists{#1.ldf}%
350     {\edef\bbl@loaded{\CurrentOption
351       \ifx\bbl@loaded\@empty\else,\bbl@loaded\fi}%
352     \expandafter\let\expandafter\bbl@afterlang
353       \csname\CurrentOption.ldf-h@@k\endcsname
354     \expandafter\let\expandafter\BabelModifiers
355       \csname bbl@mod@\CurrentOption\endcsname}%
356     {\bbl@error{%
357       Unknown option `\CurrentOption'. Either you misspelled it\\%
358       or the language definition file \CurrentOption.ldf was not found}{%
359       Valid options are: shorthands=, KeepShorthandsActive,\\%
360       activeacute, activegrave, noconfigs, safe=, main=, math=\\%
361       headfoot=, strings=, config=, hyphenmap=, or a language name.}}}
```

Now, we set language options whose names are different from ldf files.

```
362 \def\bbl@try@load@lang#1#2#3{%
363     \IfFileExists{\CurrentOption.ldf}%
364       {\bbl@load@language{\CurrentOption}}%
365       {#1\bbl@load@language{#2}#3}}
366 \DeclareOption{afrikaans}{\bbl@try@load@lang{}{dutch}{}}
367 \DeclareOption{brazil}{\bbl@try@load@lang{}{portuges}{}}
368 \DeclareOption{brazilian}{\bbl@try@load@lang{}{portuges}{}}
369 \DeclareOption{hebrew}{%
370   \input{rlbabel.def}%
371   \bbl@load@language{hebrew}}
372 \DeclareOption{hungarian}{\bbl@try@load@lang{}{magyar}{}}
```

```
373 \DeclareOption{lowersorbian}{\bbl@try@load@lang{}{lsorbian}{}}
374 \DeclareOption{nynorsk}{\bbl@try@load@lang{}{norsk}{}}
375 \DeclareOption{polutonikogreek}{%
376   \bbl@try@load@lang{}{greek}{\languageattribute{greek}{polutoniko}}}
377 \DeclareOption{portuguese}{\bbl@try@load@lang{}{portuges}{}}
378 \DeclareOption{russian}{\bbl@try@load@lang{}{russianb}{}}
379 \DeclareOption{ukrainian}{\bbl@try@load@lang{}{ukraineb}{}}
380 \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.

```
381 \ifx\bbl@opt@config\@nnil
382   \@ifpackagewith{babel}{noconfigs}{}%
383     {\InputIfFileExists{bblopts.cfg}%
384       {\typeout{*************************************^^J%
385                 * Local config file bblopts.cfg used^^J%
386                 *}}%
387       {}}%
388 \else
389   \InputIfFileExists{\bbl@opt@config.cfg}%
390     {\typeout{*************************************^^J%
391              * Local config file \bbl@opt@config.cfg used^^J%
392              *}}%
393     {\bbl@error{%
394        Local config file `\bbl@opt@config.cfg' not found}{%
395        Perhaps you misspelled it.}}%
396 \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 (note this list
also contains the language given with `main`). If not declared above, the name of the option
and the file are the same.

```
397 \bbl@for\bbl@tempa\bbl@language@opts{%
398   \bbl@ifunset{ds@\bbl@tempa}%
399     {\edef\bbl@tempb{%
400        \noexpand\DeclareOption
401          {\bbl@tempa}%
402          {\noexpand\bbl@load@language{\bbl@tempa}}}%
403      \bbl@tempb}%
404      \@empty}
```

Now, we make sure an option is explicitly declared for any language set as global option,
by checking if an `ldf` exists. The previous step was, in fact, somewhat redundant, but that
way we minimize accesing the file system just to see if the option could be a language.

```
405 \bbl@foreach\@classoptionslist{%
406   \bbl@ifunset{ds@#1}%
407     {\IfFileExists{#1.ldf}%
408       {\DeclareOption{#1}{\bbl@load@language{#1}}}%
409       {}}%
410     {}}
```

If a main language has been set, store it for the third pass.

```
411 \ifx\bbl@opt@main\@nnil\else
412   \expandafter
```

```
413    \let\expandafter\bbl@loadmain\csname ds@\bbl@opt@main\endcsname
414    \DeclareOption{\bbl@opt@main}{}
415 \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 (except, of course, global options, which LATEX processes before):

```
416 \def\AfterBabelLanguage#1{%
417    \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang}{}}
418 \DeclareOption*{}
419 \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. Then execute directly the option (because it could be used only in main). After loading all languages, we deactivate \AfterBabelLanguage.

```
420 \ifx\bbl@opt@main\@nnil
421    \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
422    \let\bbl@tempc\@empty
423    \bbl@for\bbl@tempb\bbl@tempa{%
424      \bbl@xin@{,\bbl@tempb,}{,\bbl@loaded,}%
425      \ifin@\edef\bbl@tempc{\bbl@tempb}\fi}
426    \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
427    \expandafter\bbl@tempa\bbl@loaded,\@nnil
428    \ifx\bbl@tempb\bbl@tempc\else
429      \bbl@warning{%
430        Last declared language option is `\bbl@tempc',\\%
431        but the last processed one was `\bbl@tempb'.\\%
432        The main language cannot be set as both a global\\%
433        and a package option. Use `main=\bbl@tempc' as\\%
434        option. Reported}%
435    \fi
436 \else
437    \DeclareOption{\bbl@opt@main}{\bbl@loadmain}
438    \ExecuteOptions{\bbl@opt@main}
439    \DeclareOption*{}
440    \ProcessOptions*
441 \fi
442 \def\AfterBabelLanguage{%
443    \bbl@error
444      {Too late for \string\AfterBabelLanguage}%
445      {Languages have been loaded, so I can do nothing}}
```

In order to catch the case where the user forgot to specify a language we check whether \bbl@main@language, has become defined. If not, no language has been loaded and an error message is displayed.

```
446 \ifx\bbl@main@language\@undefined
447    \bbl@info{%
448      You haven't specified a language. I'll use 'nil'\\%
449      as the main language. Reported}
450      \bbl@load@language{nil}
451 \fi
452 ⟨/package⟩
453 ⟨*core⟩
```

9 The kernel of Babel (`babel.def`, common)

The kernel of the babel system is stored in either hyphen.cfg or switch.def and babel.def. The file `babel.def` contains most of the code, while switch.def defines the language switching commands; both can be read at run time. 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 (by default, it also inputs switch.def, for "historical reasons", but it is not necessary). When `babel.def` is loaded it checks if the current version of switch.def is in the format; if not, it is loaded. A further file, babel.sty, contains LaTeX-specific stuff. 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.

9.1 Tools

```
454 \ifx\ldf@quit\@undefined
455 \else
456   \expandafter\endinput
457 \fi
458 ⟨⟨Make sure ProvidesFile is defined⟩⟩
459 \ProvidesFile{babel.def}[⟨⟨date⟩⟩ ⟨⟨version⟩⟩ Babel common definitions]
460 ⟨⟨Load macros for plain if not LaTeX⟩⟩
```

The file `babel.def` expects some definitions made in the LaTeX 2ε style file. So, In LaTeX2.09 and Plain we must provide at least some predefined values as well some tools to set them (even if not all options are available). There in no package options, and therefore and 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).

```
461 \ifx\bbl@ifshorthand\@undefined
462   \let\bbl@opt@shorthands\@nnil
463   \def\bbl@ifshorthand#1#2#3{#2}%
464   \let\bbl@language@opts\@empty
465   \ifx\babeloptionstrings\@undefined
466     \let\bbl@opt@strings\@nnil
467   \else
468     \let\bbl@opt@strings\babeloptionstrings
469   \fi
470   \def\BabelStringsDefault{generic}
471   \def\bbl@tempa{normal}
472   \ifx\babeloptionmath\bbl@tempa
473     \def\bbl@mathnormal{\noexpand\textormath}
474   \fi
475   \def\AfterBabelLanguage#1#2{}
476   \ifx\BabelModifiers\@undefined\let\BabelModifiers\relax\fi
477   \let\bbl@afterlang\relax
478   \def\bbl@opt@safe{BR}
479   \ifx\@uclclist\@undefined\let\@uclclist\@empty\fi
480   \ifx\bbl@trace\@undefined\def\bbl@trace#1{}\fi
481 \fi
```

And continue.

```
482 \ifx\bbl@switchflag\@undefined % Prevent double input
483   \let\bbl@switchflag\relax
```

```
484    \input switch.def\relax
485 \fi
486 \bbl@trace{Compatibility with language.def}
487 \ifx\bbl@languages\@undefined
488   \ifx\directlua\@undefined
489     \openin1 = language.def
490     \ifeof1
491       \closein1
492       \message{I couldn't find the file language.def}
493     \else
494       \closein1
495       \begingroup
496         \def\addlanguage#1#2#3#4#5{%
497           \expandafter\ifx\csname lang@#1\endcsname\relax\else
498             \global\expandafter\let\csname l@#1\expandafter\endcsname
499               \csname lang@#1\endcsname
500           \fi}%
501         \def\uselanguage#1{}%
502         \input language.def
503       \endgroup
504     \fi
505   \fi
506   \chardef\l@english\z@
507 \fi
508 ⟨⟨Load patterns in luatex⟩⟩
509 ⟨⟨Basic macros⟩⟩
```

\addto   For each language four control sequences have to be defined that control the
language-specific definitions. To be able to add something to these macro once they have
been defined the macro \addto is introduced. 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. Otherwise the replacement text for the ⟨control sequence⟩ is
expanded and stored in a token register, together with the TeX-code to be added. Finally
the ⟨control sequence⟩ is *re*defined, using the contents of the token register.

```
510 \def\addto#1#2{%
511   \ifx#1\@undefined
512     \def#1{#2}%
513   \else
514     \ifx#1\relax
515       \def#1{#2}%
516     \else
517       {\toks@\expandafter{#1#2}%
518        \xdef#1{\the\toks@}}%
519     \fi
520   \fi}
```

The macro \initiate@active@char takes all the necessary actions to make its argument a
shorthand character. The real work is performed once for each character.

```
521 \def\bbl@withactive#1#2{%
522   \begingroup
523     \lccode`~=`#2\relax
524     \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

64

we don't want to redefine the LaTeX macros completely in case their definitions change (they have changed in the past).

Because we need to redefine a number of commands we define the command \bbl@redefine which takes care of this. It creates a new control sequence, \org@...

```
525 \def\bbl@redefine#1{%
526   \edef\bbl@tempa{\bbl@stripslash#1}%
527   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
528   \expandafter\def\csname\bbl@tempa\endcsname}
```

This command should only be used in the preamble of the document.

```
529 \@onlypreamble\bbl@redefine
```

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

```
530 \def\bbl@redefine@long#1{%
531   \edef\bbl@tempa{\bbl@stripslash#1}%
532   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
533   \expandafter\long\expandafter\def\csname\bbl@tempa\endcsname}
534 \@onlypreamble\bbl@redefine@long
```

\bbl@redefinerobust   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␣.

```
535 \def\bbl@redefinerobust#1{%
536   \edef\bbl@tempa{\bbl@stripslash#1}%
537   \bbl@ifunset{\bbl@tempa\space}%
538     {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
539      \bbl@exp{\def\\#1{\\\protect\<\bbl@tempa\space>}}}%
540     {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}%
541     \@namedef{\bbl@tempa\space}}
```

This command should only be used in the preamble of the document.

```
542 \@onlypreamble\bbl@redefinerobust
```

9.2   Hooks

Note they are loaded in babel.def. switch.def only provides a "hook" for hooks (with a default value which is a no-op, below). Admittedly, the current implementation is a somewhat simplistic and does vety little to catch errors, but it is intended for developers, after all. \bbl@usehooks is the commands used by babel to execute hooks defined for an event.

```
543 \bbl@trace{Hooks}
544 \def\AddBabelHook#1#2{%
545   \bbl@ifunset{bbl@hk@#1}{\EnableBabelHook{#1}}{}%
546   \def\bbl@tempa##1,#2=##2,##3\@empty{\def\bbl@tempb{##2}}%
547   \expandafter\bbl@tempa\bbl@evargs,#2=,\@empty
548   \bbl@ifunset{bbl@ev@#1@#2}%
549     {\bbl@csarg\bbl@add{ev@#2}{\bbl@elt{#1}}%
550      \bbl@csarg\newcommand}%
551     {\bbl@csarg\let{ev@#1@#2}\relax
552      \bbl@csarg\newcommand}%
553   {ev@#1@#2}[\bbl@tempb]}
554 \def\EnableBabelHook#1{\bbl@csarg\let{hk@#1}\@firstofone}
555 \def\DisableBabelHook#1{\bbl@csarg\let{hk@#1}\@gobble}
556 \def\bbl@usehooks#1#2{%
```

```
557   \def\bbl@elt##1{%
558     \@nameuse{bbl@hk@##1}{\@nameuse{bbl@ev@##1@#1}#2}}%
559   \@nameuse{bbl@ev@#1}}
```

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).

```
560 \def\bbl@evargs{,% don't delete the comma
561   everylanguage=1,loadkernel=1,loadpatterns=1,loadexceptions=1,%
562   adddialect=2,patterns=2,defaultcommands=0,encodedcommands=2,write=0,%
563   beforeextras=0,afterextras=0,stopcommands=0,stringprocess=0,%
564   hyphenation=2,initiateactive=3,afterreset=0,foreign=0,foreign*=0}
```

\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 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.

```
565 \bbl@trace{Defining babelensure}
566 \newcommand\babelensure[2][]{%  TODO - revise test files
567   \AddBabelHook{babel-ensure}{afterextras}{%
568     \ifcase\bbl@select@type
569       \@nameuse{bbl@e@\languagename}%
570     \fi}%
571   \begingroup
572     \let\bbl@ens@include\@empty
573     \let\bbl@ens@exclude\@empty
574     \def\bbl@ens@fontenc{\relax}%
575     \def\bbl@tempb##1{%
576       \ifx\@empty##1\else\noexpand##1\expandafter\bbl@tempb\fi}%
577     \edef\bbl@tempa{\bbl@tempb#1\@empty}%
578     \def\bbl@tempb##1=##2\@@{\@namedef{bbl@ens@##1}{##2}}%
579     \bbl@foreach\bbl@tempa{\bbl@tempb##1\@@}%
580     \def\bbl@tempc{\bbl@ensure}%
581     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
582       \expandafter{\bbl@ens@include}}%
583     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
584       \expandafter{\bbl@ens@exclude}}%
585     \toks@\expandafter{\bbl@tempc}%
586     \bbl@exp{%
587   \endgroup
588   \def\<bbl@e@#2>{\the\toks@{\bbl@ens@fontenc}}}}}
589 \def\bbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
590   \def\bbl@tempb##1{% elt for (excluding) \bbl@captionslist list
591     \ifx##1\@empty\else
592       \in@{##1}{#2}%
593       \ifin@\else
594         \bbl@ifunset{bbl@ensure@\languagename}%
595           {\bbl@exp{%
596             \\\DeclareRobustCommand\<bbl@ensure@\languagename>[1]{%
597               \\\foreignlanguage{\languagename}%
598               {\ifx\relax#3\else
```

66

```
599            \\\fontencoding{#3}\\\selectfont
600            \fi
601            ########1}}}}%
602        {}%
603      \toks@\expandafter{##1}%
604      \edef##1{%
605          \bbl@csarg\noexpand{ensure@\languagename}%
606          {\the\toks@}}%
607      \fi
608      \expandafter\bbl@tempb
609    \fi}%
610  \expandafter\bbl@tempb\bbl@captionslist\today\@empty
611  \def\bbl@tempa##1{% elt for include list
612    \ifx##1\@empty\else
613      \bbl@csarg\in@{ensure@\languagename\expandafter}\expandafter{##1}%
614      \ifin@\else
615        \bbl@tempb##1\@empty
616      \fi
617      \expandafter\bbl@tempa
618    \fi}%
619    \bbl@tempa#1\@empty}
620  \def\bbl@captionslist{%
621    \prefacename\refname\abstractname\bibname\chaptername\appendixname
622    \contentsname\listfigurename\listtablename\indexname\figurename
623    \tablename\partname\enclname\ccname\headtoname\pagename\seename
624    \alsoname\proofname\glossaryname}
```

9.3   Setting up language files

\LdfInit   The second version of \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 at-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.

```
625  \bbl@trace{Macros for setting language files up}
626  \def\bbl@ldfinit{%
627    \let\bbl@screset\@empty
628    \let\BabelStrings\bbl@opt@string
629    \let\BabelOptions\@empty
630    \let\BabelLanguages\relax
631    \ifx\originalTeX\@undefined
```

```
632     \let\originalTeX\@empty
633   \else
634     \originalTeX
635   \fi}
636 \def\LdfInit#1#2{%
637   \chardef\atcatcode=\catcode`\@
638   \catcode`\@=11\relax
639   \chardef\eqcatcode=\catcode`\=
640   \catcode`\==12\relax
641   \expandafter\if\expandafter\@backslashchar
642                 \expandafter\@car\string#2\@nil
643     \ifx#2\@undefined\else
644       \ldf@quit{#1}%
645     \fi
646   \else
647     \expandafter\ifx\csname#2\endcsname\relax\else
648       \ldf@quit{#1}%
649     \fi
650   \fi
651   \bbl@ldfinit}
```

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

```
652 \def\ldf@quit#1{%
653   \expandafter\main@language\expandafter{#1}%
654   \catcode`\@=\atcatcode \let\atcatcode\relax
655   \catcode`\==\eqcatcode \let\eqcatcode\relax
656   \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.

```
657 \def\bbl@afterldf#1{%
658   \bbl@afterlang
659   \let\bbl@afterlang\relax
660   \let\BabelModifiers\relax
661   \let\bbl@screset\relax}%
662 \def\ldf@finish#1{%
663   \loadlocalcfg{#1}%
664   \bbl@afterldf{#1}%
665   \expandafter\main@language\expandafter{#1}%
666   \catcode`\@=\atcatcode \let\atcatcode\relax
667   \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.

```
668 \@onlypreamble\LdfInit
669 \@onlypreamble\ldf@quit
670 \@onlypreamble\ldf@finish
```

\main@language   This command should be used in the various language definition files. It stores its
\bbl@main@language   argument in \bbl@main@language; to be used to switch to the correct language at the
beginning of the document.

```
671 \def\main@language#1{%
672   \def\bbl@main@language{#1}%
673   \let\languagename\bbl@main@language
674   \bbl@patterns{\languagename}}
```

We also have to make sure that some code gets executed at the beginning of the document. Languages does not set \pagedir, so we set here for the whole document to the main \bodydir.

```
675 \AtBeginDocument{%
676   \expandafter\selectlanguage\expandafter{\bbl@main@language}%
677   \ifcase\bbl@engine\or\pagedir\bodydir\fi}  % TODO - a better place
```

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

```
678 \def\select@language@x#1{%
679   \ifcase\bbl@select@type
680     \bbl@ifsamestring\languagename{#1}{}{\select@language{#1}}%
681   \else
682     \select@language{#1}%
683   \fi}
```

9.4 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.

```
684 \bbl@trace{Shorhands}
685 \def\bbl@add@special#1{% 1:a macro like \", \?, etc.
686   \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
687   \bbl@ifunset{@sanitize}{}{\bbl@add\@sanitize{\@makeother#1}}%
688   \ifx\nfss@catcodes\@undefined\else % TODO - same for above
689     \begingroup
690       \catcode`#1\active
691       \nfss@catcodes
692       \ifnum\catcode`#1=\active
693         \endgroup
694         \bbl@add\nfss@catcodes{\@makeother#1}%
695       \else
696         \endgroup
697       \fi
698   \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.

```
699 \def\bbl@remove@special#1{%
700   \begingroup
701     \def\x##1##2{\ifnum`#1=`##2\noexpand\@empty
702                 \else\noexpand##1\noexpand##2\fi}%
703     \def\do{\x\do}%
704     \def\@makeother{\x\@makeother}%
705   \edef\x{\endgroup
706     \def\noexpand\dospecials{\dospecials}%
707     \expandafter\ifx\csname @sanitize\endcsname\relax\else
708       \def\noexpand\@sanitize{\@sanitize}%
709     \fi}%
710   \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

69

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).

```
711 \def\bbl@active@def#1#2#3#4{%
712   \@namedef{#3#1}{%
713     \expandafter\ifx\csname#2@sh@#1@\endcsname\relax
714       \bbl@afterelse\bbl@sh@select#2#1{#3@arg#1}{#4#1}%
715     \else
716       \bbl@afterfi\csname#2@sh@#1@\endcsname
717     \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.

```
718   \long\@namedef{#3@arg#1}##1{%
719     \expandafter\ifx\csname#2@sh@#1@\string##1@\endcsname\relax
720       \bbl@afterelse\csname#4#1\endcsname##1%
721     \else
722       \bbl@afterfi\csname#2@sh@#1@\string##1@\endcsname
723     \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.

```
724 \def\initiate@active@char#1{%
725   \bbl@ifunset{active@char\string#1}%
726     {\bbl@withactive
727       {\expandafter\@initiate@active@char\expandafter}#1\string#1#1}%
728     {}}
```

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 treatement to avoid
making them \relax).

```
729 \def\@initiate@active@char#1#2#3{%
730   \bbl@csarg\edef{oricat@#2}{\catcode`#2=\the\catcode`#2\relax}%
731   \ifx#1\@undefined
732     \bbl@csarg\edef{oridef@#2}{\let\noexpand#1\noexpand\@undefined}%
733   \else
734     \bbl@csarg\let{oridef@@#2}#1%
735     \bbl@csarg\edef{oridef@#2}{%
736       \let\noexpand#1%
737       \expandafter\noexpand\csname bbl@oridef@@#2\endcsname}%
738   \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*).

```
739  \ifx#1#3\relax
740    \expandafter\let\csname normal@char#2\endcsname#3%
741  \else
742    \bbl@info{Making #2 an active character}%
743    \ifnum\mathcode`#2="8000
744      \@namedef{normal@char#2}{%
745        \textormath{#3}{\csname bbl@oridef@@#2\endcsname}}%
746    \else
747      \@namedef{normal@char#2}{#3}%
748    \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).

```
749    \bbl@restoreactive{#2}%
750    \AtBeginDocument{%
751      \catcode`#2\active
752      \if@filesw
753        \immediate\write\@mainaux{\catcode`\string#2\active}%
754      \fi}%
755    \expandafter\bbl@add@special\csname#2\endcsname
756    \catcode`#2\active
757  \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*⟩).

```
758  \let\bbl@tempa\@firstoftwo
759  \if\string^#2%
760    \def\bbl@tempa{\noexpand\textormath}%
761  \else
762    \ifx\bbl@mathnormal\@undefined\else
763      \let\bbl@tempa\bbl@mathnormal
764    \fi
765  \fi
766  \expandafter\edef\csname active@char#2\endcsname{%
767    \bbl@tempa
768      {\noexpand\if@safe@actives
769        \noexpand\expandafter
770        \expandafter\noexpand\csname normal@char#2\endcsname
771      \noexpand\else
772        \noexpand\expandafter
773        \expandafter\noexpand\csname bbl@doactive#2\endcsname
774      \noexpand\fi}%
775    {\expandafter\noexpand\csname normal@char#2\endcsname}}%
```

```
776    \bbl@csarg\edef{doactive#2}{%
777      \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

$$\texttt{\textbackslash active@prefix} \langle char \rangle \texttt{\textbackslash normal@char} \langle char \rangle$$

(where \active@char⟨*char*⟩ is *one* control sequence!).

```
778    \bbl@csarg\edef{active@#2}{%
779      \noexpand\active@prefix\noexpand#1%
780      \expandafter\noexpand\csname active@char#2\endcsname}%
781    \bbl@csarg\edef{normal@#2}{%
782      \noexpand\active@prefix\noexpand#1%
783      \expandafter\noexpand\csname normal@char#2\endcsname}%
784    \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.

```
785    \bbl@active@def#2\user@group{user@active}{language@active}%
786    \bbl@active@def#2\language@group{language@active}{system@active}%
787    \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.

```
788    \expandafter\edef\csname\user@group @sh@#2@@\endcsname
789      {\expandafter\noexpand\csname normal@char#2\endcsname}%
790    \expandafter\edef\csname\user@group @sh@#2@\string\protect@\endcsname
791      {\expandafter\noexpand\csname user@active#2\endcsname}%
```

Finally, a couple of special cases are taken care of. (1) If we are making the right quote (') active we need to change \pr@m@s as well. Also, make sure that a single ' in math mode 'does the right thing'. (2) If we are using the caret (^) as a shorthand character special care should be taken to make sure math still works. Therefore an extra level of expansion is introduced with a check for math mode on the upper level.

```
792    \if\string'#2%
793      \let\prim@s\bbl@prim@s
794      \let\active@math@prime#1%
795    \fi
796    \bbl@usehooks{initiateactive}{{#1}{#2}{#3}}}
```

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

```
797 ⟨⟨∗More package options⟩⟩ ≡
798 \DeclareOption{math=active}{}
799 \DeclareOption{math=normal}{\def\bbl@mathnormal{\noexpand\textormath}}
800 ⟨⟨/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* and the end of the ldf.

```
801 \@ifpackagewith{babel}{KeepShorthandsActive}%
802    {\let\bbl@restoreactive\@gobble}%
803    {\def\bbl@restoreactive#1{%
804      \bbl@exp{%
```

```
805        \\\AfterBabelLanguage\\\CurrentOption
806          {\catcode`#1=\the\catcode`#1\relax}%
807        \\\AtEndOfPackage
808          {\catcode`#1=\the\catcode`#1\relax}}}%
809    \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.

```
810 \def\bbl@sh@select#1#2{%
811    \expandafter\ifx\csname#1@sh@#2@sel\endcsname\relax
812      \bbl@afterelse\bbl@scndcs
813    \else
814      \bbl@afterfi\csname#1@sh@#2@sel\endcsname
815    \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.

```
816 \def\active@prefix#1{%
817    \ifx\protect\@typeset@protect
818    \else
```

When \protect is set to \@unexpandable@protect we make sure that the active character is als *not* expanded by inserting \noexpand in front of it. The \@gobble is needed to remove a token such as \activechar: (when the double colon was the active character to be dealt with).

```
819      \ifx\protect\@unexpandable@protect
820        \noexpand#1%
821      \else
822        \protect#1%
823      \fi
824      \expandafter\@gobble
825    \fi}
```

\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⟩.

```
826 \newif\if@safe@actives
827 \@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.

```
828 \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
\bbl@deactivate 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.

```
829 \def\bbl@activate#1{%
830    \bbl@withactive{\expandafter\let\expandafter}#1%
831      \csname bbl@active@\string#1\endcsname}
832 \def\bbl@deactivate#1{%
```

```
833    \bbl@withactive{\expandafter\let\expandafter}#1%
834      \csname bbl@normal@\string#1\endcsname}
```

\bbl@firstcs These macros have two arguments. They use one of their arguments to build a control
\bbl@scndcs   sequence from.

```
835 \def\bbl@firstcs#1#2{\csname#1\endcsname}
836 \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.

```
837 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
838 \def\@decl@short#1#2#3\@nil#4{%
839   \def\bbl@tempa{#3}%
840   \ifx\bbl@tempa\@empty
841     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
842     \bbl@ifunset{#1@sh@\string#2@}{}%
843       {\def\bbl@tempa{#4}%
844        \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbl@tempa
845        \else
846          \bbl@info
847            {Redefining #1 shorthand \string#2\\%
848             in language \CurrentOption}%
849        \fi}%
850     \@namedef{#1@sh@\string#2@}{#4}%
851   \else
852     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@firstcs
853     \bbl@ifunset{#1@sh@\string#2@\string#3@}{}%
854       {\def\bbl@tempa{#4}%
855        \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bbl@tempa
856        \else
857          \bbl@info
858            {Redefining #1 shorthand \string#2\string#3\\%
859             in language \CurrentOption}%
860        \fi}%
861     \@namedef{#1@sh@\string#2@\string#3@}{#4}%
862   \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.

```
863 \def\textormath{%
864   \ifmmode
865     \expandafter\@secondoftwo
866   \else
867     \expandafter\@firstoftwo
868   \fi}
```

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

```
869 \def\user@group{user}
870 \def\language@group{english}
871 \def\system@group{system}
```

\useshorthands | This is the user level command to tell LaTeX that user level shorthands will be used in the document. It takes one argument, the character that starts a shorthand. First note that this is user level, and then initialize and activate 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.

```
872 \def\useshorthands{%
873   \@ifstar\bbl@usesh@s{\bbl@usesh@x{}}}
874 \def\bbl@usesh@s#1{%
875   \bbl@usesh@x
876     {\AddBabelHook{babel-sh-\string#1}{afterextras}{\bbl@activate{#1}}}%
877     {#1}}
878 \def\bbl@usesh@x#1#2{%
879   \bbl@ifshorthand{#2}%
880     {\def\user@group{user}%
881      \initiate@active@char{#2}%
882      #1%
883      \bbl@activate{#2}}%
884     {\bbl@error
885        {Cannot declare a shorthand turned off (\string#2)}
886        {Sorry, but you cannot use shorthands which have been\\%
887         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 \bbl@set@user@generic); we make also sure {} and \protect are taken into account in this new top level.

```
888 \def\user@language@group{user@\language@group}
889 \def\bbl@set@user@generic#1#2{%
890   \bbl@ifunset{user@generic@active#1}%
891     {\bbl@active@def#1\user@language@group{user@active}{user@generic@active}%
892      \bbl@active@def#1\user@group{user@generic@active}{language@active}%
893      \expandafter\edef\csname#2@sh@#1@@\endcsname{%
894        \expandafter\noexpand\csname normal@char#1\endcsname}%
895      \expandafter\edef\csname#2@sh@#1@\string\protect@\endcsname{%
896        \expandafter\noexpand\csname user@active#1\endcsname}}%
897   \@empty}
898 \newcommand\defineshorthand[3][user]{%
899   \edef\bbl@tempa{\zap@space#1 \@empty}%
900   \bbl@for\bbl@tempb\bbl@tempa{%
901     \if*\expandafter\@car\bbl@tempb\@nil
902       \edef\bbl@tempb{user@\expandafter\@gobble\bbl@tempb}%
903       \@expandtwoargs
904         \bbl@set@user@generic{\expandafter\string\@car#2\@nil}\bbl@tempb
905     \fi
906     \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.

```
907 \def\languageshorthands#1{\def\language@group{#1}}
```

\aliasshorthand | First the new shorthand needs to be initialized,

```
908 \def\aliasshorthand#1#2{%
909   \bbl@ifshorthand{#2}%
910     {\expandafter\ifx\csname active@char\string#2\endcsname\relax
911        \ifx\document\@notprerr
```

75

```
912          \@notshorthand{#2}%
913        \else
914          \initiate@active@char{#2}%
```

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
lattest to \active@char".

```
915          \expandafter\let\csname active@char\string#2\expandafter\endcsname
916            \csname active@char\string#1\endcsname
917          \expandafter\let\csname normal@char\string#2\expandafter\endcsname
918            \csname normal@char\string#1\endcsname
919          \bbl@activate{#2}%
920        \fi
921      \fi}%
922    {\bbl@error
923      {Cannot declare a shorthand turned off (\string#2)}
924      {Sorry, but you cannot use shorthands which have been\\%
925       turned off in the package options}}}
```

\@notshorthand

```
926 \def\@notshorthand#1{%
927   \bbl@error{%
928     The character `\string #1' should be made a shorthand character;\\%
929     add the command \string\useshorthands\string{#1\string} to
930     the preamble.\\%
931     I will ignore your instruction}%
932     {You may proceed, but expect unexpected results}}
```

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

```
933 \newcommand*\shorthandon[1]{\bbl@switch@sh\@ne#1\@nnil}
934 \DeclareRobustCommand*\shorthandoff{%
935   \@ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
936 \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.

```
937 \def\bbl@switch@sh#1#2{%
938   \ifx#2\@nnil\else
939     \bbl@ifunset{bbl@active@\string#2}%
940       {\bbl@error
941         {I cannot switch `\string#2' on or off--not a shorthand}%
942         {This character is not a shorthand. Maybe you made\\%
943          a typing mistake? I will ignore your instruction}}%
944       {\ifcase#1%
945         \catcode`#212\relax
946       \or
947         \catcode`#2\active
948       \or
949         \csname bbl@oricat@\string#2\endcsname
```

76

```
950        \csname bbl@oridef@\string#2\endcsname
951      \fi}%
952    \bbl@afterfi\bbl@switch@sh#1%
953  \fi}
```

Note the value is that at the expansion time, eg, in the preample shorhands are usually deactivated.

```
954 \def\babelshorthand{\active@prefix\babelshorthand\bbl@putsh}
955 \def\bbl@putsh#1{%
956   \bbl@ifunset{bbl@active@\string#1}%
957      {\bbl@putsh@i#1\@empty\@nnil}%
958      {\csname bbl@active@\string#1\endcsname}}
959 \def\bbl@putsh@i#1#2\@nnil{%
960   \csname\languagename @sh@\string#1@%
961      \ifx\@empty#2\else\string#2@\fi\endcsname}
962 \ifx\bbl@opt@shorthands\@nnil\else
963   \let\bbl@s@initiate@active@char\initiate@active@char
964   \def\initiate@active@char#1{%
965      \bbl@ifshorthand{#1}{\bbl@s@initiate@active@char{#1}}{}}
966   \let\bbl@s@switch@sh\bbl@switch@sh
967   \def\bbl@switch@sh#1#2{%
968      \ifx#2\@nnil\else
969        \bbl@afterfi
970        \bbl@ifshorthand{#2}{\bbl@s@switch@sh#1{#2}}{\bbl@switch@sh#1}%
971      \fi}
972   \let\bbl@s@activate\bbl@activate
973   \def\bbl@activate#1{%
974      \bbl@ifshorthand{#1}{\bbl@s@activate{#1}}{}}
975   \let\bbl@s@deactivate\bbl@deactivate
976   \def\bbl@deactivate#1{%
977      \bbl@ifshorthand{#1}{\bbl@s@deactivate{#1}}{}}
978 \fi
```

`\bbl@prim@s`
`\bbl@pr@m@s`
One of the internal macros that are involved in substituting \prime for each right quote in 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.

```
979 \def\bbl@prim@s{%
980   \prime\futurelet\@let@token\bbl@pr@m@s}
981 \def\bbl@if@primes#1#2{%
982   \ifx#1\@let@token
983      \expandafter\@firstoftwo
984   \else\ifx#2\@let@token
985      \bbl@afterelse\expandafter\@firstoftwo
986   \else
987      \bbl@afterfi\expandafter\@secondoftwo
988   \fi\fi}
989 \begingroup
990   \catcode`\^=7  \catcode`\*=\active  \lccode`\*=`\^
991   \catcode`\'=12 \catcode`\"=\active  \lccode`\"=`\'
992   \lowercase{%
993     \gdef\bbl@pr@m@s{%
994        \bbl@if@primes"'%
995          \pr@@@s
996          {\bbl@if@primes*^\pr@@@t\egroup}}}
997 \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

77

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).

```
998 \initiate@active@char{~}
999 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }
1000 \bbl@activate{~}
```

\OT1dqpos
\T1dqpos

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.

```
1001 \expandafter\def\csname OT1dqpos\endcsname{127}
1002 \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

```
1003 \ifx\f@encoding\@undefined
1004   \def\f@encoding{OT1}
1005 \fi
```

9.5 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.

```
1006 \bbl@trace{Language attributes}
1007 \newcommand\languageattribute[2]{%
1008   \def\bbl@tempc{#1}%
1009   \bbl@fixname\bbl@tempc
1010   \bbl@iflanguage\bbl@tempc{%
1011     \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.

```
1012       \ifx\bbl@known@attribs\@undefined
1013         \in@false
1014       \else
```

Now we need to see if the attribute occurs in the list of already selected attributes.

```
1015         \bbl@xin@{,\bbl@tempc-##1,}{,\bbl@known@attribs,}%
1016       \fi
```

When the attribute was in the list we issue a warning; this might not be the users intention.

```
1017       \ifin@
1018         \bbl@warning{%
1019           You have more than once selected the attribute '##1'\\%
1020           for language #1. Reported}%
1021       \else
```

When we end up here the attribute is not selected before. So, we add it to the list of selected attributes and execute the associated TeX-code.

```
1022         \bbl@exp{%
1023           \\\bbl@add@list\\\bbl@known@attribs{\bbl@tempc-##1}}%
```

```
1024        \edef\bbl@tempa{\bbl@tempc-##1}%
1025        \expandafter\bbl@ifknown@ttrib\expandafter{\bbl@tempa}\bbl@attributes%
1026        {\csname\bbl@tempc @attr@##1\endcsname}%
1027        {\@attrerr{\bbl@tempc}{##1}}%
1028      \fi}}}
```

This command should only be used in the preamble of a document.

```
1029 \@onlypreamble\languageattribute
```

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

```
1030 \newcommand*{\@attrerr}[2]{%
1031   \bbl@error
1032     {The attribute #2 is unknown for language #1.}%
1033     {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}.

```
1034 \def\bbl@declare@ttribute#1#2#3{%
1035   \bbl@xin@{,#2,}{,\BabelModifiers,}%
1036   \ifin@
1037     \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
1038   \fi
1039   \bbl@add@list\bbl@attributes{#1-#2}%
1040   \expandafter\def\csname#1@attr@#2\endcsname{#3}}
```

\bbl@ifattributeset   This internal macro has 4 arguments. It can be used to interpret TeX code based on whether a certain attribute was set. This command should appear inside the argument to \AtBeginDocument because the attributes are set in the document preamble, *after* babel is loaded.
The first argument is the language, the second argument the attribute being checked, and the third and fourth arguments are the true and false clauses.

```
1041 \def\bbl@ifattributeset#1#2#3#4{%
```

First we need to find out if any attributes were set; if not we're done.

```
1042   \ifx\bbl@known@attribs\@undefined
1043     \in@false
1044   \else
```

The we need to check the list of known attributes.

```
1045     \bbl@xin@{,#1-#2,}{,\bbl@known@attribs,}%
1046   \fi
```

When we're this far \ifin@ has a value indicating if the attribute in question was set or not. Just to be safe the code to be executed is 'thrown over the \fi'.

```
1047   \ifin@
1048     \bbl@afterelse#3%
1049   \else
1050     \bbl@afterfi#4%
1051   \fi
1052   }
```

\bbl@ifknown@ttrib   An internal macro to check whether a given language/attribute is known. The macro takes 4 arguments, the language/attribute, the attribute list, the TeX-code to be executed when the attribute is known and the TeX-code to be executed otherwise.

```
1053 \def\bbl@ifknown@ttrib#1#2{%
```

We first assume the attribute is unknown.

```
1054    \let\bbl@tempa\@secondoftwo
```

Then we loop over the list of known attributes, trying to find a match.

```
1055    \bbl@loopx\bbl@tempb{#2}{%
1056      \expandafter\in@\expandafter{\expandafter,\bbl@tempb,}{,#1,}%
1057      \ifin@
```

When a match is found the definition of \bbl@tempa is changed.

```
1058        \let\bbl@tempa\@firstoftwo
1059      \else
1060      \fi}%
```

Finally we execute \bbl@tempa.

```
1061    \bbl@tempa
1062 }
```

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

```
1063 \def\bbl@clear@ttribs{%
1064    \ifx\bbl@attributes\@undefined\else
1065      \bbl@loopx\bbl@tempa{\bbl@attributes}{%
1066        \expandafter\bbl@clear@ttrib\bbl@tempa.
1067        }%
1068      \let\bbl@attributes\@undefined
1069    \fi}
1070 \def\bbl@clear@ttrib#1-#2.{%
1071    \expandafter\let\csname#1@attr@#2\endcsname\@undefined}
1072 \AtBeginDocument{\bbl@clear@ttribs}
```

9.6   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
```
1073 \bbl@trace{Macros for saving definitions}
1074 \def\babel@beginsave{\babel@savecnt\z@}
```

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

```
1075 \newcount\babel@savecnt
1076 \babel@beginsave
```

\babel@save   The macro \babel@save⟨*csname*⟩ saves the current meaning of the control sequence
⟨*csname*⟩ to \originalTeX[31]. 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.

```
1077 \def\babel@save#1{%
1078    \expandafter\let\csname babel@\number\babel@savecnt\endcsname#1\relax
1079    \toks@\expandafter{\originalTeX\let#1=}%
```

---

[31]\originalTeX has to be expandable, i. e. you shouldn't let it to \relax.

80

```
1080  \bbl@exp{%
1081    \def\\\originalTeX{\the\toks@\<babel@\number\babel@savecnt>\relax}}%
1082  \advance\babel@savecnt\@ne}
```

\babel@savevariable   The macro \babel@savevariable⟨*variable*⟩ saves the value of the variable. ⟨*variable*⟩ can
be anything allowed after the \the primitive.

```
1083 \def\babel@savevariable#1{%
1084   \toks@\expandafter{\originalTeX #1=}%
1085   \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
\bbl@nonfrenchspacing   command \bbl@frenchspacing switches it on when it isn't already in effect and
\bbl@nonfrenchspacing switches it off if necessary.

```
1086 \def\bbl@frenchspacing{%
1087   \ifnum\the\sfcode`\.=\@m
1088     \let\bbl@nonfrenchspacing\relax
1089   \else
1090     \frenchspacing
1091     \let\bbl@nonfrenchspacing\nonfrenchspacing
1092   \fi}
1093 \let\bbl@nonfrenchspacing\nonfrenchspacing
```

9.7   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.

```
1094 \bbl@trace{Short tags}
1095 \def\babeltags#1{%
1096   \edef\bbl@tempa{\zap@space#1 \@empty}%
1097   \def\bbl@tempb##1=##2\@@{%
1098     \edef\bbl@tempc{%
1099       \noexpand\newcommand
1100       \expandafter\noexpand\csname ##1\endcsname{%
1101         \noexpand\protect
1102         \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
1103       \noexpand\newcommand
1104       \expandafter\noexpand\csname text##1\endcsname{%
1105         \noexpand\foreignlanguage{##2}}}%
1106     \bbl@tempc}%
1107   \bbl@for\bbl@tempa\bbl@tempa{%
1108     \expandafter\bbl@tempb\bbl@tempa\@@}}
```

9.8   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.

```
1109 \bbl@trace{Hyphens}
1110 \@onlypreamble\babelhyphenation
1111 \AtEndOfPackage{%
1112   \newcommand\babelhyphenation[2][\@empty]{%
1113     \ifx\bbl@hyphenation@\relax
1114       \let\bbl@hyphenation@\@empty
1115     \fi
```

```
1116        \ifx\bbl@hyphlist\@empty\else
1117          \bbl@warning{%
1118            You must not intermingle \string\selectlanguage\space and\\%
1119            \string\babelhyphenation\space or some exceptions will not\\%
1120            be taken into account. Reported}%
1121        \fi
1122        \ifx\@empty#1%
1123          \protected@edef\bbl@hyphenation@{\bbl@hyphenation@\space#2}%
1124        \else
1125          \bbl@vforeach{#1}{%
1126            \def\bbl@tempa{##1}%
1127            \bbl@fixname\bbl@tempa
1128            \bbl@iflanguage\bbl@tempa{%
1129              \bbl@csarg\protected@edef{hyphenation@\bbl@tempa}{%
1130                \bbl@ifunset{bbl@hyphenation@\bbl@tempa}%
1131                  \@empty
1132                  {\csname bbl@hyphenation@\bbl@tempa\endcsname\space}%
1133                #2}}%
1134        \fi}}
```

\bbl@allowhyphens   This macro makes hyphenation possible. Basically its definition is nothing more than
                     \nobreak \hskip 0pt plus 0pt[32].

```
1135 \def\bbl@allowhyphens{\ifvmode\else\nobreak\hskip\z@skip\fi}
1136 \def\bbl@t@one{T1}
1137 \def\allowhyphens{\ifx\cf@encoding\bbl@t@one\else\bbl@allowhyphens\fi}
```

\babelhyphen   Macros to insert common hyphens. Note the space before @ in \babelhyphen. Instead of
                protecting it with \DeclareRobustCommand, which could insert a \relax, we use the same
                procedure as shorthands, with \active@prefix.

```
1138 \newcommand\babelnullhyphen{\char\hyphenchar\font}
1139 \def\babelhyphen{\active@prefix\babelhyphen\bbl@hyphen}
1140 \def\bbl@hyphen{%
1141   \@ifstar{\bbl@hyphen@i @}{\bbl@hyphen@i\@empty}}
1142 \def\bbl@hyphen@i#1#2{%
1143   \bbl@ifunset{bbl@hy@#1#2\@empty}%
1144     {\csname bbl@#1usehyphen\endcsname{\discretionary{#2}{}{#2}}}%
1145     {\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 hyphen 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 discretionaty 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.

```
1146 \def\bbl@usehyphen#1{%
1147   \leavevmode
1148   \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
1149   \nobreak\hskip\z@skip}
1150 \def\bbl@@usehyphen#1{%
1151   \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}
```

The following macro inserts the hyphen char.

```
1152 \def\bbl@hyphenchar{%
1153   \ifnum\hyphenchar\font=\m@ne
1154     \babelnullhyphen
```

---

[32]TeX begins and ends a word for hyphenation at a glue node. The penalty prevents a linebreak at this glue node.

```
1155  \else
1156    \char\hyphenchar\font
1157  \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.

```
1158 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}{}}}
1159 \def\bbl@hy@@soft{\bbl@@usehyphen{\discretionary{\bbl@hyphenchar}{}{}}}
1160 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
1161 \def\bbl@hy@@hard{\bbl@@usehyphen\bbl@hyphenchar}
1162 \def\bbl@hy@nobreak{\bbl@usehyphen{\mbox{\bbl@hyphenchar}}}
1163 \def\bbl@hy@@nobreak{\mbox{\bbl@hyphenchar}}
1164 \def\bbl@hy@repeat{%
1165   \bbl@usehyphen{%
1166     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
1167 \def\bbl@hy@@repeat{%
1168   \bbl@@usehyphen{%
1169     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
1170 \def\bbl@hy@empty{\hskip\z@skip}
1171 \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.

```
1172 \def\bbl@disc#1#2{\nobreak\discretionary{#2-}{}{#1}\bbl@allowhyphens}
```

9.9   Multiencoding strings

The aim following commands is to provide a commom interface for strings in several encodings. They also contains several hooks which can be ued 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.

```
1173 \bbl@trace{Multiencoding strings}
1174 \def\bbl@toglobal#1{\global\let#1#1}
1175 \def\bbl@recatcode#1{%
1176   \@tempcnta="7F
1177   \def\bbl@tempa{%
1178     \ifnum\@tempcnta>"FF\else
1179       \catcode\@tempcnta=#1\relax
1180       \advance\@tempcnta\@ne
1181       \expandafter\bbl@tempa
1182     \fi}%
1183   \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).

```
1184 \@ifpackagewith{babel}{nocase}%
1185   {\let\bbl@patchuclc\relax}%
1186   {\def\bbl@patchuclc{%
1187     \global\let\bbl@patchuclc\relax
1188     \g@addto@macro\@uclclist{\reserved@b{\reserved@b\bbl@uclc}}%
1189     \gdef\bbl@uclc##1{%
1190       \let\bbl@encoded\bbl@encoded@uclc
1191       \bbl@ifunset{\languagename @bbl@uclc}% and resumes it
1192         {##1}%
1193         {\let\bbl@tempa##1\relax % Used by LANG@bbl@uclc
1194          \csname\languagename @bbl@uclc\endcsname}%
1195       {\bbl@tolower\@empty}{\bbl@toupper\@empty}}%
1196     \gdef\bbl@tolower{\csname\languagename @bbl@lc\endcsname}%
1197     \gdef\bbl@toupper{\csname\languagename @bbl@uc\endcsname}}}
```

1198 ⟨⟨∗More package options⟩⟩ ≡
```
1199 \DeclareOption{nocase}{}
```
1200 ⟨⟨/More package options⟩⟩

The following package options control the behavior of \SetString.

1201 ⟨⟨∗More package options⟩⟩ ≡
```
1202 \let\bbl@opt@strings\@nnil % accept strings=value
1203 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
1204 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
1205 \def\BabelStringsDefault{generic}
```
1206 ⟨⟨/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.

```
1207 \@onlypreamble\StartBabelCommands
1208 \def\StartBabelCommands{%
1209   \begingroup
1210   \bbl@recatcode{11}%
```
1211   ⟨⟨Macros local to BabelCommands⟩⟩
```
1212   \def\bbl@provstring##1##2{%
1213     \providecommand##1{##2}%
1214     \bbl@toglobal##1}%
1215   \global\let\bbl@scafter\@empty
1216   \let\StartBabelCommands\bbl@startcmds
1217   \ifx\BabelLanguages\relax
1218     \let\BabelLanguages\CurrentOption
1219   \fi
1220   \begingroup
1221   \let\bbl@screset\@nnil % local flag - disable 1st stopcommands
1222   \StartBabelCommands}
1223 \def\bbl@startcmds{%
1224   \ifx\bbl@screset\@nnil\else
1225     \bbl@usehooks{stopcommands}{}%
1226   \fi
1227   \endgroup
1228   \begingroup
1229   \@ifstar
1230     {\ifx\bbl@opt@strings\@nnil
1231        \let\bbl@opt@strings\BabelStringsDefault
1232      \fi
1233      \bbl@startcmds@i}%
```

```
1234    \bbl@startcmds@i}
1235 \def\bbl@startcmds@i#1#2{%
1236    \edef\bbl@L{\zap@space#1 \@empty}%
1237    \edef\bbl@G{\zap@space#2 \@empty}%
1238    \bbl@startcmds@ii}
```

Parse the encoding info to get the label, input, and font parts.

Select the behavior of \SetString. Thre 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.

```
1239 \newcommand\bbl@startcmds@ii[1][\@empty]{%
1240    \let\SetString\@gobbletwo
1241    \let\bbl@stringdef\@gobbletwo
1242    \let\AfterBabelCommands\@gobble
1243    \ifx\@empty#1%
1244      \def\bbl@sc@label{generic}%
1245      \def\bbl@encstring##1##2{%
1246        \ProvideTextCommandDefault##1{##2}%
1247        \bbl@toglobal##1%
1248        \expandafter\bbl@toglobal\csname\string?\string##1\endcsname}%
1249      \let\bbl@sctest\in@true
1250    \else
1251      \let\bbl@sc@charset\space % <- zapped below
1252      \let\bbl@sc@fontenc\space % <-    "       "
1253      \def\bbl@tempa##1=##2\@nil{%
1254        \bbl@csarg\edef{sc@\zap@space##1 \@empty}{##2 }}%
1255      \bbl@vforeach{label=#1}{\bbl@tempa##1\@nil}%
1256      \def\bbl@tempa##1 ##2{% space -> comma
1257        ##1%
1258        \ifx\@empty##2\else\ifx,##1,\else,\fi\bbl@afterfi\bbl@tempa##2\fi}%
1259      \edef\bbl@sc@fontenc{\expandafter\bbl@tempa\bbl@sc@fontenc\@empty}%
1260      \edef\bbl@sc@label{\expandafter\zap@space\bbl@sc@label\@empty}%
1261      \edef\bbl@sc@charset{\expandafter\zap@space\bbl@sc@charset\@empty}%
1262      \def\bbl@encstring##1##2{%
1263        \bbl@foreach\bbl@sc@fontenc{%
1264          \bbl@ifunset{T@####1}%
1265            {}%
1266            {\ProvideTextCommand##1{####1}{##2}%
1267             \bbl@toglobal##1%
1268             \expandafter
1269             \bbl@toglobal\csname####1\string##1\endcsname}}}%
1270      \def\bbl@sctest{%
1271        \bbl@xin@{,\bbl@opt@strings,}{,\bbl@sc@label,\bbl@sc@fontenc,}}%
1272    \fi
1273    \ifx\bbl@opt@strings\@nnil        % ie, no strings key -> defaults
1274    \else\ifx\bbl@opt@strings\relax   % ie, strings=encoded
1275      \let\AfterBabelCommands\bbl@aftercmds
1276      \let\SetString\bbl@setstring
1277      \let\bbl@stringdef\bbl@encstring
1278    \else        % ie, strings=value
1279    \bbl@sctest
1280    \ifin@
```

```
1281    \let\AfterBabelCommands\bbl@aftercmds
1282    \let\SetString\bbl@setstring
1283    \let\bbl@stringdef\bbl@provstring
1284  \fi\fi\fi
1285  \bbl@scswitch
1286  \ifx\bbl@G\@empty
1287    \def\SetString##1##2{%
1288      \bbl@error{Missing group for string \string##1}%
1289        {You must assign strings to some category, typically\\%
1290         captions or extras, but you set none}}%
1291  \fi
1292  \ifx\@empty#1%
1293    \bbl@usehooks{defaultcommands}{}%
1294  \else
1295    \@expandtwoargs
1296    \bbl@usehooks{encodedcommands}{{\bbl@sc@charset}{\bbl@sc@fontenc}}%
1297  \fi}
```

There are two versions of `\bbl@scswitch`. The first version is used when ldfs are read, and it makes sure \⟨*group*⟩⟨*language*⟩ 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`⟨*language*⟩ 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) .

```
1298 \def\bbl@forlang#1#2{%
1299   \bbl@for#1\bbl@L{%
1300     \bbl@xin@{,#1,}{,\BabelLanguages,}%
1301     \ifin@#2\relax\fi}}
1302 \def\bbl@scswitch{%
1303   \bbl@forlang\bbl@tempa{%
1304     \ifx\bbl@G\@empty\else
1305       \ifx\SetString\@gobbletwo\else
1306         \edef\bbl@GL{\bbl@G\bbl@tempa}%
1307         \bbl@xin@{,\bbl@GL,}{,\bbl@screset,}%
1308         \ifin@\else
1309           \global\expandafter\let\csname\bbl@GL\endcsname\@undefined
1310           \xdef\bbl@screset{\bbl@screset,\bbl@GL}%
1311         \fi
1312       \fi
1313     \fi}}
1314 \AtEndOfPackage{%
1315   \def\bbl@forlang#1#2{\bbl@for#1\bbl@L{\bbl@ifunset{date#1}{}{#2}}}%
1316   \let\bbl@scswitch\relax}
1317 \@onlypreamble\EndBabelCommands
1318 \def\EndBabelCommands{%
1319   \bbl@usehooks{stopcommands}{}%
1320   \endgroup
1321   \endgroup
1322   \bbl@scafter}
```

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 `\providescommmand`). With the event stringprocess you can preprocess the string by

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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.

```
1323 \def\bbl@setstring#1#2{%
1324   \bbl@forlang\bbl@tempa{%
1325     \edef\bbl@LC{\bbl@tempa\bbl@stripslash#1}%
1326     \bbl@ifunset{\bbl@LC}% eg, \germanchaptername
1327       {\global\expandafter  % TODO - con \bbl@exp ?
1328        \bbl@add\csname\bbl@G\bbl@tempa\expandafter\endcsname\expandafter
1329          {\expandafter\bbl@scset\expandafter#1\csname\bbl@LC\endcsname}}%
1330       {}%
1331     \def\BabelString{#2}%
1332     \bbl@usehooks{stringprocess}{}%
1333     \expandafter\bbl@stringdef
1334       \csname\bbl@LC\expandafter\endcsname\expandafter{\BabelString}}}
```

Now, some addtional 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.

```
1335 \ifx\bbl@opt@strings\relax
1336   \def\bbl@scset#1#2{\def#1{\bbl@encoded#2}}
1337   \bbl@patchuclc
1338   \let\bbl@encoded\relax
1339   \def\bbl@encoded@uclc#1{%
1340     \@inmathwarn#1%
1341     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
1342       \expandafter\ifx\csname ?\string#1\endcsname\relax
1343         \TextSymbolUnavailable#1%
1344       \else
1345         \csname ?\string#1\endcsname
1346       \fi
1347     \else
1348       \csname\cf@encoding\string#1\endcsname
1349     \fi}
1350 \else
1351   \def\bbl@scset#1#2{\def#1{#2}}
1352 \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.

```
1353 ⟨⟨*Macros local to BabelCommands⟩⟩ ≡
1354 \def\SetStringLoop##1##2{%
1355   \def\bbl@templ####1{\expandafter\noexpand\csname##1\endcsname}%
1356   \count@\z@
1357   \bbl@loop\bbl@tempa{##2}{% empty items and spaces are ok
1358     \advance\count@\@ne
1359     \toks@\expandafter{\bbl@tempa}%
1360     \bbl@exp{%
1361       \\\SetString\bbl@templ{\romannumeral\count@}{\the\toks@}%
1362       \count@=\the\count@\relax}}}%
1363 ⟨⟨/Macros local to BabelCommands⟩⟩
```

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

```
1364 \def\bbl@aftercmds#1{%
1365   \toks@\expandafter{\bbl@scafter#1}%
1366   \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.

```
1367 ⟨⟨∗Macros local to BabelCommands⟩⟩ ≡
1368   \newcommand\SetCase[3][]{%
1369     \bbl@patchuclc
1370     \bbl@forlang\bbl@tempa{%
1371       \expandafter\bbl@encstring
1372         \csname\bbl@tempa @bbl@uclc\endcsname{\bbl@tempa##1}%
1373       \expandafter\bbl@encstring
1374         \csname\bbl@tempa @bbl@uc\endcsname{##2}%
1375       \expandafter\bbl@encstring
1376         \csname\bbl@tempa @bbl@lc\endcsname{##3}}}%
1377 ⟨⟨/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.

```
1378 ⟨⟨∗Macros local to BabelCommands⟩⟩ ≡
1379   \newcommand\SetHyphenMap[1]{%
1380     \bbl@forlang\bbl@tempa{%
1381       \expandafter\bbl@stringdef
1382         \csname\bbl@tempa @bbl@hyphenmap\endcsname{##1}}}
1383 ⟨⟨/Macros local to BabelCommands⟩⟩
```

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

```
1384 \newcommand\BabelLower[2]{% one to one.
1385   \ifnum\lccode#1=#2\else
1386     \babel@savevariable{\lccode#1}%
1387     \lccode#1=#2\relax
1388   \fi}
1389 \newcommand\BabelLowerMM[4]{% many-to-many
1390   \@tempcnta=#1\relax
1391   \@tempcntb=#4\relax
1392   \def\bbl@tempa{%
1393     \ifnum\@tempcnta>#2\else
1394       \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
1395       \advance\@tempcnta#3\relax
1396       \advance\@tempcntb#3\relax
1397       \expandafter\bbl@tempa
1398     \fi}%
1399   \bbl@tempa}
1400 \newcommand\BabelLowerMO[4]{% many-to-one
1401   \@tempcnta=#1\relax
1402   \def\bbl@tempa{%
1403     \ifnum\@tempcnta>#2\else
1404       \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
1405       \advance\@tempcnta#3
1406       \expandafter\bbl@tempa
1407     \fi}%
1408   \bbl@tempa}
```

The following package options control the behavior of hyphenation mapping.

```
1409 ⟨⟨∗More package options⟩⟩ ≡
1410 \DeclareOption{hyphenmap=off}{\chardef\bbl@opt@hyphenmap\z@}
1411 \DeclareOption{hyphenmap=first}{\chardef\bbl@opt@hyphenmap\@ne}
1412 \DeclareOption{hyphenmap=select}{\chardef\bbl@opt@hyphenmap\tw@}
1413 \DeclareOption{hyphenmap=other}{\chardef\bbl@opt@hyphenmap\thr@@}
```

```
1414 \DeclareOption{hyphenmap=other*}{\chardef\bbl@opt@hyphenmap4\relax}
1415 ⟨⟨/More package options⟩⟩
```

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

```
1416 \AtEndOfPackage{%
1417   \ifx\bbl@opt@hyphenmap\@undefined
1418     \bbl@xin@{,}{\bbl@language@opts}%
1419     \chardef\bbl@opt@hyphenmap\ifin@4\else\@ne\fi
1420   \fi}
```

9.10   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.

```
1421 \bbl@trace{Macros related to glyphs}
1422 \def\set@low@box#1{\setbox\tw@\hbox{,}\setbox\z@\hbox{#1}%
1423     \dimen\z@\ht\z@ \advance\dimen\z@ -\ht\tw@%
1424     \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.

```
1425 \def\save@sf@q#1{\leavevmode
1426   \begingroup
1427     \edef\@SF{\spacefactor\the\spacefactor}#1\@SF
1428   \endgroup}
```

9.11   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.

9.11.1   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.

```
1429 \ProvideTextCommand{\quotedblbase}{OT1}{%
1430   \save@sf@q{\set@low@box{\textquotedblright\/}%
1431     \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.

```
1432 \ProvideTextCommandDefault{\quotedblbase}{%
1433   \UseTextSymbol{OT1}{\quotedblbase}}
```

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

```
1434 \ProvideTextCommand{\quotesinglbase}{OT1}{%
1435   \save@sf@q{\set@low@box{\textquoteright\/}%
1436     \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.

```
1437 \ProvideTextCommandDefault{\quotesinglbase}{%
1438   \UseTextSymbol{OT1}{\quotesinglbase}}
```

`\guillemotleft`
`\guillemotright` The guillemet characters are not available in OT1 encoding. They are faked.

```
1439 \ProvideTextCommand{\guillemotleft}{OT1}{%
1440    \ifmmode
1441       \ll
1442    \else
1443       \save@sf@q{\nobreak
1444          \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bbl@allowhyphens}%
1445    \fi}
1446 \ProvideTextCommand{\guillemotright}{OT1}{%
1447    \ifmmode
1448       \gg
1449    \else
1450       \save@sf@q{\nobreak
1451          \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bbl@allowhyphens}%
1452    \fi}
```

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

```
1453 \ProvideTextCommandDefault{\guillemotleft}{%
1454    \UseTextSymbol{OT1}{\guillemotleft}}
1455 \ProvideTextCommandDefault{\guillemotright}{%
1456    \UseTextSymbol{OT1}{\guillemotright}}
```

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

```
1457 \ProvideTextCommand{\guilsinglleft}{OT1}{%
1458    \ifmmode
1459       <%
1460    \else
1461       \save@sf@q{\nobreak
1462          \raise.2ex\hbox{$\scriptscriptstyle<$}\bbl@allowhyphens}%
1463    \fi}
1464 \ProvideTextCommand{\guilsinglright}{OT1}{%
1465    \ifmmode
1466       >%
1467    \else
1468       \save@sf@q{\nobreak
1469          \raise.2ex\hbox{$\scriptscriptstyle>$}\bbl@allowhyphens}%
1470    \fi}
```

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

```
1471 \ProvideTextCommandDefault{\guilsinglleft}{%
1472    \UseTextSymbol{OT1}{\guilsinglleft}}
1473 \ProvideTextCommandDefault{\guilsinglright}{%
1474    \UseTextSymbol{OT1}{\guilsinglright}}
```

9.11.2 Letters

`\ij` The dutch language uses the letter 'ij'. It is available in T1 encoded fonts, but not in the OT1
`\IJ` encoded fonts. Therefore we fake it for the OT1 encoding.

```
1475 \DeclareTextCommand{\ij}{OT1}{%
1476    i\kern-0.02em\bbl@allowhyphens j}
1477 \DeclareTextCommand{\IJ}{OT1}{%
1478    I\kern-0.02em\bbl@allowhyphens J}
1479 \DeclareTextCommand{\ij}{T1}{\char188}
1480 \DeclareTextCommand{\IJ}{T1}{\char156}
```

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

```
1481 \ProvideTextCommandDefault{\ij}{%
1482   \UseTextSymbol{OT1}{\ij}}
1483 \ProvideTextCommandDefault{\IJ}{%
1484   \UseTextSymbol{OT1}{\IJ}}
```

\dj   The croatian language needs the letters \dj and \DJ; they are available in the T1 encoding,
\DJ   but not in the OT1 encoding by default.
       Some code to construct these glyphs for the OT1 encoding was made available to me by
       Stipcevic Mario, (stipcevic@olimp.irb.hr).

```
1485 \def\crrtic@{\hrule height0.1ex width0.3em}
1486 \def\crttic@{\hrule height0.1ex width0.33em}
1487 \def\ddj@{%
1488   \setbox0\hbox{d}\dimen@=\ht0
1489   \advance\dimen@1ex
1490   \dimen@.45\dimen@
1491   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
1492   \advance\dimen@ii.5ex
1493   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
1494 \def\DDJ@{%
1495   \setbox0\hbox{D}\dimen@=.55\ht0
1496   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
1497   \advance\dimen@ii.15ex %             correction for the dash position
1498   \advance\dimen@ii-.15\fontdimen7\font %     correction for cmtt font
1499   \dimen\thr@@\expandafter\rem@pt\the\fontdimen7\font\dimen@
1500   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crttic@}}}}
1501 %
1502 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
1503 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}
```

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

```
1504 \ProvideTextCommandDefault{\dj}{%
1505   \UseTextSymbol{OT1}{\dj}}
1506 \ProvideTextCommandDefault{\DJ}{%
1507   \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.

```
1508 \DeclareTextCommand{\SS}{OT1}{SS}
1509 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}
```

9.11.3 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
```
1510 \ProvideTextCommandDefault{\glq}{%
1511   \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}
```

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

```
1512 \ProvideTextCommand{\grq}{T1}{%
1513   \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
1514 \ProvideTextCommand{\grq}{TU}{%
1515   \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
1516 \ProvideTextCommand{\grq}{OT1}{%
1517   \save@sf@q{\kern-.0125em
1518     \textormath{\textquoteleft}{\mbox{\textquoteleft}}%
1519     \kern.07em\relax}}
1520 \ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}
```

\glqq The 'german' double quotes.
\grqq
```
1521 \ProvideTextCommandDefault{\glqq}{%
1522   \textormath{\quotedblbase}{\mbox{\quotedblbase}}}
```

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

```
1523 \ProvideTextCommand{\grqq}{T1}{%
1524   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
1525 \ProvideTextCommand{\grqq}{TU}{%
1526   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
1527 \ProvideTextCommand{\grqq}{OT1}{%
1528   \save@sf@q{\kern-.07em
1529     \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}%
1530     \kern.07em\relax}}
1531 \ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}
```

\flq The 'french' single guillemets.
\frq
```
1532 \ProvideTextCommandDefault{\flq}{%
1533   \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}
1534 \ProvideTextCommandDefault{\frq}{%
1535   \textormath{\guilsinglright}{\mbox{\guilsinglright}}}
```

\flqq The 'french' double guillemets.
\frqq
```
1536 \ProvideTextCommandDefault{\flqq}{%
1537   \textormath{\guillemotleft}{\mbox{\guillemotleft}}}
1538 \ProvideTextCommandDefault{\frqq}{%
1539   \textormath{\guillemotright}{\mbox{\guillemotright}}}
```

9.11.4   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
\umlautlow positioning, the default will be \umlauthigh (the normal positioning).

```
1540 \def\umlauthigh{%
1541   \def\bbl@umlauta##1{\leavevmode\bgroup%
1542     \expandafter\accent\csname\f@encoding dqpos\endcsname
1543     ##1\bbl@allowhyphens\egroup}%
1544   \let\bbl@umlaute\bbl@umlauta}
1545 \def\umlautlow{%
1546   \def\bbl@umlauta{\protect\lower@umlaut}}
1547 \def\umlautelow{%
1548   \def\bbl@umlaute{\protect\lower@umlaut}}
1549 \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.

```
1550 \expandafter\ifx\csname U@D\endcsname\relax
1551   \csname newdimen\endcsname\U@D
1552 \fi
```

The following code fools TeX's make_accent procedure about the current x-height of the font to force another placement of the umlaut character. First we have to save the current x-height of the font, because we'll change this font dimension and this is always done globally.

Then we compute the new x-height in such a way that the umlaut character is lowered to the base character. The value of `.45ex` depends on the METAFONT parameters with which the fonts were built. (Just try out, which value will look best.) If the new x-height is too low, it is not changed. Finally we call the `\accent` primitive, reset the old x-height and insert the base character in the argument.

```
1553 \def\lower@umlaut#1{%
1554   \leavevmode\bgroup
1555     \U@D 1ex%
1556     {\setbox\z@\hbox{%
1557       \expandafter\char\csname\f@encoding dqpos\endcsname}%
1558       \dimen@ -.45ex\advance\dimen@\ht\z@
1559       \ifdim 1ex<\dimen@ \fontdimen5\font\dimen@ \fi}%
1560     \expandafter\accent\csname\f@encoding dqpos\endcsname
1561     \fontdimen5\font\U@D #1%
1562   \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).

```
1563 \AtBeginDocument{%
1564   \DeclareTextCompositeCommand{\"}{OT1}{a}{\bbl@umlauta{a}}%
1565   \DeclareTextCompositeCommand{\"}{OT1}{e}{\bbl@umlaute{e}}%
1566   \DeclareTextCompositeCommand{\"}{OT1}{i}{\bbl@umlaute{\i}}%
1567   \DeclareTextCompositeCommand{\"}{OT1}{\i}{\bbl@umlaute{\i}}%
1568   \DeclareTextCompositeCommand{\"}{OT1}{o}{\bbl@umlauta{o}}%
1569   \DeclareTextCompositeCommand{\"}{OT1}{u}{\bbl@umlauta{u}}%
1570   \DeclareTextCompositeCommand{\"}{OT1}{A}{\bbl@umlauta{A}}%
1571   \DeclareTextCompositeCommand{\"}{OT1}{E}{\bbl@umlaute{E}}%
1572   \DeclareTextCompositeCommand{\"}{OT1}{I}{\bbl@umlaute{I}}%
1573   \DeclareTextCompositeCommand{\"}{OT1}{O}{\bbl@umlauta{O}}%
1574   \DeclareTextCompositeCommand{\"}{OT1}{U}{\bbl@umlauta{U}}%
1575 }
```

Finally, the default is to use English as the main language.

```
1576 \ifx\l@english\@undefined
1577   \chardef\l@english\z@
1578 \fi
1579 \main@language{english}
```

9.12 Layout

Work in progress.

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

```
1580 \bbl@trace{Bidi layout}
1581 \providecommand\IfBabelLayout[3]{#3}%
1582 \newcommand\BabelPatchSection[1]{%
1583   \@ifundefined{#1}{}{%
1584     \bbl@exp{\let\<bbl@ss@#1>\<#1>}%
1585     \@namedef{#1}{%
1586       \@ifstar{\bbl@presec@s{#1}}%
1587               {\@dblarg{\bbl@presec@x{#1}}}}}}
1588 \def\bbl@presec@x#1[#2]#3{%
1589   \bbl@exp{%
1590     \\\select@language@x{\bbl@main@language}%
1591     \\\@nameuse{bbl@sspre@#1}%
1592     \\\@nameuse{bbl@ss@#1}%
1593       [\\\foreignlanguage{\languagename}{\unexpanded{#2}}]%
1594       {\\\foreignlanguage{\languagename}{\unexpanded{#3}}}%
1595     \\\select@language@x{\languagename}}}
1596 \def\bbl@presec@s#1#2{%
1597   \bbl@exp{%
1598     \\\select@language@x{\bbl@main@language}%
1599     \\\@nameuse{bbl@sspre@#1}%
1600     \\\@nameuse{bbl@ss@#1}*%
1601       {\\\foreignlanguage{\languagename}{\unexpanded{#2}}}%
1602     \\\select@language@x{\languagename}}}
1603 \IfBabelLayout{sectioning}%
1604   {\BabelPatchSection{part}%
1605    \BabelPatchSection{chapter}%
1606    \BabelPatchSection{section}%
1607    \BabelPatchSection{subsection}%
1608    \BabelPatchSection{subsubsection}%
1609    \BabelPatchSection{paragraph}%
1610    \BabelPatchSection{subparagraph}%
1611    \def\babel@toc#1{%
1612      \select@language@x{\bbl@main@language}}}{}
1613 \IfBabelLayout{captions}%
1614   {\BabelPatchSection{caption}}{}
```

Now we load definition files for engines.

```
1615 \bbl@trace{Input engine specific macros}
1616 \ifcase\bbl@engine
1617   \input txtbabel.def
1618 \or
1619   \input luababel.def
1620 \or
1621   \input xebabel.def
1622 \fi
```

9.13   Creating languages

\babelprovide is a general purpose tool for creating languages. Currently it just creates the language infrastructure, but in the future it will be able to read data from ini files, as well as to create variants. Unlike the nil pseudo-language, captions are defined, but with a warning to invite the user to provide the real string.

```
1623 \bbl@trace{Creating languages and reading ini files}
1624 \newcommand\babelprovide[2][]{%
1625   \let\bbl@savelangname\languagename
```

```
1626    \def\languagename{#2}%
1627    \let\bbl@KVP@captions\@nil
1628    \let\bbl@KVP@import\@nil
1629    \let\bbl@KVP@main\@nil
1630    \let\bbl@KVP@script\@nil
1631    \let\bbl@KVP@language\@nil
1632    \let\bbl@KVP@dir\@nil
1633    \let\bbl@KVP@hyphenrules\@nil
1634    \let\bbl@KVP@mapfont\@nil
1635    \let\bbl@KVP@maparabic\@nil
1636    \bbl@forkv{#1}{\bbl@csarg\def{KVP@##1}{##2}}%   TODO - error handling
1637    \ifx\bbl@KVP@import\@nil\else
1638      \bbl@exp{\\\bbl@ifblank{\bbl@KVP@import}}%
1639        {\begingroup
1640           \def\BabelBeforeIni##1##2{\gdef\bbl@KVP@import{##1}\endinput}%
1641           \InputIfFileExists{babel-#2.tex}{}{}%
1642         \endgroup}%
1643        {}%
1644    \fi
1645    \ifx\bbl@KVP@captions\@nil
1646      \let\bbl@KVP@captions\bbl@KVP@import
1647    \fi
1648    \bbl@ifunset{date#2}%
1649      {\bbl@provide@new{#2}}%
1650      {\bbl@ifblank{#1}%
1651        {\bbl@error
1652          {If you want to modify `#2' you must tell how in\\%
1653           the optional argument. Currently there are three\\%
1654           options: captions=lang-tag, hyphenrules=lang-list\\%
1655           import=lang-tag}%
1656          {Use this macro as documented}}%
1657        {\bbl@provide@renew{#2}}}%
1658    \bbl@exp{\\\babelensure[exclude=\\\today]{#2}}%
1659    \bbl@ifunset{bbl@ensure@\languagename}%
1660      {\bbl@exp{%
1661        \\\DeclareRobustCommand\<bbl@ensure@\languagename>[1]{%
1662          \\\foreignlanguage{\languagename}%
1663          {####1}}}}%
1664      {}%
1665    \ifx\bbl@KVP@script\@nil\else
1666      \bbl@csarg\edef{sname@#2}{\bbl@KVP@script}%
1667    \fi
1668    \ifx\bbl@KVP@language\@nil\else
1669      \bbl@csarg\edef{lname@#2}{\bbl@KVP@language}%
1670    \fi
1671    \ifx\bbl@KVP@mapfont\@nil\else
1672      \bbl@ifsamestring{\bbl@KVP@mapfont}{direction}{}%
1673        {\bbl@error{Option `\bbl@KVP@mapfont' unknown for\\%
1674                    mapfont. Use `direction'.%
1675                    {See the manual for details.}}}%
1676      \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
1677      \bbl@ifunset{bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{}%
1678      \ifx\bbl@mapselect\@undefined
1679        \AtBeginDocument{%
1680          \expandafter\bbl@add\csname selectfont \endcsname{{\bbl@mapselect}}%
1681          {\selectfont}}%
1682        \def\bbl@mapselect{%
1683          \let\bbl@mapselect\relax
1684          \edef\bbl@prefontid{\fontid\font}}%
```

```
1685      \def\bbl@mapdir##1{%
1686        {\def\languagename{##1}\bbl@switchfont
1687         \directlua{Babel.fontmap
1688           [\the\csname bbl@wdir@##1\endcsname]%
1689           [\bbl@prefontid]=\fontid\font}}}%
1690      \fi
1691      \bbl@exp{\\\bbl@add\\\bbl@mapselect{\\\bbl@mapdir{\languagename}}}}%
1692    \fi
1693    \ifcase\bbl@engine\else
1694      \bbl@ifunset{bbl@dgnat@\languagename}{}%
1695        {\expandafter\ifx\csname bbl@dgnat@\languagename\endcsname\@empty\else
1696          \expandafter\expandafter\expandafter
1697          \bbl@setdigits\csname bbl@dgnat@\languagename\endcsname
1698          \ifx\bbl@KVP@maparabic\@nil\else
1699            \ifx\bbl@latinarabic\@undefined
1700              \expandafter\let\expandafter\@arabic
1701                \csname bbl@counter@\languagename\endcsname
1702            \else    % ie, if layout=counters, which redefines \@arabic
1703              \expandafter\let\expandafter\bbl@latinarabic
1704                \csname bbl@counter@\languagename\endcsname
1705            \fi
1706          \fi
1707        \fi}%
1708    \fi
1709    \let\languagename\bbl@savelangname}
1710 \def\bbl@setdigits#1#2#3#4#5{%
1711    \bbl@exp{%
1712      \def\<\languagename digits>####1{%        ie, \langdigits
1713        \<bbl@digits@\languagename>####1\\\@nil}%
1714      \def\<\languagename counter>####1{%        ie, \langcounter
1715        \\\expandafter\<bbl@counter@\languagename>%
1716        \\\csname c@####1\endcsname}%
1717      \def\<bbl@counter@\languagename>####1{% ie, \bbl@counter@lang
1718        \\\expandafter\<bbl@digits@\languagename>%
1719        \\\number####1\\\@nil}}%
1720    \def\bbl@tempa##1##2##3##4##5{%
1721      \bbl@exp{%    Wow, quite a lot of hashes! :-(
1722        \def\<bbl@digits@\languagename>########1{%
1723          \\\ifx########1\\\@nil                % ie, \bbl@digits@lang
1724          \\\else
1725            \\\ifx0########1#1%
1726            \\\else\\\ifx1########1#2%
1727            \\\else\\\ifx2########1#3%
1728            \\\else\\\ifx3########1#4%
1729            \\\else\\\ifx4########1#5%
1730            \\\else\\\ifx5########1##1%
1731            \\\else\\\ifx6########1##2%
1732            \\\else\\\ifx7########1##3%
1733            \\\else\\\ifx8########1##4%
1734            \\\else\\\ifx9########1##5%
1735            \\\else########1%
1736            \\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi
1737            \\\expandafter\<bbl@digits@\languagename>%
1738          \\\fi}}}%
1739    \bbl@tempa}
```

Depending on whether or not the language exists, we define two macros.
-

```
1740 \def\bbl@provide@new#1{%
```

```
1741 \@namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
1742 \@namedef{extras#1}{}%
1743 \@namedef{noextras#1}{}%
1744 \StartBabelCommands*{#1}{captions}%
1745   \ifx\bbl@KVP@captions\@nil %        and also if import, implicit
1746     \def\bbl@tempb##1{%              elt for \bbl@captionslist
1747       \ifx##1\@empty\else
1748         \bbl@exp{%
1749           \\\SetString\\##1{%
1750             \\\bbl@nocaption{\bbl@stripslash##1}{#1\bbl@stripslash##1}}}%
1751         \expandafter\bbl@tempb
1752       \fi}%
1753     \expandafter\bbl@tempb\bbl@captionslist\@empty
1754   \else
1755     \bbl@read@ini{\bbl@KVP@captions}%  Here all letters cat = 11
1756     \bbl@after@ini
1757     \bbl@savestrings
1758   \fi
1759 \StartBabelCommands*{#1}{date}%
1760   \ifx\bbl@KVP@import\@nil
1761     \bbl@exp{%
1762       \\\SetString\\\today{\\\bbl@nocaption{today}{#1today}}}%
1763   \else
1764     \bbl@savetoday
1765     \bbl@savedate
1766   \fi
1767 \EndBabelCommands
1768 \bbl@exp{%
1769   \def\<#1hyphenmins>{%
1770     {\bbl@ifunset{bbl@lfthm@#1}{2}{\@nameuse{bbl@lfthm@#1}}}%
1771     {\bbl@ifunset{bbl@rgthm@#1}{3}{\@nameuse{bbl@rgthm@#1}}}}}%
1772 \bbl@provide@hyphens{#1}%
1773 \ifx\bbl@KVP@main\@nil\else
1774   \expandafter\main@language\expandafter{#1}%
1775 \fi}
1776 \def\bbl@provide@renew#1{%
1777 \ifx\bbl@KVP@captions\@nil\else
1778   \StartBabelCommands*{#1}{captions}%
1779     \bbl@read@ini{\bbl@KVP@captions}%   Here all letters cat = 11
1780     \bbl@after@ini
1781     \bbl@savestrings
1782   \EndBabelCommands
1783 \fi
1784 \ifx\bbl@KVP@import\@nil\else
1785   \StartBabelCommands*{#1}{date}%
1786     \bbl@savetoday
1787     \bbl@savedate
1788   \EndBabelCommands
1789 \fi
1790 \bbl@provide@hyphens{#1}}
```

The hyphenrules option is handled with an auxiliary macro.

```
1791 \def\bbl@provide@hyphens#1{%
1792 \let\bbl@tempa\relax
1793 \ifx\bbl@KVP@hyphenrules\@nil\else
1794   \bbl@replace\bbl@KVP@hyphenrules{ }{,}%
1795   \bbl@foreach\bbl@KVP@hyphenrules{%
1796     \ifx\bbl@tempa\relax     %  if not yet found
1797       \bbl@ifsamestring{##1}{+}%
```

97

```
1798          {{\bbl@exp{\\\addlanguage\<l@##1>}}}%
1799          {}%
1800        \bbl@ifunset{l@##1}%
1801          {}%
1802          {\bbl@exp{\let\bbl@tempa\<l@##1>}}}%
1803      \fi}%
1804   \fi
1805   \ifx\bbl@tempa\relax %        if no opt or no language in opt found
1806     \ifx\bbl@KVP@import\@nil\else % if importing
1807       \bbl@exp{%               and hyphenrules is not empty
1808         \\\bbl@ifblank{\@nameuse{bbl@hyphr@#1}}%
1809          {}%
1810          {\let\\\bbl@tempa\<l@\@nameuse{bbl@hyphr@\languagename}>}}%
1811     \fi
1812   \fi
1813   \bbl@ifunset{bbl@tempa}%      ie, relax or undefined
1814     {\bbl@ifunset{l@#1}%        no hyphenrules found - fallback
1815       {\bbl@exp{\\\adddialect\<l@#1>\language}}%
1816       {}}%                      so, l@<lang> is ok - nothing to do
1817     {\bbl@exp{\\\adddialect\<l@#1>\bbl@tempa}}%  found in opt list or ini
```

The reader of ini files. There are 3 possible cases: a section name (in the form [...]), a comment (starting with ;) and a key/value pair. *TODO - Work in progress.*

```
1818 \def\bbl@read@ini#1{%
1819   \openin1=babel-#1.ini
1820   \ifeof1
1821     \bbl@error
1822       {There is no ini file for the requested language\\%
1823         (#1). Perhaps you misspelled it or your installation\\%
1824         is not complete.}%
1825       {Fix the name or reinstall babel.}%
1826   \else
1827     \let\bbl@section\@empty
1828     \let\bbl@savestrings\@empty
1829     \let\bbl@savetoday\@empty
1830     \let\bbl@savedate\@empty
1831     \let\bbl@inireader\bbl@iniskip
1832     \bbl@info{Importing data from babel-#1.ini for \languagename}%
1833     \loop
1834     \if T\ifeof1F\fi T\relax % Trick, because inside \loop
1835       \endlinechar\m@ne
1836       \read1 to \bbl@line
1837       \endlinechar`\^^M
1838       \ifx\bbl@line\@empty\else
1839         \expandafter\bbl@iniline\bbl@line\bbl@iniline
1840       \fi
1841     \repeat
1842   \fi}
1843 \def\bbl@iniline#1\bbl@iniline{%
1844   \@ifnextchar[\bbl@inisec{\@ifnextchar;\bbl@iniskip\bbl@inireader}#1\@@}% ]
```

The special cases for comment lines and sections are handled by the two following commands. In sections, we provide the posibility to take extra actions at the end or at the start (TODO - but note the last section is not ended). By default, key=val pairs are ignored.

```
1845 \def\bbl@iniskip#1\@@{}%       if starts with ;
1846 \def\bbl@inisec[#1]#2\@@{%     if starts with opening bracket
1847   \@nameuse{bbl@secpost@\bbl@section}%  ends previous section
1848   \def\bbl@section{#1}%
1849   \@nameuse{bbl@secpre@\bbl@section}%    starts current section
```

```
1850    \bbl@ifunset{bbl@secline@#1}%
1851      {\let\bbl@inireader\bbl@iniskip}%
1852      {\bbl@exp{\let\\\bbl@inireader\<bbl@secline@#1>}}}
```

Reads a key=val line and stores the trimmed val in \bbl@@kv@<section>.<key>.

```
1853 \def\bbl@inikv#1=#2\@@{%        key=value
1854    \bbl@trim@def\bbl@tempa{#1}%
1855    \bbl@trim\toks@{#2}%
1856    \bbl@csarg\edef{@kv@\bbl@section.\bbl@tempa}{\the\toks@}}
```

The previous assignments are local, so we need to export them. If the value is empty, we can provide a default value.

```
1857 \def\bbl@exportkey#1#2#3{%
1858    \bbl@ifunset{bbl@@kv@#2}%
1859      {\bbl@csarg\gdef{#1@\languagename}{#3}}%
1860      {\expandafter\ifx\csname bbl@@kv@#2\endcsname\@empty
1861        \bbl@csarg\gdef{#1@\languagename}{#3}%
1862      \else
1863        \bbl@exp{\global\let\<bbl@#1@\languagename>\<bbl@@kv@#2>}%
1864      \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.

```
1865 \let\bbl@secline@identification\bbl@inikv
1866 \def\bbl@secpost@identification{%
1867    \bbl@exportkey{lname}{identification.name.english}{}%
1868    \bbl@exportkey{lbcp}{identification.tag.bcp47}{}%
1869    \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
1870    \bbl@exportkey{sname}{identification.script.name}{}%
1871    \bbl@exportkey{sbcp}{identification.script.tag.bcp47}{}%
1872    \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}}
1873 \let\bbl@secline@typography\bbl@inikv
1874 \let\bbl@secline@numbers\bbl@inikv
1875 \def\bbl@after@ini{%
1876    \bbl@exportkey{lfthm}{typography.lefthyphenmin}{2}%
1877    \bbl@exportkey{rgthm}{typography.righthyphenmin}{3}%
1878    \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
1879    \bbl@exportkey{dgnat}{numbers.digits.native}{}%
1880    \bbl@xin@{0.5}{\@nameuse{bbl@@kv@identification.version}}%
1881    \ifin@
1882      \bbl@warning{%
1883        There are neither captions nor date in `\languagename'.\\%
1884        It may not be suitable for proper typesetting, and it\\%
1885        could change. Reported}%
1886    \fi
1887    \bbl@xin@{0.9}{\@nameuse{bbl@@kv@identification.version}}%
1888    \ifin@
1889      \bbl@warning{%
1890        The `\languagename' date format may not be suitable\\%
1891        for proper typesetting, and therefore it very likely will\\%
1892        change in a future release. Reported}%
1893    \fi
1894    \bbl@toglobal\bbl@savetoday
1895    \bbl@toglobal\bbl@savedate}
```

Now captions and captions.licr, depending on the engine. And also for dates. They rely on a few auxilary macros.

```
1896 \ifcase\bbl@engine
1897    \bbl@csarg\def{secline@captions.licr}#1=#2\@@{%
```

```
1898        \bbl@ini@captions@aux{#1}{#2}}
1899    \bbl@csarg\def{secline@date.gregorian}#1=#2\@@{%        for defaults
1900        \bbl@ini@dategreg#1...\relax{#2}}
1901    \bbl@csarg\def{secline@date.gregorian.licr}#1=#2\@@{%  override
1902        \bbl@ini@dategreg#1...\relax{#2}}
1903 \else
1904    \def\bbl@secline@captions#1=#2\@@{%
1905        \bbl@ini@captions@aux{#1}{#2}}
1906    \bbl@csarg\def{secline@date.gregorian}#1=#2\@@{%
1907        \bbl@ini@dategreg#1...\relax{#2}}
1908 \fi
```

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

```
1909 \def\bbl@ini@captions@aux#1#2{%
1910    \bbl@trim@def\bbl@tempa{#1}%
1911    \bbl@ifblank{#2}%
1912      {\bbl@exp{%
1913          \toks@{\\\bbl@nocaption{\bbl@tempa}{\languagename\bbl@tempa name}}}}%
1914      {\bbl@trim\toks@{#2}}%
1915    \bbl@exp{%
1916      \\\bbl@add\\\bbl@savestrings{%
1917        \\\SetString\<\bbl@tempa name>{\the\toks@}}}}
```

But dates are more complex. The full date format is stores in date.gregorian, so we must read it in non-Unicode engines, too.

```
1918 \bbl@csarg\def{secpre@date.gregorian.licr}{%
1919    \ifcase\bbl@engine\let\bbl@savedate\@empty\fi}
1920 \def\bbl@ini@dategreg#1.#2.#3.#4\relax#5{% TODO - ignore with 'captions'
1921    \bbl@trim@def\bbl@tempa{#1.#2}%
1922    \bbl@ifsamestring{\bbl@tempa}{months.wide}%
1923      {\bbl@trim@def\bbl@tempa{#3}%
1924        \bbl@trim\toks@{#5}%
1925        \bbl@exp{%
1926          \\\bbl@add\\\bbl@savedate{%
1927            \\\SetString\<month\romannumeral\bbl@tempa name>{\the\toks@}}}%
1928      {\bbl@ifsamestring{\bbl@tempa}{date.long}%
1929        {\bbl@trim@def\bbl@toreplace{#5}%
1930          \bbl@TG@@date
1931          \global\bbl@csarg\let{date@\languagename}\bbl@toreplace
1932          \bbl@exp{%
1933            \gdef\<\languagename date>{\\\protect\<\languagename date >}%
1934            \gdef\<\languagename date >####1####2####3{%
1935              \\\bbl@usedategrouptrue
1936              \<bbl@ensure@\languagename>{%
1937                \<bbl@date@\languagename>{####1}{####2}{####3}}}%
1938            \\\bbl@add\\\bbl@savetoday{%
1939              \\\SetString\\\today{%
1940                \<\languagename date>{\\\the\year}{\\\the\month}{\\\the\day}}}}}}%
1941        {}}
```

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" inconsistenly in either in the date or in the month name.

```
1942 \newcommand\BabelDateSpace{\nobreakspace}
1943 \newcommand\BabelDateDot{.\@}
1944 \newcommand\BabelDated[1]{{\number#1}}
1945 \newcommand\BabelDatedd[1]{{\ifnum#1<10 0\fi\number#1}}
1946 \newcommand\BabelDateM[1]{{\number#1}}
1947 \newcommand\BabelDateMM[1]{{\ifnum#1<10 0\fi\number#1}}
```

```
1948 \newcommand\BabelDateMMMM[1]{{%
1949   \csname month\romannumeral#1name\endcsname}}%
1950 \newcommand\BabelDatey[1]{{\number#1}}%
1951 \newcommand\BabelDateyy[1]{{%
1952   \ifnum#1<10 0\number#1 %
1953   \else\ifnum#1<100 \number#1 %
1954   \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
1955   \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
1956   \else
1957     \bbl@error
1958       {Currently two-digit years are restricted to the\\
1959        range 0-9999.}%
1960       {There is little you can do. Sorry.}%
1961   \fi\fi\fi\fi}}
1962 \newcommand\BabelDateyyyy[1]{{\number#1}}
1963 \def\bbl@replace@finish@iii#1{%
1964   \bbl@exp{\def\\#1####1####2####3{\the\toks@}}}
1965 \def\bbl@TG@@date{%
1966   \bbl@replace\bbl@toreplace{[ ]}{\BabelDateSpace{}}%
1967   \bbl@replace\bbl@toreplace{[.]}{\BabelDateDot{}}%
1968   \bbl@replace\bbl@toreplace{[d]}{\BabelDated{####3}}%
1969   \bbl@replace\bbl@toreplace{[dd]}{\BabelDatedd{####3}}%
1970   \bbl@replace\bbl@toreplace{[M]}{\BabelDateM{####2}}%
1971   \bbl@replace\bbl@toreplace{[MM]}{\BabelDateMM{####2}}%
1972   \bbl@replace\bbl@toreplace{[MMMM]}{\BabelDateMMMM{####2}}%
1973   \bbl@replace\bbl@toreplace{[y]}{\BabelDatey{####1}}%
1974   \bbl@replace\bbl@toreplace{[yy]}{\BabelDateyy{####1}}%
1975   \bbl@replace\bbl@toreplace{[yyyy]}{\BabelDateyyyy{####1}}%
1976 % Note after \bbl@replace \toks@ contains the resulting string.
1977 % TODO - Using this implicit behavior doesn't seem a good idea.
1978   \bbl@replace@finish@iii\bbl@toreplace}
```

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

```
1979 \def\bbl@provide@lsys#1{%
1980   \bbl@ifunset{bbl@lname@#1}%
1981     {\bbl@ini@ids{#1}}%
1982     {}%
1983   \bbl@csarg\let{lsys@#1}\@empty
1984   \bbl@ifunset{bbl@sname@#1}{\bbl@csarg\gdef{sname@#1}{Default}}{}%
1985   \bbl@ifunset{bbl@sotf#1}{\bbl@csarg\gdef{sotf@#1}{DFLT}}{}%
1986   \bbl@csarg\bbl@add@list{lsys@#1}{Script=\bbl@cs{sname@#1}}%
1987   \bbl@ifunset{bbl@lname@#1}{}%
1988     {\bbl@csarg\bbl@add@list{lsys@#1}{Language=\bbl@cs{lname@#1}}}%
1989   \bbl@csarg\bbl@toglobal{lsys@#1}}%
1990 %  \bbl@exp{% TODO - should be global
1991 %    \<keys_if_exist:nnF>{fontspec-opentype/Script}{\bbl@cs{sname@#1}}%
1992 %      {\\\newfontscript{\bbl@cs{sname@#1}}{\bbl@cs{sotf@#1}}}%
1993 %    \<keys_if_exist:nnF>{fontspec-opentype/Language}{\bbl@cs{lname@#1}}%
1994 %      {\\\newfontlanguage{\bbl@cs{lname@#1}}{\bbl@cs{lotf@#1}}}}}
```

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.

```
1995 \def\bbl@ini@ids#1{%
1996   \def\BabelBeforeIni##1##2{%
1997     \begingroup
1998       \bbl@add\bbl@secpost@identification{\closein1 }%
```

```
1999        \catcode`\[=12 \catcode`\]=12 \catcode`\==12 %
2000        \bbl@read@ini{##1}%
2001    \endgroup}%              boxed, to avoid extra spaces:
2002  {\setbox\z@\hbox{\InputIfFileExists{babel-#1.tex}{}{}}}}
```

10 The kernel of Babel (`babel.def`, only LaTeX)

10.1 The redefinition of the style commands

The rest of the code in this file can only be processed by LaTeX, so we check the current format. If it is plain TeX, processing should stop here. But, because of the need to limit the scope of the definition of \format, a macro that is used locally in the following \if statement, this comparison is done inside a group. To prevent TeX from complaining about an unclosed group, the processing of the command \endinput is deferred until after the group is closed. This is accomplished by the command \aftergroup.

```
2003 {\def\format{lplain}
2004 \ifx\fmtname\format
2005 \else
2006   \def\format{LaTeX2e}
2007   \ifx\fmtname\format
2008   \else
2009     \aftergroup\endinput
2010   \fi
2011 \fi}
```

10.2 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 only way to accomplish this in most cases is to use the trick described in the TeXbook [2] (Appendix D, page 382). The primitive \meaning applied to a token expands to the current meaning of this token. For example, '\meaning\A' with \A defined as '\def\A#1{\B}' expands to the characters 'macro:#1->\B' with all category codes set to 'other' or 'space'.

\newlabel   The macro \label writes a line with a \newlabel command into the .aux file to define labels.

```
2012 %\bbl@redefine\newlabel#1#2{%
2013 %   \@safe@activestrue\org@newlabel{#1}{#2}\@safe@activesfalse}
```

\@newl@bel   We need to change the definition of the LaTeX-internal macro \@newl@bel. This is needed because we need to make sure that shorthand characters expand to their non-active version.
The following package options control which macros are to be redefined.

```
2014 ⟨⟨*More package options⟩⟩ ≡
2015 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
2016 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
```

```
2017 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
2018 ⟨⟨/More package options⟩⟩
```

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.

```
2019 \bbl@trace{Cross referencing macros}
2020 \ifx\bbl@opt@safe\@empty\else
2021   \def\@newl@bel#1#2#3{%
2022    {\@safe@activestrue
2023     \bbl@ifunset{#1@#2}%
2024        \relax
2025        {\gdef\@multiplelabels{%
2026           \@latex@warning@no@line{There were multiply-defined labels}}%
2027         \@latex@warning@no@line{Label `#2' multiply defined}}%
2028     \global\@namedef{#1@#2}{#3}}}
```

\@testdef   An internal LATEX macro used to test if the labels that have been written on the .aux file
have changed. It is called by the \enddocument macro. This macro needs to be completely
rewritten, using \meaning. The reason for this is that in some cases the expansion of
\#1@#2 contains the same characters as the #3; but the character codes differ. Therefore
LATEX keeps reporting that the labels may have changed.

```
2029   \CheckCommand*\@testdef[3]{%
2030     \def\reserved@a{#3}%
2031     \expandafter\ifx\csname#1@#2\endcsname\reserved@a
2032     \else
2033       \@tempswatrue
2034     \fi}
```

Now that we made sure that \@testdef still has the same definition we can rewrite it. First
we make the shorthands 'safe'.

```
2035   \def\@testdef#1#2#3{%
2036     \@safe@activestrue
```

Then we use \bbl@tempa as an 'alias' for the macro that contains the label which is being
checked.

```
2037     \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname
```

Then we define \bbl@tempb just as \@newl@bel does it.

```
2038     \def\bbl@tempb{#3}%
2039     \@safe@activesfalse
```

When the label is defined we replace the definition of \bbl@tempa by its meaning.

```
2040     \ifx\bbl@tempa\relax
2041     \else
2042       \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
2043     \fi
```

We do the same for \bbl@tempb.

```
2044     \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
```

If the label didn't change, \bbl@tempa and \bbl@tempb should be identical macros.

```
2045     \ifx\bbl@tempa\bbl@tempb
2046     \else
2047       \@tempswatrue
2048     \fi}
2049 \fi
```

\ref The same holds for the macro \ref that references a label and \pageref to reference a
\pageref page. So we redefine \ref and \pageref. While we change these macros, we make them
robust as well (if they weren't already) to prevent problems if they should become
expanded at the wrong moment.

```
2050 \bbl@xin@{R}\bbl@opt@safe
2051 \ifin@
2052   \bbl@redefinerobust\ref#1{%
2053     \@safe@activestrue\org@ref{#1}\@safe@activesfalse}
2054   \bbl@redefinerobust\pageref#1{%
2055     \@safe@activestrue\org@pageref{#1}\@safe@activesfalse}
2056 \else
2057   \let\org@ref\ref
2058   \let\org@pageref\pageref
2059 \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.

```
2060 \bbl@xin@{B}\bbl@opt@safe
2061 \ifin@
2062   \bbl@redefine\@citex[#1]#2{%
2063     \@safe@activestrue\edef\@tempa{#2}\@safe@activesfalse
2064     \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.

```
2065   \AtBeginDocument{%
2066     \@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.)

```
2067     \def\@citex[#1][#2]#3{%
2068       \@safe@activestrue\edef\@tempa{#3}\@safe@activesfalse
2069       \org@@citex[#1][#2]{\@tempa}}%
2070     }{}}
```

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

```
2071   \AtBeginDocument{%
2072     \@ifpackageloaded{cite}{%
2073       \def\@citex[#1]#2{%
2074         \@safe@activestrue\org@@citex[#1]{#2}\@safe@activesfalse}%
2075       }{}}
```

\nocite The macro \nocite which is used to instruct BiBTEX to extract uncited references from the
database.

```
2076   \bbl@redefine\nocite#1{%
2077     \@safe@activestrue\org@nocite{#1}\@safe@activesfalse}
```

104

\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@activestrue` 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.

```
2078  \bbl@redefine\bibcite{%
```

We call `\bbl@cite@choice` to select the proper definition for `\bibcite`. This new definition is then activated.

```
2079    \bbl@cite@choice
2080    \bibcite}
```

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

```
2081  \def\bbl@bibcite#1#2{%
2082    \org@bibcite{#1}{\@safe@activesfalse#2}}
```

\bbl@cite@choice The macro `\bbl@cite@choice` determines which definition of `\bibcite` is needed.

```
2083  \def\bbl@cite@choice{%
```

First we give `\bibcite` its default definition.

```
2084    \global\let\bibcite\bbl@bibcite
```

Then, when `natbib` is loaded we restore the original definition of `\bibcite`.

```
2085    \@ifpackageloaded{natbib}{\global\let\bibcite\org@bibcite}{}%
```

For `cite` we do the same.

```
2086    \@ifpackageloaded{cite}{\global\let\bibcite\org@bibcite}{}%
```

Make sure this only happens once.

```
2087    \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.

```
2088    \AtBeginDocument{\bbl@cite@choice}
```

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

```
2089  \bbl@redefine\@bibitem#1{%
2090    \@safe@activestrue\org@@bibitem{#1}\@safe@activesfalse}
2091 \else
2092  \let\org@nocite\nocite
2093  \let\org@@citex\@citex
2094  \let\org@bibcite\bibcite
2095  \let\org@@bibitem\@bibitem
2096 \fi
```

10.3 Marks

\markright Because the output routine is asynchronous, we must pass the current language attribute to the head lines, together with the text that is put into them. To achieve this we need to adapt the definition of `\markright` and `\markboth` somewhat.
We check whether the argument is empty; if it is, we just make sure the scratch token register is empty. Next, we store the argument to `\markright` in the scratch token register.

This way these commands will not be expanded later, and we make sure that the text is typeset using the correct language settings. While doing so, we make sure that active characters that may end up in the mark are not disabled by the output routine kicking in while `\@safe@activestrue` is in effect.

```
2097 \bbl@trace{Marks}
2098 \IfBabelLayout{sectioning}
2099   {\ifx\bbl@opt@headfoot\@nnil
2100     \g@addto@macro\@resetactivechars{%
2101       \set@typeset@protect
2102       \expandafter\select@language@x\expandafter{\bbl@main@language}%
2103       \let\protect\noexpand
2104       \edef\thepage{%
2105         \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}}%
2106   \fi}
2107   {\bbl@redefine\markright#1{%
2108     \bbl@ifblank{#1}%
2109       {\org@markright{}}%
2110       {\toks@{#1}%
2111         \bbl@exp{%
2112           \\\org@markright{\\\protect\\\foreignlanguage{\languagename}%
2113             {\\\protect\\\bbl@restore@actives\the\toks@}}}}}%
```

`\markboth`   The definition of `\markboth` is equivalent to that of `\markright`, except that we need two
`\@mkboth`   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 neeed to do that again with the new definition of `\markboth`.

```
2114   \ifx\@mkboth\markboth
2115     \def\bbl@tempc{\let\@mkboth\markboth}
2116   \else
2117     \def\bbl@tempc{}
2118   \fi
```

Now we can start the new definition of `\markboth`

```
2119   \bbl@redefine\markboth#1#2{%
2120     \protected@edef\bbl@tempb##1{%
2121       \protect\foreignlanguage
2122       {\languagename}{\protect\bbl@restore@actives##1}}%
2123     \bbl@ifblank{#1}%
2124       {\toks@{}}%
2125       {\toks@\expandafter{\bbl@tempb{#1}}}%
2126     \bbl@ifblank{#2}%
2127       {\@temptokena{}}%
2128       {\@temptokena\expandafter{\bbl@tempb{#2}}}%
2129     \bbl@exp{\\\org@markboth{\the\toks@}{\the\@temptokena}}}
```

and copy it to `\@mkboth` if necessary.

```
2130   \bbl@tempc}  % end \IfBabelLayout
```

10.4 Preventing clashes with other packages

10.4.1 `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.

The first thing we need to do is check if the package ifthen is loaded. This should be done at \begin{document} time.

```
2131 \bbl@trace{Preventing clashes with other packages}
2132 \bbl@xin@{R}\bbl@opt@safe
2133 \ifin@
2134   \AtBeginDocument{%
2135     \@ifpackageloaded{ifthen}{%
```

Then we can redefine \ifthenelse:

```
2136       \bbl@redefine@long\ifthenelse#1#2#3{%
```

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.

```
2137         \let\bbl@temp@pref\pageref
2138         \let\pageref\org@pageref
2139         \let\bbl@temp@ref\ref
2140         \let\ref\org@ref
```

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. When the package wasn't loaded we do nothing.

```
2141         \@safe@activestrue
2142         \org@ifthenelse{#1}%
2143           {\let\pageref\bbl@temp@pref
2144            \let\ref\bbl@temp@ref
2145            \@safe@activesfalse
2146            #2}%
2147           {\let\pageref\bbl@temp@pref
2148            \let\ref\bbl@temp@ref
2149            \@safe@activesfalse
2150            #3}%
2151        }%
2152      }{}%
2153    }
```

10.4.2 varioref

\@@vpageref When the package varioref is in use we need to modify its internal command \@@vpageref
\vrefpagenum in order to prevent problems when an active character ends up in the argument of \vref.
\Ref
```
2154  \AtBeginDocument{%
2155    \@ifpackageloaded{varioref}{%
2156      \bbl@redefine\@@vpageref#1[#2]#3{%
2157        \@safe@activestrue
2158        \org@@@vpageref{#1}[#2]{#3}%
2159        \@safe@activesfalse}%
```

The same needs to happen for \vrefpagenum.

```
2160      \bbl@redefine\vrefpagenum#1#2{%
```

```
2161          \@safe@activestrue
2162          \org@vrefpagenum{#1}{#2}%
2163          \@safe@activesfalse}%
```

The package varioref defines \Ref to be a robust command wich uppercases the first character of the reference text. In order to be able to do that it needs to access the exandable form of \ref. So we employ a little trick here. We redefine the (internal) command \Ref␣ to call \org@ref instead of \ref. The disadvantgage of this solution is that whenever the derfinition of \Ref changes, this definition needs to be updated as well.

```
2164          \expandafter\def\csname Ref \endcsname#1{%
2165            \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
2166          }{}%
2167        }
2168 \fi
```

10.4.3 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.
So at \begin{document} we check whether hhline is loaded.

```
2169 \AtEndOfPackage{%
2170   \AtBeginDocument{%
2171     \@ifpackageloaded{hhline}%
```

Then we check whether the expansion of \normal@char: is not equal to \relax.

```
2172        {\expandafter\ifx\csname normal@char\string:\endcsname\relax
2173         \else
```

In that case we simply reload the package. 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.

```
2174          \makeatletter
2175          \def\@currname{hhline}\input{hhline.sty}\makeatother
2176        \fi}%
2177      {}}}
```

10.4.4 hyperref

\pdfstringdefDisableCommands A number of interworking problems between babel and hyperref are tackled by hyperref itself. The following code was introduced to prevent some annoying warnings but it broke bookmarks. This was quickly fixed in hyperref, which essentially made it no-op. However, it will not removed for the moment because hyperref is expecting it.

```
2178 \AtBeginDocument{%
2179   \ifx\pdfstringdefDisableCommands\@undefined\else
2180     \pdfstringdefDisableCommands{\languageshorthands{system}}%
2181   \fi}
```

10.4.5 fancyhdr

\FOREIGNLANGUAGE The package fancyhdr treats the running head and fout lines somewhat differently as the standard classes. A symptom of this is that the command \foreignlanguage which babel adds to the marks can end up inside the argument of \MakeUppercase. To prevent unexpected results we need to define \FOREIGNLANGUAGE here.

```
2182 \DeclareRobustCommand{\FOREIGNLANGUAGE}[1]{%
2183   \lowercase{\foreignlanguage{#1}}}
```

\substitutefontfamily 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.

```
2184 \def\substitutefontfamily#1#2#3{%
2185   \lowercase{\immediate\openout15=#1#2.fd\relax}%
2186   \immediate\write15{%
2187     \string\ProvidesFile{#1#2.fd}%
2188     [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
2189      \space generated font description file]^^J
2190     \string\DeclareFontFamily{#1}{#2}{}^^J
2191     \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{}^^J
2192     \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{}^^J
2193     \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{}^^J
2194     \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{}^^J
2195     \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{}^^J
2196     \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{}^^J
2197     \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{}^^J
2198     \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{}^^J
2199     }%
2200   \closeout15
2201   }
```

This command should only be used in the preamble of a document.

```
2202 \@onlypreamble\substitutefontfamily
```

10.5   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.
Unfortunately, fontenc deletes its package options, so we must guess which encodings has
been loaded by traversing \@filelist to search for ⟨enc⟩enc.def. 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

```
2203 \bbl@trace{Encoding and fonts}
2204 \newcommand\BabelNonASCII{LGR,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU,}
2205 \let\org@TeX\TeX
2206 \let\org@LaTeX\LaTeX
2207 \let\ensureascii\@firstofone
2208 \AtBeginDocument{%
2209   \in@false
2210   \bbl@foreach\BabelNonASCII{% is there a non-ascii enc?
2211     \ifin@\else
2212       \lowercase{\bbl@xin@{,#1enc.def,}{,\@filelist,}}%
2213     \fi}%
2214   \ifin@ % if a non-ascii has been loaded
2215     \def\ensureascii#1{{\fontencoding{OT1}\selectfont#1}}%
2216     \DeclareTextCommandDefault{\TeX}{\org@TeX}%
2217     \DeclareTextCommandDefault{\LaTeX}{\org@LaTeX}%
2218     \def\bbl@tempb#1\@@{\uppercase{\bbl@tempc#1}ENC.DEF\@empty\@@}%
2219     \def\bbl@tempc#1ENC.DEF#2\@@{%
2220       \ifx\@empty#2\else
2221         \bbl@ifunset{T@#1}%
2222           {}%
2223           {\bbl@xin@{,#1,}{,\BabelNonASCII,}%
2224            \ifin@
```

```
2225              \DeclareTextCommand{\TeX}{#1}{\ensureascii{\org@TeX}}%
2226              \DeclareTextCommand{\LaTeX}{#1}{\ensureascii{\org@LaTeX}}%
2227            \else
2228              \def\ensureascii##1{{\fontencoding{#1}\selectfont##1}}%
2229            \fi}%
2230        \fi}%
2231      \bbl@foreach\@filelist{\bbl@tempb#1\@@}%  TODO - \@@ de mas??
2232      \bbl@xin@{,\cf@encoding,}{,\BabelNonASCII,}%
2233      \ifin@\else
2234        \edef\ensureascii#1{{%
2235          \noexpand\fontencoding{\cf@encoding}\noexpand\selectfont#1}}%
2236      \fi
2237    \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.

```
2238 \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.

```
2239 \AtBeginDocument{%
2240   \@ifpackageloaded{fontspec}%
2241     {\xdef\latinencoding{%
2242        \ifx\UTFencname\@undefined
2243          EU\ifcase\bbl@engine\or2\or1\fi
2244        \else
2245          \UTFencname
2246        \fi}}%
2247     {\gdef\latinencoding{OT1}%
2248      \ifx\cf@encoding\bbl@t@one
2249        \xdef\latinencoding{\bbl@t@one}%
2250      \else
2251        \@ifl@aded{def}{t1enc}{\xdef\latinencoding{\bbl@t@one}}{}%
2252      \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.

```
2253 \DeclareRobustCommand{\latintext}{%
2254   \fontencoding{\latinencoding}\selectfont
2255   \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.

```
2256 \ifx\@undefined\DeclareTextFontCommand
2257   \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}
2258 \else
2259   \DeclareTextFontCommand{\textlatin}{\latintext}
2260 \fi
```

10.6 Basic bidi support

Work in progress. This code is currently placed here for practical reasons.
It is loosely based on `rlbabel.def`, but most of it has been developed from scratch. This babel module (by Johannes Braams and Boris Lavva) has served the purpose of typesetting R documents for two decades, and despite its flaws I think it is still a good starting point (some parts have been copied here almost verbatim), partly thanks to its simplicity. I've also looked at ARABI (by Youssef Jabri), which is compatible with babel.
There are two ways of modifying macros to make them "bidi", namely, by patching the internal low level macros (which is what I have done with lists, columns, counters, tocs, much like `rlbabel` did), and by introducing a "middle layer" just below the user interface (sectioning, footnotes).

- pdftex provides a minimal support for bidi text, and it must be done by hand. Vertical typesetting is not possible.

- xetex is somewhat better, thanks to its font engine (even if not always reliable) and a few additional tools. However, very little is done at the paragraph level. Another challenging problem is text direction does not honour TeX grouping.

- luatex can provide the most complete solution, as we can manipulate almost freely the node list, the generated lines, and so on, but bidi text does not work out of the box and some development is necessary. It also provides tools to properly set left-to-right and right-to-left page layouts. As LuaTeX-ja shows, vertical typesetting is posible, too. Its main drawback is font handling is often considered to be less mature than xetex, mainly in Indic scripts (but there are steps to make HarfBuzz, the xetex font engine, available in luatex; see <https://github.com/tatzetwerk/luatex-harfbuzz>).

```
2261 \bbl@trace{Basic (internal) bidi support}
2262 \def\bbl@alscripts{,Arabic,Syriac,Thaana,}
2263 \def\bbl@rscripts{%
2264   ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
2265   Old Hungarian,Old Hungarian,Lydian,Mandaean,Manichaean,%
2266   Manichaean,Meroitic Cursive,Meroitic,Old North Arabian,%
2267   Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
2268   Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%
2269   Old South Arabian,}%
2270 \def\bbl@provide@dirs#1{%
2271   \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts\bbl@rscripts}%
2272   \ifin@
2273     \global\bbl@csarg\chardef{wdir@#1}\@ne
2274     \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts}%
2275     \ifin@
2276       \global\bbl@csarg\chardef{wdir@#1}\tw@  % useless in xetex
2277     \fi
2278   \else
2279     \global\bbl@csarg\chardef{wdir@#1}\z@
2280   \fi}
2281 \def\bbl@switchdir{%
2282   \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
2283   \bbl@ifunset{bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{}%
2284   \bbl@exp{\\\bbl@setdirs\bbl@cs{wdir@\languagename}}}
2285 \def\bbl@setdirs#1{% TODO - math
2286   \ifcase\bbl@select@type % TODO - strictly, not the right test
2287     \bbl@bodydir{#1}%
2288     \bbl@pardir{#1}%
2289   \fi
2290   \bbl@textdir{#1}}
```

```
2291 \ifodd\bbl@engine  % luatex=1
2292  \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
2293  \DisableBabelHook{babel-bidi}
2294  \chardef\bbl@thepardir\z@
2295  \def\bbl@getluadir#1{%
2296    \directlua{
2297      if tex.#1dir == 'TLT' then
2298        tex.sprint('0')
2299      elseif tex.#1dir == 'TRT' then
2300        tex.sprint('1')
2301      end}}
2302  \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\textdir.. 3=0 lr/1 rl
2303    \ifcase#3\relax
2304      \ifcase\bbl@getluadir{#1}\relax\else
2305        #2 TLT\relax
2306      \fi
2307    \else
2308      \ifcase\bbl@getluadir{#1}\relax
2309        #2 TRT\relax
2310      \fi
2311    \fi}
2312  \def\bbl@textdir#1{%
2313    \bbl@setluadir{text}\textdir{#1}% TODO - ?\linedir
2314    \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*3+#1}}
2315  \def\bbl@pardir#1{\bbl@setluadir{par}\pardir{#1}%
2316    \chardef\bbl@thepardir#1\relax}
2317  \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}
2318  \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}
2319  \def\bbl@dirparastext{\pardir\the\textdir\relax}%   %%%%
2320 \else % pdftex=0, xetex=2
2321  \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
2322  \DisableBabelHook{babel-bidi}
2323  \newcount\bbl@dirlevel
2324  \chardef\bbl@thetextdir\z@
2325  \chardef\bbl@thepardir\z@
2326  \def\bbl@textdir#1{%
2327    \ifcase#1\relax
2328      \chardef\bbl@thetextdir\z@
2329      \bbl@textdir@i\beginL\endL
2330    \else
2331      \chardef\bbl@thetextdir\@ne
2332      \bbl@textdir@i\beginR\endR
2333    \fi}
2334  \def\bbl@textdir@i#1#2{%
2335    \ifhmode
2336      \ifnum\currentgrouplevel>\z@
2337        \ifnum\currentgrouplevel=\bbl@dirlevel
2338          \bbl@error{Multiple bidi settings inside a group}%
2339            {I'll insert a new group, but expect wrong results.}%
2340          \bgroup\aftergroup#2\aftergroup\egroup
2341        \else
2342          \ifcase\currentgrouptype\or % 0 bottom
2343            \aftergroup#2% 1 simple {}
2344          \or
2345            \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
2346          \or
2347            \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
2348          \or\or\or % vbox vtop align
2349          \or
```

```
2350              \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
2351          \or\or\or\or\or\or % output math disc insert vcent mathchoice
2352          \or
2353            \aftergroup#2% 14 \begingroup
2354          \else
2355            \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
2356          \fi
2357        \fi
2358        \bbl@dirlevel\currentgrouplevel
2359      \fi
2360      #1%
2361    \fi}
2362 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
2363 \let\bbl@bodydir\@gobble
2364 \let\bbl@pagedir\@gobble
2365 \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).

```
2366 \def\bbl@xebidipar{%
2367    \let\bbl@xebidipar\relax
2368    \TeXXeTstate\@ne
2369    \def\bbl@xeeverypar{%
2370      \ifcase\bbl@thepardir
2371        \ifcase\bbl@thetextdir\else\beginR\fi
2372      \else
2373        {\setbox\z@\lastbox\beginR\box\z@}%
2374      \fi}%
2375    \let\bbl@severypar\everypar
2376    \newtoks\everypar
2377    \everypar=\bbl@severypar
2378    \bbl@severypar{\bbl@xeeverypar\the\everypar}}
2379 \fi
```

A tool for weak L (mainly digits).

```
2380    \DeclareRobustCommand\babelsublr[1]{\leavevmode{\bbl@textdir\z@#1}}
```

10.7   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.

```
2381 \bbl@trace{Local Language Configuration}
2382 \ifx\loadlocalcfg\@undefined
2383   \@ifpackagewith{babel}{noconfigs}%
2384     {\let\loadlocalcfg\@gobble}%
2385     {\def\loadlocalcfg#1{%
2386       \InputIfFileExists{#1.cfg}%
2387         {\typeout{*************************************^^J%
2388                      * Local config file #1.cfg used^^J%
2389                      *}}%
2390         \@empty}}
2391 \fi
```

Just to be compatible with LATEX 2.09 we add a few more lines of code:

```
2392 \ifx\@unexpandable@protect\@undefined
2393   \def\@unexpandable@protect{\noexpand\protect\noexpand}
2394   \long\def\protected@write#1#2#3{%
2395     \begingroup
2396       \let\thepage\relax
2397       #2%
2398       \let\protect\@unexpandable@protect
2399       \edef\reserved@a{\write#1{#3}}%
2400       \reserved@a
2401     \endgroup
2402     \if@nobreak\ifvmode\nobreak\fi\fi}
2403 \fi
2404 ⟨/core⟩
2405 ⟨∗kernel⟩
```

11   Multiple languages (`switch.def`)

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.

```
2406 ⟨⟨Make sure ProvidesFile is defined⟩⟩
2407 \ProvidesFile{switch.def}[⟨⟨date⟩⟩ ⟨⟨version⟩⟩ Babel switching mechanism]
2408 ⟨⟨Load macros for plain if not LaTeX⟩⟩
2409 ⟨⟨Define core switching macros⟩⟩
```

\adddialect   The macro \adddialect can be used to add the name of a dialect or variant language, for which an already defined hyphenation table can be used.

```
2410 \def\bbl@version{⟨⟨version⟩⟩}
2411 \def\bbl@date{⟨⟨date⟩⟩}
2412 \def\adddialect#1#2{%
2413   \global\chardef#1#2\relax
2414   \bbl@usehooks{adddialect}{{#1}{#2}}%
2415   \wlog{\string#1 = a dialect from \string\language#2}}
```

\bbl@iflanguage executes code only if the language l@ exists. Otherwise raises and 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 intented 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.

```
2416 \def\bbl@fixname#1{%
2417   \begingroup
2418     \def\bbl@tempe{l@}%
2419     \edef\bbl@tempd{\noexpand\@ifundefined{\noexpand\bbl@tempe#1}}%
2420     \bbl@tempd
2421       {\lowercase\expandafter{\bbl@tempd}%
2422         {\uppercase\expandafter{\bbl@tempd}%
2423           \@empty
2424           {\edef\bbl@tempd{\def\noexpand#1{#1}}%
2425            \uppercase\expandafter{\bbl@tempd}}}%
2426         {\edef\bbl@tempd{\def\noexpand#1{#1}}%
2427          \lowercase\expandafter{\bbl@tempd}}}%
2428       \@empty
```

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```
2429        \edef\bbl@tempd{\endgroup\def\noexpand#1{#1}}%
2430     \bbl@tempd}
2431 \def\bbl@iflanguage#1{%
2432     \@ifundefined{l@#1}{\@nolanerr{#1}\@gobble}\@firstofone}
```

\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.

```
2433 \def\iflanguage#1{%
2434     \bbl@iflanguage{#1}{%
2435         \ifnum\csname l@#1\endcsname=\language
2436             \expandafter\@firstoftwo
2437         \else
2438             \expandafter\@secondoftwo
2439         \fi}}
```

11.1 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.
                 To allow the call of \selectlanguage either with a control sequence name or with a
                 simple string as argument, we have to use a trick to delete the optional escape character.
                 To convert a control sequence to a string, we use the \string primitive. Next we have to
                 look at the first character of this string and compare it with the escape character. Because
                 this escape character can be changed by setting the internal integer \escapechar to a
                 character number, we have to compare this number with the character of the string. To do
                 this we have to use TeX's backquote notation to specify the character as a number.
                 If the first character of the \string'ed argument is the current escape character, the
                 comparison has stripped this character and the rest in the 'then' part consists of the rest of
                 the control sequence name. Otherwise we know that either the argument is not a control
                 sequence or \escapechar is set to a value outside of the character range 0–255.
                 If the user gives an empty argument, we provide a default argument for \string. This
                 argument should expand to nothing.

```
2440 \let\bbl@select@type\z@
2441 \edef\selectlanguage{%
2442     \noexpand\protect
2443     \expandafter\noexpand\csname selectlanguage \endcsname}
```

Because the command \selectlanguage could be used in a moving argument it expands
to \protect\selectlanguage␣. Therefore, we have to make sure that a macro \protect
exists. If it doesn't it is \let to \relax.

```
2444 \ifx\@undefined\protect\let\protect\relax\fi
```

As LaTeX 2.09 writes to files *expanded* whereas LaTeX 2_ε takes care *not* to expand the
arguments of \write statements we need to be a bit clever about the way we add
information to .aux files. Therefore we introduce the macro \xstring which should
expand to the right amount of \string's.

```
2445 \ifx\documentclass\@undefined
2446     \def\xstring{\string\string\string}
2447 \else
2448     \let\xstring\string
2449 \fi
```

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.

```
2450 \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
\bbl@pop@language The stack is simply a list of languagenames, separated with a '+' sign; the push function can be simple:

```
2451 \def\bbl@push@language{%
2452   \xdef\bbl@language@stack{\languagename+\bbl@language@stack}}
```

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 \languagename. For this we first define a helper function.

\bbl@pop@lang This macro stores its first element (which is delimited by the '+'-sign) in \languagename and stores the rest of the string (delimited by '-') in its third argument.

```
2453 \def\bbl@pop@lang#1+#2-#3{%
2454   \edef\languagename{#1}\xdef#3{#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) followed by the '-'-sign and finally the reference to the stack.

```
2455 \let\bbl@ifrestoring\@secondoftwo
2456 \def\bbl@pop@language{%
2457   \expandafter\bbl@pop@lang\bbl@language@stack-\bbl@language@stack
2458   \let\bbl@ifrestoring\@firstoftwo
2459   \expandafter\bbl@set@language\expandafter{\languagename}%
2460   \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.

```
2461 \expandafter\def\csname selectlanguage \endcsname#1{%
2462   \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\tw@\fi
2463   \bbl@push@language
2464   \aftergroup\bbl@pop@language
2465   \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 historial 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 \languagename are not well defined. 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.

```
2466 \def\BabelContentsFiles{toc,lof,lot}
2467 \def\bbl@set@language#1{%
2468   \edef\languagename{%
2469     \ifnum\escapechar=\expandafter`\string#1\@empty
2470     \else\string#1\@empty\fi}%
2471   \select@language{\languagename}%
2472   \expandafter\ifx\csname date\languagename\endcsname\relax\else
2473     \if@filesw
2474       \protected@write\@auxout{}{\string\babel@aux{\languagename}{}}%
2475       \bbl@usehooks{write}{}%
2476     \fi
2477   \fi}
2478 \def\select@language#1{%
2479   \ifnum\bbl@hymapsel=\@cclv\chardef\bbl@hymapsel4\relax\fi
2480   \edef\languagename{#1}%
2481   \bbl@fixname\languagename
2482   \bbl@iflanguage\languagename{%
2483     \expandafter\ifx\csname date\languagename\endcsname\relax
2484       \bbl@error
2485         {Unknown language `#1'. Either you have\\%
2486          misspelled its name, it has not been installed,\\%
2487          or you requested it in a previous run. Fix its name,\\%
2488          install it or just rerun the file, respectively. In\\%
2489          some cases, you may need to remove the aux file}%
2490         {You may proceed, but expect wrong results}%
2491     \else
2492       \let\bbl@select@type\z@
2493       \expandafter\bbl@switch\expandafter{\languagename}%
2494     \fi}}
2495 \def\babel@aux#1#2{%
2496   \expandafter\ifx\csname date#1\endcsname\relax
2497     \expandafter\ifx\csname bbl@auxwarn@#1\endcsname\relax
2498       \@namedef{bbl@auxwarn@#1}{}%
2499       \bbl@warning
2500         {Unknown language `#1'. Very likely you\\%
2501          requested it in a previous run. Expect some\\%
2502          wrong results in this run, which should vanish\\%
2503          in the next one. Reported}%
2504     \fi
2505   \else
2506     \select@language{#1}%
2507     \bbl@foreach\BabelContentsFiles{%
2508       \@writefile{##1}{\babel@toc{#1}{#2}}}% %% TODO - ok in plain?
2509   \fi}
2510 \def\babel@toc#1#2{%
2511   \select@language{#1}}
```

A bit of optimization. Select in heads/foots the language only if necessary. The real thing is in babel.def.

```
2512 \let\select@language@x\select@language
```

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 \languagename.

Then we have to *re*define \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.

```
2513 \newif\ifbbl@usedategroup
2514 \def\bbl@switch#1{%
2515   \originalTeX
2516   \expandafter\def\expandafter\originalTeX\expandafter{%
2517     \csname noextras#1\endcsname
2518     \let\originalTeX\@empty
2519     \babel@beginsave}%
2520   \bbl@usehooks{afterreset}{}%
2521   \languageshorthands{none}%
2522   \ifcase\bbl@select@type
2523     \ifhmode
2524       \hskip\z@skip % trick to ignore spaces
2525       \csname captions#1\endcsname\relax
2526       \csname date#1\endcsname\relax
2527       \loop\ifdim\lastskip>\z@\unskip\repeat\unskip
2528     \else
2529       \csname captions#1\endcsname\relax
2530       \csname date#1\endcsname\relax
2531     \fi
2532   \else\ifbbl@usedategroup
2533     \bbl@usedategroupfalse
2534     \ifhmode
2535       \hskip\z@skip % trick to ignore spaces
2536       \csname date#1\endcsname\relax
2537       \loop\ifdim\lastskip>\z@\unskip\repeat\unskip
2538     \else
2539       \csname date#1\endcsname\relax
2540     \fi
2541   \fi\fi
2542   \bbl@usehooks{beforeextras}{}%
2543   \csname extras#1\endcsname\relax
2544   \bbl@usehooks{afterextras}{}%
2545   \ifcase\bbl@opt@hyphenmap\or
2546     \def\BabelLower##1##2{\lccode##1=##2\relax}%
2547     \ifnum\bbl@hymapsel>4\else
2548       \csname\languagename @bbl@hyphenmap\endcsname
2549     \fi
2550     \chardef\bbl@opt@hyphenmap\z@
2551   \else
2552     \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
2553       \csname\languagename @bbl@hyphenmap\endcsname
2554     \fi
2555   \fi
2556   \global\let\bbl@hymapsel\@cclv
2557   \bbl@patterns{#1}%
```

```
2558    \babel@savevariable\lefthyphenmin
2559    \babel@savevariable\righthyphenmin
2560    \expandafter\ifx\csname #1hyphenmins\endcsname\relax
2561      \set@hyphenmins\tw@\thr@@\relax
2562    \else
2563      \expandafter\expandafter\expandafter\set@hyphenmins
2564        \csname #1hyphenmins\endcsname\relax
2565    \fi}
```

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.

```
2566 \long\def\otherlanguage#1{%
2567    \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\thr@@\fi
2568    \csname selectlanguage \endcsname{#1}%
2569    \ignorespaces}
```

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

```
2570 \long\def\endotherlanguage{%
2571    \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`.

```
2572 \expandafter\def\csname otherlanguage*\endcsname#1{%
2573    \ifnum\bbl@hymapsel=\@cclv\chardef\bbl@hymapsel4\relax\fi
2574    \foreign@language{#1}}
```

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".

```
2575 \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.

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In other words, at the beginning of a paragraph \foreignlanguage enters into hmode with the surrounding lang, and with \foreignlanguage* with the new lang.

```
2576 \providecommand\bbl@beforeforeign{}
2577 \edef\foreignlanguage{%
2578   \noexpand\protect
2579   \expandafter\noexpand\csname foreignlanguage \endcsname}
2580 \expandafter\def\csname foreignlanguage \endcsname{%
2581   \@ifstar\bbl@foreign@s\bbl@foreign@x}
2582 \def\bbl@foreign@x#1#2{%
2583   \begingroup
2584     \let\BabelText\@firstofone
2585     \bbl@beforeforeign
2586     \foreign@language{#1}%
2587     \bbl@usehooks{foreign}{}%
2588     \BabelText{#2}% Now in horizontal mode!
2589   \endgroup}
2590 \def\bbl@foreign@s#1#2{% TODO - \shapemode, \@setpar, ?\@@par
2591   \begingroup
2592     {\par}%
2593     \let\BabelText\@firstofone
2594     \foreign@language{#1}%
2595     \bbl@usehooks{foreign*}{}%
2596     \bbl@dirparastext
2597     \BabelText{#2}% Still in vertical mode!
2598     {\par}%
2599   \endgroup}
```

\foreign@language   This macro does the work for \foreignlanguage and the otherlanguage* 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.

```
2600 \def\foreign@language#1{%
2601   \edef\languagename{#1}%
2602   \bbl@fixname\languagename
2603   \bbl@iflanguage\languagename{%
2604     \expandafter\ifx\csname date\languagename\endcsname\relax
2605       \bbl@warning
2606         {Unknown language `#1'. Either you have\\%
2607          misspelled its name, it has not been installed,\\%
2608          or you requested it in a previous run. Fix its name,\\%
2609          install it or just rerun the file, respectively.\\%
2610          I'll proceed, but expect wrong results.\\%
2611          Reported}%
2612     \fi
2613     \let\bbl@select@type\@ne
2614     \expandafter\bbl@switch\expandafter{\languagename}}}
```

\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.

```
2615 \let\bbl@hyphlist\@empty
2616 \let\bbl@hyphenation@\relax
```

```
2617 \let\bbl@pttnlist\@empty
2618 \let\bbl@patterns@\relax
2619 \let\bbl@hymapsel=\@cclv
2620 \def\bbl@patterns#1{%
2621   \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
2622     \csname l@#1\endcsname
2623     \edef\bbl@tempa{#1}%
2624   \else
2625     \csname l@#1:\f@encoding\endcsname
2626     \edef\bbl@tempa{#1:\f@encoding}%
2627   \fi
2628 \@expandtwoargs\bbl@usehooks{patterns}{{#1}{\bbl@tempa}}%
2629 \@ifundefined{bbl@hyphenation@}{}{% Can be \relax!
2630   \begingroup
2631     \bbl@xin@{,\number\language,}{,\bbl@hyphlist}%
2632     \ifin@\else
2633       \@expandtwoargs\bbl@usehooks{hyphenation}{{#1}{\bbl@tempa}}%
2634       \hyphenation{%
2635         \bbl@hyphenation@
2636         \@ifundefined{bbl@hyphenation@#1}%
2637           \@empty
2638           {\space\csname bbl@hyphenation@#1\endcsname}}%
2639       \xdef\bbl@hyphlist{\bbl@hyphlist\number\language,}%
2640     \fi
2641   \endgroup}}
```

hyphenrules The environment hyphenrules can be used to select *just* the hyphenation rules. This
environment does *not* change \languagename 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*.

```
2642 \def\hyphenrules#1{%
2643   \edef\bbl@tempf{#1}%
2644   \bbl@fixname\bbl@tempf
2645   \bbl@iflanguage\bbl@tempf{%
2646     \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
2647     \languageshorthands{none}%
2648     \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
2649       \set@hyphenmins\tw@\thr@@\relax
2650     \else
2651       \expandafter\expandafter\expandafter\set@hyphenmins
2652       \csname\bbl@tempf hyphenmins\endcsname\relax
2653     \fi}}
2654 \let\endhyphenrules\@empty
```

\providehyphenmins The macro \providehyphenmins should be used in the language definition files to provide
a *default* setting for the hyphenation parameters \lefthyphenmin and \righthyphenmin.
If the macro \⟨lang⟩hyphenmins is already defined this command has no effect.

```
2655 \def\providehyphenmins#1#2{%
2656   \expandafter\ifx\csname #1hyphenmins\endcsname\relax
2657     \@namedef{#1hyphenmins}{#2}%
2658   \fi}
```

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

```
2659 \def\set@hyphenmins#1#2{%
2660   \lefthyphenmin#1\relax
2661   \righthyphenmin#2\relax}
```

\ProvidesLanguage   The identification code for each file is something that was introduced in LaTeX 2ε. 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.

```
2662 \ifx\ProvidesFile\@undefined
2663   \def\ProvidesLanguage#1[#2 #3 #4]{%
2664     \wlog{Language: #1 #4 #3 <#2>}%
2665     }
2666 \else
2667   \def\ProvidesLanguage#1{%
2668     \begingroup
2669       \catcode`\ 10 %
2670       \@makeother\/%
2671       \@ifnextchar[%
2672         {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}}
2673   \def\@provideslanguage#1[#2]{%
2674     \wlog{Language: #1 #2}%
2675     \expandafter\xdef\csname ver@#1.ldf\endcsname{#2}%
2676     \endgroup}
2677 \fi
```

\LdfInit   This macro is defined in two versions. The first version is to be part of the 'kernel' of babel, ie. the part that is loaded in the format; the second version is defined in babel.def. The version in the format just checks the category code of the ampersand and then loads babel.def.
The category code of the ampersand is restored and the macro calls itself again with the new definition from babel.def

```
2678 \def\LdfInit{%
2679   \chardef\atcatcode=\catcode`\@
2680   \catcode`\@=11\relax
2681   \input babel.def\relax
2682   \catcode`\@=\atcatcode \let\atcatcode\relax
2683   \LdfInit}
```

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

```
2684 \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 initialises the save mechanism, \babel@beginsave, is not considered to be undefined.

```
2685 \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':

```
2686 \providecommand\setlocale{%
2687   \bbl@error
2688     {Not yet available}%
2689     {Find an armchair, sit down and wait}}
2690 \let\uselocale\setlocale
2691 \let\locale\setlocale
2692 \let\selectlocale\setlocale
2693 \let\textlocale\setlocale
2694 \let\textlanguage\setlocale
2695 \let\languagetext\setlocale
```

11.2 Errors

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.

When the package was loaded without options not everything will work as expected. An error message is issued in that case.

When the format knows about \PackageError it must be LATEX 2$_\varepsilon$, so we can safely use its error handling interface. Otherwise we'll have to 'keep it simple'.

```
2696 \edef\bbl@nulllanguage{\string\language=0}
2697 \ifx\PackageError\@undefined
2698   \def\bbl@error#1#2{%
2699     \begingroup
2700       \newlinechar=`\^^J
2701       \def\\{^^J(babel) }%
2702       \errhelp{#2}\errmessage{\\#1}%
2703     \endgroup}
2704   \def\bbl@warning#1{%
2705     \begingroup
2706       \newlinechar=`\^^J
2707       \def\\{^^J(babel) }%
2708       \message{\\#1}%
2709     \endgroup}
2710   \def\bbl@info#1{%
2711     \begingroup
2712       \newlinechar=`\^^J
2713       \def\\{^^J}%
2714       \wlog{#1}%
2715     \endgroup}
2716 \else
2717   \def\bbl@error#1#2{%
2718     \begingroup
2719       \def\\{\MessageBreak}%
2720       \PackageError{babel}{#1}{#2}%
2721     \endgroup}
2722   \def\bbl@warning#1{%
2723     \begingroup
2724       \def\\{\MessageBreak}%
2725       \PackageWarning{babel}{#1}%
2726     \endgroup}
2727   \def\bbl@info#1{%
2728     \begingroup
2729       \def\\{\MessageBreak}%
2730       \PackageInfo{babel}{#1}%
2731     \endgroup}
2732 \fi
2733 \@ifpackagewith{babel}{silent}
2734   {\let\bbl@info\@gobble
2735    \let\bbl@warning\@gobble}
2736   {}
2737 \def\bbl@nocaption{\protect\bbl@nocaption@i}
2738 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
2739   \global\@namedef{#2}{\textbf{?#1?}}%
2740   \@nameuse{#2}%
2741   \bbl@warning{%
```

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```
2742      \@backslashchar#2 not set. Please, define\\%
2743      it in the preamble with something like:\\%
2744      \string\renewcommand\@backslashchar#2{..}\\%
2745      Reported}}
2746 \def\@nolanerr#1{%
2747   \bbl@error
2748      {You haven't defined the language #1\space yet}%
2749      {Your command will be ignored, type <return> to proceed}}
2750 \def\@nopatterns#1{%
2751   \bbl@warning
2752      {No hyphenation patterns were preloaded for\\%
2753       the language `#1' into the format.\\%
2754       Please, configure your TeX system to add them and\\%
2755       rebuild the format. Now I will use the patterns\\%
2756       preloaded for \bbl@nulllanguage\space instead}}
2757 \let\bbl@usehooks\@gobbletwo
2758 ⟨/kernel⟩
2759 ⟨∗patterns⟩
```

12   Loading hyphenation patterns

The following code is meant to be read by iniTEX because it should instruct TEX to read hyphenation patterns. To this end the docstrip option patterns can be used to include this code in the file hyphen.cfg. Code is written with lower level macros.
We want to add a message to the message LATEX 2.09 puts in the \everyjob register. This could be done by the following code:

```
\let\orgeveryjob\everyjob
\def\everyjob#1{%
  \orgeveryjob{#1}%
  \orgeveryjob\expandafter{\the\orgeveryjob\immediate\write16{%
      hyphenation patterns for \the\loaded@patterns loaded.}}%
  \let\everyjob\orgeveryjob\let\orgeveryjob\@undefined}
```

The code above redefines the control sequence \everyjob in order to be able to add something to the current contents of the register. This is necessary because the processing of hyphenation patterns happens long before LATEX fills the register.
There are some problems with this approach though.

- When someone wants to use several hyphenation patterns with SLTEX the above scheme won't work. The reason is that SLTEX overwrites the contents of the \everyjob register with its own message.

- Plain TEX does not use the \everyjob register so the message would not be displayed.

To circumvent this a 'dirty trick' can be used. As this code is only processed when creating a new format file there is one command that is sure to be used, \dump. Therefore the original \dump is saved in \org@dump and a new definition is supplied.
To make sure that LATEX 2.09 executes the \@begindocumenthook we would want to alter \begin{document}, but as this done too often already, we add the new code at the front of \@preamblecmds. But we can only do that after it has been defined, so we add this piece of code to \dump.
This new definition starts by adding an instruction to write a message on the terminal and in the transcript file to inform the user of the preloaded hyphenation patterns.
Then everything is restored to the old situation and the format is dumped.

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```
2760 ⟨⟨Make sure ProvidesFile is defined⟩⟩
2761 \ProvidesFile{hyphen.cfg}[⟨⟨date⟩⟩ ⟨⟨version⟩⟩ Babel hyphens]
2762 \xdef\bbl@format{\jobname}
2763 \ifx\AtBeginDocument\@undefined
2764   \def\@empty{}
2765   \let\orig@dump\dump
2766   \def\dump{%
2767     \ifx\@ztryfc\@undefined
2768     \else
2769       \toks0=\expandafter{\@preamblecmds}%
2770       \edef\@preamblecmds{\noexpand\@begindocumenthook\the\toks0}%
2771       \def\@begindocumenthook{}%
2772     \fi
2773     \let\dump\orig@dump\let\orig@dump\@undefined\dump}
2774 \fi
2775 ⟨⟨Define core switching macros⟩⟩
```

\process@line   Each line in the file `language.dat` is processed by \process@line after it is read. The first thing this macro does is to check whether the line starts with =. When the first token of a line is an =, the macro \process@synonym is called; otherwise the macro \process@language will continue.

```
2776 \def\process@line#1#2 #3 #4 {%
2777   \ifx=#1%
2778     \process@synonym{#2}%
2779   \else
2780     \process@language{#1#2}{#3}{#4}%
2781   \fi
2782   \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.

```
2783 \toks@{}
2784 \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.

```
2785 \def\process@synonym#1{%
2786   \ifnum\last@language=\m@ne
2787     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
2788   \else
2789     \expandafter\chardef\csname l@#1\endcsname\last@language
2790     \wlog{\string\l@#1=\string\language\the\last@language}%
2791     \expandafter\let\csname #1hyphenmins\expandafter\endcsname
2792       \csname\languagename hyphenmins\endcsname
2793     \let\bbl@elt\relax
2794     \edef\bbl@languages{\bbl@languages\bbl@elt{#1}{\the\last@language}{}{}}%
2795   \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 \⟨lang⟩hyphenmins macro. When no assignments were made we provide a default setting.

Some pattern files contain changes to the \lccode en \uccode arrays. Such changes should remain local to the language; therefore we process the pattern file in a group; the \patterns command acts globally so its effect will be remembered.

Then we globally store the settings of \lefthyphenmin and \righthyphenmin and close the group.

When the hyphenation patterns have been processed we need to see if a file with hyphenation exceptions needs to be read. This is the case when the third argument is not empty and when it does not contain a space token. (Note however there is no need to save hyphenation exceptions into the format.)

\bbl@languages saves a snapshot of the loaded languagues 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.

```
2796 \def\process@language#1#2#3{%
2797   \expandafter\addlanguage\csname l@#1\endcsname
2798   \expandafter\language\csname l@#1\endcsname
2799   \edef\languagename{#1}%
2800   \bbl@hook@everylanguage{#1}%
2801   \bbl@get@enc#1::\@@@
2802   \begingroup
2803     \lefthyphenmin\m@ne
2804     \bbl@hook@loadpatterns{#2}%
2805     \ifnum\lefthyphenmin=\m@ne
2806     \else
2807       \expandafter\xdef\csname #1hyphenmins\endcsname{%
2808         \the\lefthyphenmin\the\righthyphenmin}%
2809     \fi
2810   \endgroup
2811   \def\bbl@tempa{#3}%
2812   \ifx\bbl@tempa\@empty\else
2813     \bbl@hook@loadexceptions{#3}%
2814   \fi
2815   \let\bbl@elt\relax
2816   \edef\bbl@languages{%
2817     \bbl@languages\bbl@elt{#1}{\the\language}{#2}{\bbl@tempa}}%
2818   \ifnum\the\language=\z@
2819     \expandafter\ifx\csname #1hyphenmins\endcsname\relax
2820       \set@hyphenmins\tw@\thr@@\relax
2821     \else
2822       \expandafter\expandafter\expandafter\set@hyphenmins
2823         \csname #1hyphenmins\endcsname
2824     \fi
2825     \the\toks@
2826     \toks@{}%
2827   \fi}
```

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

```
2828 \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.

```
2829 \def\bbl@hook@everylanguage#1{}
2830 \def\bbl@hook@loadpatterns#1{\input #1\relax}
2831 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
2832 \let\bbl@hook@loadkernel\bbl@hook@loadpatterns
2833 \begingroup
2834   \def\AddBabelHook#1#2{%
2835     \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
2836       \def\next{\toks1}%
2837     \else
2838       \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname####1}%
2839     \fi
2840     \next}
2841   \ifx\directlua\@undefined
2842     \ifx\XeTeXinputencoding\@undefined\else
2843       \input xebabel.def
2844     \fi
2845   \else
2846     \input luababel.def
2847   \fi
2848   \openin1 = babel-\bbl@format.cfg
2849   \ifeof1
2850   \else
2851     \input babel-\bbl@format.cfg\relax
2852   \fi
2853   \closein1
2854 \endgroup
2855 \bbl@hook@loadkernel{switch.def}
```

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

```
2856 \openin1 = language.dat
```

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

```
2857 \def\languagename{english}%
2858 \ifeof1
2859   \message{I couldn't find the file language.dat,\space
2860           I will try the file hyphen.tex}
2861   \input hyphen.tex\relax
2862   \chardef\l@english\z@
2863 \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.

```
2864   \last@language\m@ne
```

We now read lines from the file until the end is found

```
2865   \loop
```

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.

```
2866     \endlinechar\m@ne
2867     \read1 to \bbl@line
2868     \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.

```
2869     \if T\ifeof1F\fi T\relax
2870       \ifx\bbl@line\@empty\else
2871         \edef\bbl@line{\bbl@line\space\space\space}%
2872         \expandafter\process@line\bbl@line\relax
2873       \fi
2874   \repeat
```

Check for the end of the file. We must reverse the test for \ifeof without \else. Then reactivate the default patterns.

```
2875   \begingroup
2876     \def\bbl@elt#1#2#3#4{%
2877       \global\language=#2\relax
2878       \gdef\languagename{#1}%
2879       \def\bbl@elt##1##2##3##4{}}%
2880     \bbl@languages
2881   \endgroup
2882 \fi
```

and close the configuration file.

```
2883 \closein1
```

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

```
2884 \if/\the\toks@/\else
2885   \errhelp{language.dat loads no language, only synonyms}
2886   \errmessage{Orphan language synonym}
2887 \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.

```
2888 \let\bbl@line\@undefined
2889 \let\process@line\@undefined
2890 \let\process@synonym\@undefined
2891 \let\process@language\@undefined
2892 \let\bbl@get@enc\@undefined
2893 \let\bbl@hyph@enc\@undefined
2894 \let\bbl@tempa\@undefined
2895 \let\bbl@hook@loadkernel\@undefined
2896 \let\bbl@hook@everylanguage\@undefined
2897 \let\bbl@hook@loadpatterns\@undefined
2898 \let\bbl@hook@loadexceptions\@undefined
2899 ⟨/patterns⟩
```

Here the code for iniTEX ends.

13 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].

```
2900 ⟨⟨*More package options⟩⟩ ≡
2901 \ifodd\bbl@engine
2902   \DeclareOption{bidi=basic-r}%
2903     {\ExecuteOptions{bidi=basic}}
2904   \DeclareOption{bidi=basic}%
2905     {\let\bbl@beforeforeign\leavevmode
2906      \newattribute\bbl@attr@dir
2907      \bbl@exp{\output{\bodydir\pagedir\the\output}}%
2908      \AtEndOfPackage{\EnableBabelHook{babel-bidi}}}
2909 \else
2910   \DeclareOption{bidi=basic-r}%
2911     {\ExecuteOptions{bidi=basic}}
2912   \DeclareOption{bidi=basic}%
2913     {\bbl@error
2914       {The bidi method `basic' is available only in\\%
2915        luatex. I'll continue with `bidi=default', so\\%
2916        expect wrong results}%
2917       {See the manual for further details.}%
2918     \let\bbl@beforeforeign\leavevmode
2919     \AtEndOfPackage{%
2920       \EnableBabelHook{babel-bidi}%
2921       \bbl@xebidipar}}
2922 \fi
2923 \DeclareOption{bidi=default}%
2924   {\let\bbl@beforeforeign\leavevmode
2925    \ifodd\bbl@engine
2926      \newattribute\bbl@attr@dir
2927      \bbl@exp{\output{\bodydir\pagedir\the\output}}%
2928    \fi
2929    \AtEndOfPackage{%
2930      \EnableBabelHook{babel-bidi}%
2931      \ifodd\bbl@engine\else
2932        \bbl@xebidipar
2933      \fi}}
2934 ⟨⟨/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.

```
2935 ⟨⟨*Font selection⟩⟩ ≡
2936 \bbl@trace{Font handling with fontspec}
2937 \@onlypreamble\babelfont
2938 \newcommand\babelfont[2][]{%  1=langs/scripts 2=fam
2939   \edef\bbl@tempa{#1}%
2940   \def\bbl@tempb{#2}%
2941   \ifx\fontspec\@undefined
2942     \usepackage{fontspec}%
2943   \fi
2944   \EnableBabelHook{babel-fontspec}%
2945   \bbl@bblfont}
2946 \newcommand\bbl@bblfont[2][]{% 1=features 2=fontname
2947   \bbl@ifunset{\bbl@tempb family}{\bbl@providefam{\bbl@tempb}}{}%
2948   \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
2949   \expandafter\bbl@ifblank\expandafter{\bbl@tempa}%
```

```
2950        {\bbl@csarg\edef{\bbl@tempb dflt@}{<>{#1}{#2}}% save bbl@rmdflt@
2951         \bbl@exp{%
2952           \let\<bbl@\bbl@tempb dflt@\languagename>\<bbl@\bbl@tempb dflt@>%
2953           \\\bbl@font@set\<bbl@\bbl@tempb dflt@\languagename>%
2954                           \<\bbl@tempb default>\<\bbl@tempb family>}}%
2955        {\bbl@foreach\bbl@tempa{% ie bbl@rmdflt@lang / *scrt
2956           \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:

```
2957 \def\bbl@providefam#1{%
2958   \bbl@exp{%
2959     \\\newcommand\<#1default>{}% Just define it
2960     \\\bbl@add@list\\\bbl@font@fams{#1}%
2961     \\\DeclareRobustCommand\<#1family>{%
2962       \\\not@math@alphabet\<#1family>\relax
2963       \\\fontfamily\<#1default>\\\selectfont}%
2964     \\\DeclareTextFontCommand{\<text#1>}{\<#1family>}}}
```

The following macro is activated when the hook `babel-fontspec` is enabled.

```
2965 \def\bbl@switchfont{%
2966   \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
2967   \bbl@exp{%  eg Arabic -> arabic
2968     \lowercase{\edef\\\bbl@tempa{\bbl@cs{sname@\languagename}}}}%
2969   \bbl@foreach\bbl@font@fams{%
2970     \bbl@ifunset{bbl@##1dflt@\languagename}%      (1) language?
2971       {\bbl@ifunset{bbl@##1dflt@*\bbl@tempa}%      (2) from script?
2972         {\bbl@ifunset{bbl@##1dflt@}%               2=F - (3) from generic?
2973           {}%                                      123=F - nothing!
2974           {\bbl@exp{%                              3=T - from generic
2975             \global\let\<bbl@##1dflt@\languagename>%
2976                         \<bbl@##1dflt@>}}}%
2977         {\bbl@exp{%                                2=T - from script
2978           \global\let\<bbl@##1dflt@\languagename>%
2979                       \<bbl@##1dflt@*\bbl@tempa>}}}%
2980       {}}%                                         1=T - language, already defined
2981   \def\bbl@tempa{%
2982     \bbl@warning{The current font is not a standard family:\\%
2983       \fontname\font\\%
2984       Script and Language are not applied. Consider defining a\\%
2985       new family with \string\babelfont. Reported}}%
2986   \bbl@foreach\bbl@font@fams{%      don't gather with prev for
2987     \bbl@ifunset{bbl@##1dflt@\languagename}%
2988       {\bbl@cs{famrst@##1}%
2989        \global\bbl@csarg\let{famrst@##1}\relax}%
2990       {\bbl@exp{% order is relevant
2991          \\\bbl@add\\\originalTeX{%
2992            \\\bbl@font@rst{\bbl@cs{##1dflt@\languagename}}%
2993                          \<##1default>\<##1family>{##1}}%
2994          \\\bbl@font@set\<bbl@##1dflt@\languagename>% the main part!
2995                        \<##1default>\<##1family>}}}%
2996   \bbl@ifrestoring{}{\bbl@tempa}}%
```

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.

```
2997 \def\bbl@font@set#1#2#3{% eg \bbl@rmdflt@lang \rmdefault \rmfamily
2998   \bbl@xin@{<>}{#1}%
```

```
2999    \ifin@
3000      \bbl@exp{\\\bbl@fontspec@set\\#1\expandafter\@gobbletwo#1}%
3001    \fi
3002    \bbl@exp{%
3003      \def\\#2{#1}%           eg, \rmdefault{\bbl@rmdflt@lang}
3004      \\\bbl@ifsamestring{#2}{\f@family}{\\#3\let\\\bbl@tempa\relax}{}}}
3005 \def\bbl@fontspec@set#1#2#3{% eg \bbl@rmdflt@lang fnt-opt fnt-nme
3006    \let\bbl@tempe\bbl@mapselect
3007    \let\bbl@mapselect\relax
3008    \bbl@exp{\<fontspec_set_family:Nnn>\\#1%
3009      {\bbl@cs{lsys@\languagename},#2}}{#3}%
3010    \let\bbl@mapselect\bbl@tempe
3011    \bbl@toglobal#1}%
```

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.

```
3012 \def\bbl@font@rst#1#2#3#4{%
3013    \bbl@csarg\def{famrst@#4}{\bbl@font@set{#1}#2#3}}
```

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

```
3014 \def\bbl@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 in explained in the user guide, but essentially – that was not the way to go :-).

```
3015 \newcommand\babelFSstore[2][]{%
3016    \bbl@ifblank{#1}%
3017      {\bbl@csarg\def{sname@#2}{Latin}}%
3018      {\bbl@csarg\def{sname@#2}{#1}}%
3019    \bbl@provide@dirs{#2}%
3020    \bbl@csarg\ifnum{wdir@#2}>\z@
3021      \let\bbl@beforeforeign\leavevmode
3022      \EnableBabelHook{babel-bidi}%
3023    \fi
3024    \bbl@foreach{#2}{%
3025      \bbl@FSstore{##1}{rm}\rmdefault\bbl@save@rmdefault
3026      \bbl@FSstore{##1}{sf}\sfdefault\bbl@save@sfdefault
3027      \bbl@FSstore{##1}{tt}\ttdefault\bbl@save@ttdefault}}
3028 \def\bbl@FSstore#1#2#3#4{%
3029    \bbl@csarg\edef{#2default#1}{#3}%
3030    \expandafter\addto\csname extras#1\endcsname{%
3031      \let#4#3%
3032      \ifx#3\f@family
3033        \edef#3{\csname bbl@#2default#1\endcsname}%
3034        \fontfamily{#3}\selectfont
3035      \else
3036        \edef#3{\csname bbl@#2default#1\endcsname}%
3037      \fi}%
3038    \expandafter\addto\csname noextras#1\endcsname{%
3039      \ifx#3\f@family
3040        \fontfamily{#4}\selectfont
3041      \fi
3042      \let#3#4}}
3043 \let\bbl@langfeatures\@empty
3044 \def\babelFSfeatures{% make sure \fontspec is redefined once
3045    \let\bbl@ori@fontspec\fontspec
3046    \renewcommand\fontspec[1][]{%
3047      \bbl@ori@fontspec[\bbl@langfeatures##1]}
```

```
3048    \let\babelFSfeatures\bbl@FSfeatures
3049    \babelFSfeatures}
3050 \def\bbl@FSfeatures#1#2{%
3051    \expandafter\addto\csname extras#1\endcsname{%
3052      \babel@save\bbl@langfeatures
3053      \edef\bbl@langfeatures{#2,}}}
3054 ⟨⟨/Font selection⟩⟩
```

14   Hooks for XeTeX and LuaTeX

14.1   XeTeX

Unfortunately, the current encoding cannot be retrieved and therefore it is reset always to
utf8, which seems a sensible default.

LaTeX sets many "codes" just before loading hyphen.cfg. That is not a problem in luatex,
but in xetex they must be reset to the proper value. Most of the work is done in
xe(la)tex.ini, so here we just "undo" some of the changes done by LaTeX. Anyway, for
consistency LuaTeX also resets the catcodes.

```
3055 ⟨⟨∗Restore Unicode catcodes before loading patterns⟩⟩ ≡
3056   \begingroup
3057       % Reset chars "80-"C0 to category "other", no case mapping:
3058     \catcode`\@=11 \count@=128
3059     \loop\ifnum\count@<192
3060       \global\uccode\count@=0 \global\lccode\count@=0
3061       \global\catcode\count@=12 \global\sfcode\count@=1000
3062       \advance\count@ by 1 \repeat
3063       % Other:
3064     \def\O ##1 {%
3065       \global\uccode"##1=0 \global\lccode"##1=0
3066       \global\catcode"##1=12 \global\sfcode"##1=1000 }%
3067       % Letter:
3068     \def\L ##1 ##2 ##3 {\global\catcode"##1=11
3069       \global\uccode"##1="##2
3070       \global\lccode"##1="##3
3071       % Uppercase letters have sfcode=999:
3072       \ifnum"##1="##3 \else \global\sfcode"##1=999 \fi }%
3073       % Letter without case mappings:
3074     \def\l ##1 {\L ##1 ##1 ##1 }%
3075     \l 00AA
3076     \L 00B5 039C 00B5
3077     \l 00BA
3078     \O 00D7
3079     \l 00DF
3080     \O 00F7
3081     \L 00FF 0178 00FF
3082   \endgroup
3083   \input #1\relax
3084 ⟨⟨/Restore Unicode catcodes before loading patterns⟩⟩
```

Some more common code.

```
3085 ⟨⟨∗Footnote changes⟩⟩ ≡
3086 \bbl@trace{Bidi footnotes}
3087 \ifx\bbl@beforeforeign\leavevmode
3088   \def\bbl@footnote#1#2#3{%
3089     \@ifnextchar[%
3090       {\bbl@footnote@o{#1}{#2}{#3}}%
3091       {\bbl@footnote@x{#1}{#2}{#3}}}
```

```
3092    \def\bbl@footnote@x#1#2#3#4{%
3093      \bgroup
3094        \select@language@x{\bbl@main@language}%
3095        \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
3096      \egroup}
3097    \def\bbl@footnote@o#1#2#3[#4]#5{%
3098      \bgroup
3099        \select@language@x{\bbl@main@language}%
3100        \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
3101      \egroup}
3102    \def\bbl@footnotetext#1#2#3{%
3103      \@ifnextchar[%
3104        {\bbl@footnotetext@o{#1}{#2}{#3}}%
3105        {\bbl@footnotetext@x{#1}{#2}{#3}}}
3106    \def\bbl@footnotetext@x#1#2#3#4{%
3107      \bgroup
3108        \select@language@x{\bbl@main@language}%
3109        \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
3110      \egroup}
3111    \def\bbl@footnotetext@o#1#2#3[#4]#5{%
3112      \bgroup
3113        \select@language@x{\bbl@main@language}%
3114        \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
3115      \egroup}
3116    \def\BabelFootnote#1#2#3#4{%
3117      \ifx\bbl@fn@footnote\@undefined
3118        \let\bbl@fn@footnote\footnote
3119      \fi
3120      \ifx\bbl@fn@footnotetext\@undefined
3121        \let\bbl@fn@footnotetext\footnotetext
3122      \fi
3123      \bbl@ifblank{#2}%
3124        {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
3125         \@namedef{\bbl@stripslash#1text}%
3126           {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
3127        {\def#1{\bbl@exp{\\\bbl@footnote{\\\foreignlanguage{#2}}}{#3}{#4}}%
3128         \@namedef{\bbl@stripslash#1text}%
3129           {\bbl@exp{\\\bbl@footnotetext{\\\foreignlanguage{#2}}}{#3}{#4}}}}
3130 \fi
3131 ⟨⟨/Footnote changes⟩⟩
```

Now, the code.

```
3132 ⟨∗xetex⟩
3133 \def\BabelStringsDefault{unicode}
3134 \let\xebbl@stop\relax
3135 \AddBabelHook{xetex}{encodedcommands}{%
3136    \def\bbl@tempa{#1}%
3137    \ifx\bbl@tempa\@empty
3138      \XeTeXinputencoding"bytes"%
3139    \else
3140      \XeTeXinputencoding"#1"%
3141    \fi
3142    \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
3143 \AddBabelHook{xetex}{stopcommands}{%
3144    \xebbl@stop
3145    \let\xebbl@stop\relax}
3146 \AddBabelHook{xetex}{loadkernel}{%
3147 ⟨⟨Restore Unicode catcodes before loading patterns⟩⟩}
3148 \ifx\DisableBabelHook\@undefined\endinput\fi
```

```
3149 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
3150 \DisableBabelHook{babel-fontspec}
3151 ⟨⟨Font selection⟩⟩
3152 \input txtbabel.def
3153 ⟨/xetex⟩
```

14.2 Layout

In progress.

Unfortunately, proper support for xetex requires patching somehow lots of macros and packages (and some issues related to \specials remain, like color and hyperlinks). At least at this stage, babel will not do it and therefore a package like bidi (by Vafa Khalighi) would be necessary to overcome the limitations of xetex. Any help in making babel and bidi collaborate will be welcome, although the underlying concepts in both packages seem very different. Note also elements like headlines and margins can be modified easily with packages like fancyhdr, typearea or titleps, and geometry.

\bbl@startskip and \bbl@endskip are available to package authors. Thanks to the TeX 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.

```
3154 ⟨*texxet⟩
3155 \bbl@trace{Redefinitions for bidi layout}
3156 \def\bbl@sspre@caption{%
3157   \bbl@exp{\everyhbox{\\\bbl@textdir\bbl@cs{wdir@\bbl@main@language}}}}}
3158 \ifx\bbl@opt@layout\@nnil\endinput\fi  % No layout
3159 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
3160 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}
3161 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
3162   \def\@hangfrom#1{%
3163     \setbox\@tempboxa\hbox{{#1}}%
3164     \hangindent\ifcase\bbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
3165     \noindent\box\@tempboxa}
3166   \def\raggedright{%
3167     \let\\\@centercr
3168     \bbl@startskip\z@skip
3169     \@rightskip\@flushglue
3170     \bbl@endskip\@rightskip
3171     \parindent\z@
3172     \parfillskip\bbl@startskip}
3173   \def\raggedleft{%
3174     \let\\\@centercr
3175     \bbl@startskip\@flushglue
3176     \bbl@endskip\z@skip
3177     \parindent\z@
3178     \parfillskip\bbl@endskip}
3179 \fi
3180 \IfBabelLayout{lists}
3181   {\def\list#1#2{%
3182     \ifnum \@listdepth >5\relax
3183       \@toodeep
3184     \else
3185       \global\advance\@listdepth\@ne
3186     \fi
3187     \rightmargin\z@
3188     \listparindent\z@
3189     \itemindent\z@
```

```
3190        \csname @list\romannumeral\the\@listdepth\endcsname
3191        \def\@itemlabel{#1}%
3192        \let\makelabel\@mklab
3193        \@nmbrlistfalse
3194        #2\relax
3195        \@trivlist
3196        \parskip\parsep
3197        \parindent\listparindent
3198        \advance\linewidth-\rightmargin
3199        \advance\linewidth-\leftmargin
3200        \advance\@totalleftmargin
3201          \ifcase\bbl@thepardir\leftmargin\else\rightmargin\fi
3202        \parshape\@ne\@totalleftmargin\linewidth
3203        \ignorespaces}%
3204    \ifcase\bbl@engine
3205        \def\labelenumii{)\theenumii(}%
3206        \def\p@enumiii{\p@enumii)\theenumii(}%
3207    \fi
3208    \def\@verbatim{%
3209        \trivlist \item\relax
3210        \if@minipage\else\vskip\parskip\fi
3211        \bbl@startskip\textwidth
3212        \advance\bbl@startskip-\linewidth
3213        \bbl@endskip\z@skip
3214        \parindent\z@
3215        \parfillskip\@flushglue
3216        \parskip\z@skip
3217        \@@par
3218        \language\l@nohyphenation
3219        \@tempswafalse
3220        \def\par{%
3221          \if@tempswa
3222            \leavevmode\null
3223            \@@par\penalty\interlinepenalty
3224          \else
3225            \@tempswatrue
3226            \ifhmode\@@par\penalty\interlinepenalty\fi
3227          \fi}%
3228        \let\do\@makeother \dospecials
3229        \obeylines \verbatim@font \@noligs
3230        \everypar\expandafter{\the\everypar\unpenalty}}}
3231    {}
3232 \IfBabelLayout{contents}
3233    {\def\@dottedtocline#1#2#3#4#5{%
3234      \ifnum#1>\c@tocdepth\else
3235        \vskip \z@ \@plus.2\p@
3236        {\bbl@startskip#2\relax
3237         \bbl@endskip\@tocrmarg
3238         \parfillskip-\bbl@endskip
3239         \parindent#2\relax
3240         \@afterindenttrue
3241         \interlinepenalty\@M
3242         \leavevmode
3243         \@tempdima#3\relax
3244         \advance\bbl@startskip\@tempdima
3245         \null\nobreak\hskip-\bbl@startskip
3246         {#4}\nobreak
3247         \leaders\hbox{%
3248           $\m@th\mkern\@dotsep mu\hbox{.}\mkern\@dotsep mu$}%
```

```
3249            \hfill\nobreak
3250            \hb@xt@\@pnumwidth{\hfil\normalfont\normalcolor#5}%
3251            \par}%
3252       \fi}}
3253    {}
3254 \IfBabelLayout{columns}
3255    {\def\@outputdblcol{%
3256       \if@firstcolumn
3257         \global\@firstcolumnfalse
3258         \global\setbox\@leftcolumn\copy\@outputbox
3259         \splitmaxdepth\maxdimen
3260         \vbadness\maxdimen
3261         \setbox\@outputbox\vbox{\unvbox\@outputbox\unskip}%
3262         \setbox\@outputbox\vsplit\@outputbox to\maxdimen
3263         \toks@\expandafter{\topmark}%
3264         \xdef\@firstcoltopmark{\the\toks@}%
3265         \toks@\expandafter{\splitfirstmark}%
3266         \xdef\@firstcolfirstmark{\the\toks@}%
3267         \ifx\@firstcolfirstmark\@empty
3268           \global\let\@setmarks\relax
3269         \else
3270           \gdef\@setmarks{%
3271             \let\firstmark\@firstcolfirstmark
3272             \let\topmark\@firstcoltopmark}%
3273         \fi
3274       \else
3275         \global\@firstcolumntrue
3276         \setbox\@outputbox\vbox{%
3277           \hb@xt@\textwidth{%
3278             \hskip\columnwidth
3279             \hfil
3280             {\normalcolor\vrule \@width\columnseprule}%
3281             \hfil
3282             \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
3283             \hskip-\textwidth
3284             \hb@xt@\columnwidth{\box\@outputbox \hss}%
3285             \hskip\columnsep
3286             \hskip\columnwidth}}%
3287         \@combinedblfloats
3288         \@setmarks
3289         \@outputpage
3290         \begingroup
3291           \@dblfloatplacement
3292           \@startdblcolumn
3293           \@whilesw\if@fcolmade \fi{\@outputpage
3294           \@startdblcolumn}%
3295         \endgroup
3296       \fi}}%
3297    {}
3298 ⟨⟨Footnote changes⟩⟩
3299 \IfBabelLayout{footnotes}%
3300    {\BabelFootnote\footnote\languagename{}{}%
3301     \BabelFootnote\localfootnote\languagename{}{}%
3302     \BabelFootnote\mainfootnote{}{}{}}
3303    {}
```

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.

```
3304 \IfBabelLayout{counters}%
```

```
3305   {\let\bbl@latinarabic=\@arabic
3306    \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
3307    \let\bbl@asciiroman=\@roman
3308    \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciiroman#1}}}%
3309    \let\bbl@asciiRoman=\@Roman
3310    \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}}{}
3311 ⟨/texxet⟩
```

14.3   LuaTeX

The new 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, the 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 has 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). 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.

```
3312 ⟨*luatex⟩
3313 \ifx\AddBabelHook\@undefined
3314 \bbl@trace{Read language.dat}
3315 \begingroup
3316   \toks@{}
3317   \count@\z@ % 0=start, 1=0th, 2=normal
3318   \def\bbl@process@line#1#2 #3 #4 {%
3319     \ifx=#1%
3320       \bbl@process@synonym{#2}%
3321     \else
3322       \bbl@process@language{#1#2}{#3}{#4}%
3323     \fi
3324     \ignorespaces}
3325 \def\bbl@manylang{%
3326   \ifnum\bbl@last>\@ne
```

```
3327        \bbl@info{Non-standard hyphenation setup}%
3328      \fi
3329      \let\bbl@manylang\relax}
3330    \def\bbl@process@language#1#2#3{%
3331      \ifcase\count@
3332        \@ifundefined{zth@#1}{\count@\tw@}{\count@\@ne}%
3333      \or
3334        \count@\tw@
3335      \fi
3336      \ifnum\count@=\tw@
3337        \expandafter\addlanguage\csname l@#1\endcsname
3338        \language\allocationnumber
3339        \chardef\bbl@last\allocationnumber
3340        \bbl@manylang
3341        \let\bbl@elt\relax
3342        \xdef\bbl@languages{%
3343          \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
3344      \fi
3345      \the\toks@
3346      \toks@{}}
3347    \def\bbl@process@synonym@aux#1#2{%
3348      \global\expandafter\chardef\csname l@#1\endcsname#2\relax
3349      \let\bbl@elt\relax
3350      \xdef\bbl@languages{%
3351        \bbl@languages\bbl@elt{#1}{#2}{}{}}}%
3352    \def\bbl@process@synonym#1{%
3353      \ifcase\count@
3354        \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
3355      \or
3356        \@ifundefined{zth@#1}{\bbl@process@synonym@aux{#1}{0}}{}%
3357      \else
3358        \bbl@process@synonym@aux{#1}{\the\bbl@last}%
3359      \fi}
3360    \ifx\bbl@languages\@undefined % Just a (sensible?) guess
3361      \chardef\l@english\z@
3362      \chardef\l@USenglish\z@
3363      \chardef\bbl@last\z@
3364      \global\@namedef{bbl@hyphendata@0}{{hyphen.tex}{}}
3365      \gdef\bbl@languages{%
3366        \bbl@elt{english}{0}{hyphen.tex}{}%
3367        \bbl@elt{USenglish}{0}{}{}}
3368    \else
3369      \global\let\bbl@languages@format\bbl@languages
3370      \def\bbl@elt#1#2#3#4{% Remove all except language 0
3371        \ifnum#2>\z@\else
3372          \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
3373        \fi}%
3374      \xdef\bbl@languages{\bbl@languages}%
3375    \fi
3376    \def\bbl@elt#1#2#3#4{\@namedef{zth@#1}{}} % Define flags
3377    \bbl@languages
3378    \openin1=language.dat
3379    \ifeof1
3380      \bbl@warning{I couldn't find language.dat. No additional\\%
3381                   patterns loaded. Reported}%
3382    \else
3383      \loop
3384        \endlinechar\m@ne
3385        \read1 to \bbl@line
```

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```
3386        \endlinechar`\^^M
3387        \if T\ifeof1F\fi T\relax
3388          \ifx\bbl@line\@empty\else
3389            \edef\bbl@line{\bbl@line\space\space\space}%
3390            \expandafter\bbl@process@line\bbl@line\relax
3391          \fi
3392      \repeat
3393    \fi
3394  \endgroup
3395  \bbl@trace{Macros for reading patterns files}
3396  \def\bbl@get@enc#1:#2:#3\@@@{\def\bbl@hyph@enc{#2}}
3397  \ifx\babelcatcodetablenum\@undefined
3398    \def\babelcatcodetablenum{5211}
3399  \fi
3400  \def\bbl@luapatterns#1#2{%
3401    \bbl@get@enc#1::\@@@
3402    \setbox\z@\hbox\bgroup
3403      \begingroup
3404        \ifx\catcodetable\@undefined
3405          \let\savecatcodetable\luatexsavecatcodetable
3406          \let\initcatcodetable\luatexinitcatcodetable
3407          \let\catcodetable\luatexcatcodetable
3408        \fi
3409        \savecatcodetable\babelcatcodetablenum\relax
3410        \initcatcodetable\numexpr\babelcatcodetablenum+1\relax
3411        \catcodetable\numexpr\babelcatcodetablenum+1\relax
3412        \catcode`\#=6  \catcode`\$=3 \catcode`\&=4 \catcode`\^=7
3413        \catcode`\_=8  \catcode`\{=1 \catcode`\}=2 \catcode`\~=13
3414        \catcode`\@=11 \catcode`\^^I=10 \catcode`\^^J=12
3415        \catcode`\<=12 \catcode`\>=12 \catcode`\*=12 \catcode`\.=12
3416        \catcode`\-=12 \catcode`\/=12 \catcode`\[=12 \catcode`\]=12
3417        \catcode`\`=12 \catcode`\'=12 \catcode`\"=12
3418        \input #1\relax
3419        \catcodetable\babelcatcodetablenum\relax
3420      \endgroup
3421      \def\bbl@tempa{#2}%
3422      \ifx\bbl@tempa\@empty\else
3423        \input #2\relax
3424      \fi
3425    \egroup}%
3426  \def\bbl@patterns@lua#1{%
3427    \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
3428      \csname l@#1\endcsname
3429      \edef\bbl@tempa{#1}%
3430    \else
3431      \csname l@#1:\f@encoding\endcsname
3432      \edef\bbl@tempa{#1:\f@encoding}%
3433    \fi\relax
3434    \@namedef{lu@texhyphen@loaded@\the\language}{}% Temp
3435    \@ifundefined{bbl@hyphendata@\the\language}%
3436      {\def\bbl@elt##1##2##3##4{%
3437         \ifnum##2=\csname l@\bbl@tempa\endcsname % #2=spanish, dutch:OT1...
3438           \def\bbl@tempb{##3}%
3439           \ifx\bbl@tempb\@empty\else % if not a synonymous
3440             \def\bbl@tempc{{##3}{##4}}%
3441           \fi
3442           \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
3443         \fi}%
3444      \bbl@languages
```

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```
3445       \@ifundefined{bbl@hyphendata@\the\language}%
3446         {\bbl@info{No hyphenation patterns were set for\\%
3447                    language '\bbl@tempa'. Reported}}%
3448         {\expandafter\expandafter\expandafter\bbl@luapatterns
3449            \csname bbl@hyphendata@\the\language\endcsname}}{}}
3450 \endinput\fi
3451 \begingroup
3452 \catcode`\%=12
3453 \catcode`\'=12
3454 \catcode`\"=12
3455 \catcode`\:=12
3456 \directlua{
3457   Babel = Babel or {}
3458   function Babel.bytes(line)
3459     return line:gsub("(.)",
3460       function (chr) return unicode.utf8.char(string.byte(chr)) end)
3461   end
3462   function Babel.begin_process_input()
3463     if luatexbase and luatexbase.add_to_callback then
3464       luatexbase.add_to_callback('process_input_buffer',
3465                                   Babel.bytes,'Babel.bytes')
3466     else
3467       Babel.callback = callback.find('process_input_buffer')
3468       callback.register('process_input_buffer',Babel.bytes)
3469     end
3470   end
3471   function Babel.end_process_input ()
3472     if luatexbase and luatexbase.remove_from_callback then
3473       luatexbase.remove_from_callback('process_input_buffer','Babel.bytes')
3474     else
3475       callback.register('process_input_buffer',Babel.callback)
3476     end
3477   end
3478   function Babel.addpatterns(pp, lg)
3479     local lg = lang.new(lg)
3480     local pats = lang.patterns(lg) or ''
3481     lang.clear_patterns(lg)
3482     for p in pp:gmatch('[^%s]+') do
3483       ss = ''
3484       for i in string.utfcharacters(p:gsub('%d', '')) do
3485         ss = ss .. '%d?' .. i
3486       end
3487       ss = ss:gsub('^%%d%?%.', '%%.') .. '%d?'
3488       ss = ss:gsub('%.%%d%?$', '%%.')
3489       pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
3490       if n == 0 then
3491         tex.sprint(
3492           [[\string\csname\space bbl@info\endcsname{New pattern: ]]
3493           .. p .. [[}]])
3494         pats = pats .. ' ' .. p
3495       else
3496         tex.sprint(
3497           [[\string\csname\space bbl@info\endcsname{Renew pattern: ]]
3498           .. p .. [[}]])
3499       end
3500     end
3501     lang.patterns(lg, pats)
3502   end
3503 }
```

```
3504 \endgroup
3505 \def\BabelStringsDefault{unicode}
3506 \let\luabbl@stop\relax
3507 \AddBabelHook{luatex}{encodedcommands}{%
3508   \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
3509   \ifx\bbl@tempa\bbl@tempb\else
3510     \directlua{Babel.begin_process_input()}%
3511     \def\luabbl@stop{%
3512       \directlua{Babel.end_process_input()}}%
3513   \fi}%
3514 \AddBabelHook{luatex}{stopcommands}{%
3515   \luabbl@stop
3516   \let\luabbl@stop\relax}
3517 \AddBabelHook{luatex}{patterns}{%
3518   \@ifundefined{bbl@hyphendata@\the\language}%
3519     {\def\bbl@elt##1##2##3##4{%
3520       \ifnum##2=\csname l@##2\endcsname % #2=spanish, dutch:OT1...
3521         \def\bbl@tempb{##3}%
3522         \ifx\bbl@tempb\@empty\else % if not a synonymous
3523           \def\bbl@tempc{{##3}{##4}}%
3524         \fi
3525         \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
3526       \fi}%
3527     \bbl@languages
3528     \@ifundefined{bbl@hyphendata@\the\language}%
3529       {\bbl@info{No hyphenation patterns were set for\\%
3530                  language '#2'. Reported}}%
3531       {\expandafter\expandafter\expandafter\bbl@luapatterns
3532         \csname bbl@hyphendata@\the\language\endcsname}}{}%
3533   \@ifundefined{bbl@patterns@}{}{%
3534     \begingroup
3535       \bbl@xin@{,\number\language,}{,\bbl@pttnlist}%
3536       \ifin@\else
3537         \ifx\bbl@patterns@\@empty\else
3538           \directlua{ Babel.addpatterns(
3539             [[\bbl@patterns@]], \number\language) }%
3540         \fi
3541         \@ifundefined{bbl@patterns@#1}%
3542           \@empty
3543           {\directlua{ Babel.addpatterns(
3544                 [[\space\csname bbl@patterns@#1\endcsname]],
3545                 \number\language) }}%
3546         \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
3547       \fi
3548     \endgroup}}
3549 \AddBabelHook{luatex}{everylanguage}{%
3550   \def\process@language##1##2##3{%
3551     \def\process@line####1####2 ####3 ####4 {}}}
3552 \AddBabelHook{luatex}{loadpatterns}{%
3553   \input #1\relax
3554   \expandafter\gdef\csname bbl@hyphendata@\the\language\endcsname
3555     {{#1}{}}}
3556 \AddBabelHook{luatex}{loadexceptions}{%
3557   \input #1\relax
3558   \def\bbl@tempb##1##2{{##1}{#1}}%
3559   \expandafter\xdef\csname bbl@hyphendata@\the\language\endcsname
3560     {\expandafter\expandafter\expandafter\bbl@tempb
3561       \csname bbl@hyphendata@\the\language\endcsname}}
```

\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.

```
3562 \@onlypreamble\babelpatterns
3563 \AtEndOfPackage{%
3564   \newcommand\babelpatterns[2][\@empty]{%
3565     \ifx\bbl@patterns@\relax
3566       \let\bbl@patterns@\@empty
3567     \fi
3568     \ifx\bbl@pttnlist\@empty\else
3569       \bbl@warning{%
3570         You must not intermingle \string\selectlanguage\space and\\%
3571         \string\babelpatterns\space or some patterns will not\\%
3572         be taken into account. Reported}%
3573     \fi
3574     \ifx\@empty#1%
3575       \protected@edef\bbl@patterns@{\bbl@patterns@\space#2}%
3576     \else
3577       \edef\bbl@tempb{\zap@space#1 \@empty}%
3578       \bbl@for\bbl@tempa\bbl@tempb{%
3579         \bbl@fixname\bbl@tempa
3580         \bbl@iflanguage\bbl@tempa{%
3581           \bbl@csarg\protected@edef{patterns@\bbl@tempa}{%
3582             \@ifundefined{bbl@patterns@\bbl@tempa}%
3583               \@empty
3584               {\csname bbl@patterns@\bbl@tempa\endcsname\space}%
3585             #2}}}%
3586     \fi}}
```

Common stuff.

```
3587 \AddBabelHook{luatex}{loadkernel}{%
3588 ⟨⟨Restore Unicode catcodes before loading patterns⟩⟩}
3589 \ifx\DisableBabelHook\@undefined\endinput\fi
3590 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
3591 \DisableBabelHook{babel-fontspec}
3592 ⟨⟨Font selection⟩⟩
```

14.4   Layout

Work in progress.
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.) and with bidi=basic-r, 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.

```
3593 \bbl@trace{Redefinitions for bidi layout}
3594 \ifx\@eqnnum\@undefined\else
3595   \ifx\bbl@attr@dir\@undefined\else
3596     \edef\@eqnnum{{%
3597       \unexpanded{\ifcase\bbl@attr@dir\else\bbl@textdir\@ne\fi}%
3598       \unexpanded\expandafter{\@eqnnum}}}
3599   \fi
3600 \fi
```

```
3601 \ifx\bbl@opt@layout\@nnil\endinput\fi  % if no layout
3602 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
3603   \def\bbl@nextfake#1{%
3604     \mathdir\bodydir  % non-local, use always inside a group!
3605     \bbl@exp{%
3606       #1%                Once entered in math, set boxes to restore values
3607       \everyvbox{%
3608         \the\everyvbox
3609         \bodydir\the\bodydir
3610         \mathdir\the\mathdir
3611         \everyhbox{\the\everyhbox}%
3612         \everyvbox{\the\everyvbox}}%
3613       \everyhbox{%
3614         \the\everyhbox
3615         \bodydir\the\bodydir
3616         \mathdir\the\mathdir
3617         \everyhbox{\the\everyhbox}%
3618         \everyvbox{\the\everyvbox}}}}%
3619   \def\@hangfrom#1{%
3620     \setbox\@tempboxa\hbox{{#1}}%
3621     \hangindent\wd\@tempboxa
3622     \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
3623       \shapemode\@ne
3624     \fi
3625     \noindent\box\@tempboxa}
3626 \fi
3627 \IfBabelLayout{tabular}
3628   {\def\@tabular{%
3629     \leavevmode\hbox\bgroup\bbl@nextfake$%   %$
3630     \let\@acol\@tabacol      \let\@classz\@tabclassz
3631     \let\@classiv\@tabclassiv \let\\\@tabularcr\@tabarray}}
3632   {}
3633 \IfBabelLayout{lists}
3634   {\def\list#1#2{%
3635     \ifnum \@listdepth >5\relax
3636       \@toodeep
3637     \else
3638       \global\advance\@listdepth\@ne
3639     \fi
3640     \rightmargin\z@
3641     \listparindent\z@
3642     \itemindent\z@
3643     \csname @list\romannumeral\the\@listdepth\endcsname
3644     \def\@itemlabel{#1}%
3645     \let\makelabel\@mklab
3646     \@nmbrlistfalse
3647     #2\relax
3648     \@trivlist
3649     \parskip\parsep
3650     \parindent\listparindent
3651     \advance\linewidth -\rightmargin
3652     \advance\linewidth -\leftmargin
3653     \advance\@totalleftmargin \leftmargin
3654     \parshape \@ne
3655     \@totalleftmargin \linewidth
3656     \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
3657       \shapemode\tw@
3658     \fi
3659     \ignorespaces}}
```

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```
3660    {}
```

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-r`, but there are some additional readjustments for `bidi=default`.

```
3661 \IfBabelLayout{counters}%
3662   {\def\@textsuperscript#1{{% lua has separate settings for math
3663      \m@th
3664      \mathdir\pagedir % required with basic-r; ok with default, too
3665      \ensuremath{^{\mbox {\fontsize \sf@size \z@ #1}}}}}%
3666   \let\bbl@latinarabic=\@arabic
3667   \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
3668   \@ifpackagewith{babel}{bidi=default}%
3669     {\let\bbl@asciiroman=\@roman
3670      \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciiroman#1}}}%
3671      \let\bbl@asciiRoman=\@Roman
3672      \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}%
3673      \def\labelenumii{)\theenumii(}%
3674      \def\p@enumiii{\p@enumii)\theenumii(}}{}}{}
3675 ⟨⟨Footnote changes⟩⟩
3676 \IfBabelLayout{footnotes}%
3677   {\BabelFootnote\footnote\languagename{}{}%
3678    \BabelFootnote\localfootnote\languagename{}{}%
3679    \BabelFootnote\mainfootnote{}{}{}}
3680   {}
```

Some LaTeX macros use internally the math mode for text formatting. They have very little in common and are grouped here, as a single option.

```
3681 \IfBabelLayout{extras}%
3682   {\def\underline#1{%
3683      \relax
3684      \ifmmode\@@underline{#1}%
3685      \else\bbl@nextfake$\@@underline{\hbox{#1}}\m@th$\relax\fi}%
3686   \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
3687    \if b\expandafter\@car\f@series\@nil\boldmath\fi
3688    \babelsublr{%
3689      \LaTeX\kern.15em2\bbl@nextfake$_{\textstyle\varepsilon}$}}}}
3690   {}
3691 ⟨/luatex⟩
```

14.5 **Auto bidi with** `basic-r`

The file babel-bidi.lua currently only contains data. It is a large and boring file and it's not shown here. See the generated file.

Now the `basic-r` bidi mode. One of the aims is to implement a fast and simple bidi algorithm, with a single loop. I managed to do it for R texts, with a second smaller loop for a special case. The code is still somewhat chaotic, but its behavior is essentially correct. I cannot resist copying the following text from Emacs `bidi.c` (which also attempts to implement the bidi algorithm with a single loop):

> Arrrgh!! The UAX#9 algorithm is too deeply entrenched in the assumption of batch-style processing [...]. May the fleas of a thousand camels infest the armpits of those who design supposedly general-purpose algorithms by looking at their own implementations, and fail to consider other possible implementations!

Well, it took me some time to guess what the batch rules in UAX#9 actually mean (in other word, *what* they do and *why*, and not only *how*), but I think (or I hope) I've managed to understand them.

In some sense, there are two bidi modes, one for numbers, and the other for text. Furthermore, setting just the direction in R text is not enough, because there are actually *two* R modes (set explicitly in Unicode with RLM and ALM). In babel the dir is set by a higher protocol based on the language/script, which in turn sets the correct dir (<l>, <r> or <al>).

From UAX#9: "Where available, markup should be used instead of the explicit formatting characters". So, this simple version just ignores formatting characters. Actually, most of that annex is devoted to how to handle them.

BD14-BD16 are not implemented. Unicode (and the W3C) are making a great effort to deal with some special problematic cases in "streamed" plain text. I don't think this is the way to go – particular issues should be fixed by a high level interface taking into account the needs of the document. And here is where luatex excels, because everything related to bidi writing is under our control.

TODO: math mode (as weak L?)

```
3692 ⟨∗basic-r⟩
3693 Babel = Babel or {}
3694
3695 require('babel-bidi.lua')
3696
3697 local characters = Babel.characters
3698 local ranges = Babel.ranges
3699
3700 local DIR = node.id("dir")
3701
3702 local function dir_mark(head, from, to, outer)
3703   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
3704   local d = node.new(DIR)
3705   d.dir = '+' .. dir
3706   node.insert_before(head, from, d)
3707   d = node.new(DIR)
3708   d.dir = '-' .. dir
3709   node.insert_after(head, to, d)
3710 end
3711
3712 function Babel.pre_otfload_v(head)
3713   -- head = Babel.numbers(head)
3714   head = Babel.bidi(head, true)
3715   return head
3716 end
3717
3718 function Babel.pre_otfload_h(head)
3719   -- head = Babel.numbers(head)
3720   head = Babel.bidi(head, false)
3721   return head
3722 end
3723
3724 function Babel.bidi(head, ispar)
3725   local first_n, last_n        -- first and last char with nums
3726   local last_es                -- an auxiliary 'last' used with nums
3727   local first_d, last_d        -- first and last char in L/R block
3728   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):

```
3729   local strong = ('TRT' == tex.pardir) and 'r' or 'l'
3730   local strong_lr = (strong == 'l') and 'l' or 'r'
```

```
3731    local outer = strong
3732
3733    local new_dir = false
3734    local first_dir = false
3735
3736    local last_lr
3737
3738    local type_n = ''
3739
3740    for item in node.traverse(head) do
3741
3742      -- three cases: glyph, dir, otherwise
3743      if item.id == node.id'glyph'
3744        or (item.id == 7 and item.subtype == 2) then
3745
3746        local itemchar
3747        if item.id == 7 and item.subtype == 2 then
3748          itemchar = item.replace.char
3749        else
3750          itemchar = item.char
3751        end
3752        local chardata = characters[itemchar]
3753        dir = chardata and chardata.d or nil
3754        if not dir then
3755          for nn, et in ipairs(ranges) do
3756            if itemchar < et[1] then
3757              break
3758            elseif itemchar <= et[2] then
3759              dir = et[3]
3760              break
3761            end
3762          end
3763        end
3764        dir = dir or 'l'
```

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.

```
3765        if new_dir then
3766          attr_dir = 0
3767          for at in node.traverse(item.attr) do
3768            if at.number == luatexbase.registernumber'bbl@attr@dir' then
3769              attr_dir = at.value % 3
3770            end
3771          end
3772          if attr_dir == 1 then
3773            strong = 'r'
3774          elseif attr_dir == 2 then
3775            strong = 'al'
3776          else
3777            strong = 'l'
3778          end
3779          strong_lr = (strong == 'l') and 'l' or 'r'
3780          outer = strong_lr
3781          new_dir = false
3782        end
3783
3784        if dir == 'nsm' then dir = strong end            -- W1
```

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

```
3785        dir_real = dir                -- We need dir_real to set strong below
3786        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:

```
3787        if strong == 'al' then
3788          if dir == 'en' then dir = 'an' end                  -- W2
3789          if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
3790          strong_lr = 'r'                                     -- W3
3791        end
```

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

```
3792        elseif item.id == node.id'dir' then
3793          new_dir = true
3794          dir = nil
3795        else
3796          dir = nil          -- Not a char
3797        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>.

```
3798        if dir == 'en' or dir == 'an' or dir == 'et' then
3799          if dir ~= 'et' then
3800            type_n = dir
3801          end
3802          first_n = first_n or item
3803          last_n = last_es or item
3804          last_es = nil
3805        elseif dir == 'es' and last_n then -- W3+W6
3806          last_es = item
3807        elseif dir == 'cs' then            -- it's right - do nothing
3808        elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
3809          if strong_lr == 'r' and type_n ~= '' then
3810            dir_mark(head, first_n, last_n, 'r')
3811          elseif strong_lr == 'l' and first_d and type_n == 'an' then
3812            dir_mark(head, first_n, last_n, 'r')
3813            dir_mark(head, first_d, last_d, outer)
3814            first_d, last_d = nil, nil
3815          elseif strong_lr == 'l' and type_n ~= '' then
3816            last_d = last_n
3817          end
3818          type_n = ''
3819          first_n, last_n = nil, nil
3820        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:

```
3821        if dir == 'l' or dir == 'r' then
3822          if dir ~= outer then
3823            first_d = first_d or item
```

```
3824        last_d = item
3825      elseif first_d and dir ~= strong_lr then
3826        dir_mark(head, first_d, last_d, outer)
3827        first_d, last_d = nil, nil
3828    end
3829  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.

```
3830    if dir and not last_lr and dir ~= 'l' and outer == 'r' then
3831      item.char = characters[item.char] and
3832                  characters[item.char].m or item.char
3833    elseif (dir or new_dir) and last_lr ~= item then
3834      local mir = outer .. strong_lr .. (dir or outer)
3835      if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
3836        for ch in node.traverse(node.next(last_lr)) do
3837          if ch == item then break end
3838          if ch.id == node.id'glyph' then
3839            ch.char = characters[ch.char].m or ch.char
3840          end
3841        end
3842      end
3843    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`).

```
3844    if dir == 'l' or dir == 'r' then
3845      last_lr = item
3846      strong = dir_real          -- Don't search back - best save now
3847      strong_lr = (strong == 'l') and 'l' or 'r'
3848    elseif new_dir then
3849      last_lr = nil
3850    end
3851  end
```

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

```
3852  if last_lr and outer == 'r' then
3853    for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
3854      ch.char = characters[ch.char].m or ch.char
3855    end
3856  end
3857  if first_n then
3858    dir_mark(head, first_n, last_n, outer)
3859  end
3860  if first_d then
3861    dir_mark(head, first_d, last_d, outer)
3862  end
```

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

```
3863  return node.prev(head) or head
3864 end
3865 ⟨/basic-r⟩
```

And here the Lua code for `bidi=basic`:

```
3866 ⟨*basic⟩
```

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```
3867 Babel = Babel or {}
3868
3869 Babel.fontmap = Babel.fontmap or {}
3870 Babel.fontmap[0] = {}        -- l
3871 Babel.fontmap[1] = {}        -- r
3872 Babel.fontmap[2] = {}        -- al/an
3873
3874 function Babel.pre_otfload_v(head)
3875   -- head = Babel.numbers(head)
3876   head = Babel.bidi(head, true)
3877   return head
3878 end
3879
3880 function Babel.pre_otfload_h(head, gc, sz, pt, dir)
3881   -- head = Babel.numbers(head)
3882   head = Babel.bidi(head, false, dir)
3883   return head
3884 end
3885
3886 require('babel-bidi.lua')
3887
3888 local characters = Babel.characters
3889 local ranges = Babel.ranges
3890
3891 local DIR = node.id('dir')
3892 local GLYPH = node.id('glyph')
3893
3894 local function insert_implicit(head, state, outer)
3895   local new_state = state
3896   if state.sim and state.eim and state.sim ~= state.eim then
3897     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
3898     local d = node.new(DIR)
3899     d.dir = '+' .. dir
3900     node.insert_before(head, state.sim, d)
3901     local d = node.new(DIR)
3902     d.dir = '-' .. dir
3903     node.insert_after(head, state.eim, d)
3904   end
3905   new_state.sim, new_state.eim = nil, nil
3906   return head, new_state
3907 end
3908
3909 local function insert_numeric(head, state)
3910   local new
3911   local new_state = state
3912   if state.san and state.ean and state.san ~= state.ean then
3913     local d = node.new(DIR)
3914     d.dir = '+TLT'
3915     _, new = node.insert_before(head, state.san, d)
3916     if state.san == state.sim then state.sim = new end
3917     local d = node.new(DIR)
3918     d.dir = '-TLT'
3919     _, new = node.insert_after(head, state.ean, d)
3920     if state.ean == state.eim then state.eim = new end
3921   end
3922   new_state.san, new_state.ean = nil, nil
3923   return head, new_state
3924 end
3925
```

```
3926 -- \hbox with an explicit dir can lead to wrong results
3927 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>
3928
3929 function Babel.bidi(head, ispar, hdir)
3930   local d    -- d is used mainly for computations in a loop
3931   local prev_d = ''
3932   local new_d = false
3933
3934   local nodes = {}
3935   local outer_first = nil
3936
3937   local glue_d = nil
3938   local glue_i = nil
3939
3940   local has_en = false
3941   local first_et = nil
3942
3943   local ATDIR = luatexbase.registernumber'bbl@attr@dir'
3944
3945   local save_outer
3946   local temp = node.get_attribute(head, ATDIR)
3947   if temp then
3948     temp = temp % 3
3949     save_outer = (temp == 0 and 'l') or
3950                  (temp == 1 and 'r') or
3951                  (temp == 2 and 'al')
3952   elseif ispar then              -- Or error? Shouldn't happen
3953     save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
3954   else
3955     save_outer = ('TRT' == hdir) and 'r' or 'l'
3956   end
3957   local outer = save_outer
3958   local last = outer
3959   -- 'al' is only taken into account in the first, current loop
3960   if save_outer == 'al' then save_outer = 'r' end
3961
3962   local fontmap = Babel.fontmap
3963
3964   for item in node.traverse(head) do
3965
3966     -- In what follows, #node is the last (previous) node, because the
3967     -- current one is not added until we start processing the neutrals.
3968
3969     -- three cases: glyph, dir, otherwise
3970     if item.id == GLYPH
3971        or (item.id == 7 and item.subtype == 2) then
3972
3973       local d_font = nil
3974       local item_r
3975       if item.id == 7 and item.subtype == 2 then
3976         item_r = item.replace    -- automatic discs have just 1 glyph
3977       else
3978         item_r = item
3979       end
3980       local chardata = characters[item_r.char]
3981       d = chardata and chardata.d or nil
3982       if not d or d == 'nsm' then
3983         for nn, et in ipairs(ranges) do
3984           if item_r.char < et[1] then
```

```
3985            break
3986          elseif item_r.char <= et[2] then
3987            if not d then d = et[3]
3988            elseif d == 'nsm' then d_font = et[3]
3989            end
3990            break
3991          end
3992        end
3993      end
3994      d = d or 'l'
3995      d_font = d_font or d
3996
3997      d_font = (d_font == 'l' and 0) or
3998               (d_font == 'nsm' and 0) or
3999               (d_font == 'r' and 1) or
4000               (d_font == 'al' and 2) or
4001               (d_font == 'an' and 2) or nil
4002      if d_font and fontmap and fontmap[d_font][item_r.font] then
4003        item_r.font = fontmap[d_font][item_r.font]
4004      end
4005
4006      if new_d then
4007        table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
4008        attr_d = node.get_attribute(item, ATDIR)
4009        attr_d = attr_d % 3
4010        if attr_d == 1 then
4011          outer_first = 'r'
4012          last = 'r'
4013        elseif attr_d == 2 then
4014          outer_first = 'r'
4015          last = 'al'
4016        else
4017          outer_first = 'l'
4018          last = 'l'
4019        end
4020        outer = last
4021        has_en = false
4022        first_et = nil
4023        new_d = false
4024      end
4025
4026      if glue_d then
4027        if (d == 'l' and 'l' or 'r') ~= glue_d then
4028          table.insert(nodes, {glue_i, 'on', nil})
4029        end
4030        glue_d = nil
4031        glue_i = nil
4032      end
4033
4034    elseif item.id == DIR then
4035      d = nil
4036      new_d = true
4037
4038    elseif item.id == node.id'glue' and item.subtype == 13 then
4039      glue_d = d
4040      glue_i = item
4041      d = nil
4042
4043    else
```

```
4044       d = nil
4045     end
4046
4047     -- AL <= EN/ET/ES     -- W2 + W3 + W6
4048     if last == 'al' and d == 'en' then
4049       d = 'an'           -- W3
4050     elseif last == 'al' and (d == 'et' or d == 'es') then
4051       d = 'on'           -- W6
4052     end
4053
4054     -- EN + CS/ES + EN       -- W4
4055     if d == 'en' and #nodes >= 2 then
4056       if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
4057           and nodes[#nodes-1][2] == 'en' then
4058         nodes[#nodes][2] = 'en'
4059       end
4060     end
4061
4062     -- AN + CS + AN          -- W4 too, because uax9 mixes both cases
4063     if d == 'an' and #nodes >= 2 then
4064       if (nodes[#nodes][2] == 'cs')
4065           and nodes[#nodes-1][2] == 'an' then
4066         nodes[#nodes][2] = 'an'
4067       end
4068     end
4069
4070     -- ET/EN                 -- W5 + W7->l / W6->on
4071     if d == 'et' then
4072       first_et = first_et or (#nodes + 1)
4073     elseif d == 'en' then
4074       has_en = true
4075       first_et = first_et or (#nodes + 1)
4076     elseif first_et then        -- d may be nil here !
4077       if has_en then
4078         if last == 'l' then
4079           temp = 'l'     -- W7
4080         else
4081           temp = 'en'    -- W5
4082         end
4083       else
4084         temp = 'on'      -- W6
4085       end
4086       for e = first_et, #nodes do
4087         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
4088       end
4089       first_et = nil
4090       has_en = false
4091     end
4092
4093     if d then
4094       if d == 'al' then
4095         d = 'r'
4096         last = 'al'
4097       elseif d == 'l' or d == 'r' then
4098         last = d
4099       end
4100       prev_d = d
4101       table.insert(nodes, {item, d, outer_first})
4102     end
```

```
4103
4104     outer_first = nil
4105
4106   end
4107
4108   -- TODO -- repeated here in case EN/ET is the last node. Find a
4109   -- better way of doing things:
4110   if first_et then        -- dir may be nil here !
4111     if has_en then
4112       if last == 'l' then
4113         temp = 'l'      -- W7
4114       else
4115         temp = 'en'     -- W5
4116       end
4117     else
4118       temp = 'on'       -- W6
4119     end
4120     for e = first_et, #nodes do
4121       if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
4122     end
4123   end
4124
4125   -- dummy node, to close things
4126   table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
4127
4128   --------------  NEUTRAL  -----------------
4129
4130   outer = save_outer
4131   last = outer
4132
4133   local first_on = nil
4134
4135   for q = 1, #nodes do
4136     local item
4137
4138     local outer_first = nodes[q][3]
4139     outer = outer_first or outer
4140     last = outer_first or last
4141
4142     local d = nodes[q][2]
4143     if d == 'an' or d == 'en' then d = 'r' end
4144     if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
4145
4146     if d == 'on' then
4147       first_on = first_on or q
4148     elseif first_on then
4149       if last == d then
4150         temp = d
4151       else
4152         temp = outer
4153       end
4154       for r = first_on, q - 1 do
4155         nodes[r][2] = temp
4156         item = nodes[r][1]    -- MIRRORING
4157         if item.id == GLYPH and temp == 'r' then
4158           item.char = characters[item.char].m or item.char
4159         end
4160       end
4161       first_on = nil
```

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```
4162      end
4163
4164      if d == 'r' or d == 'l' then last = d end
4165   end
4166
4167   -------------   IMPLICIT, REORDER ----------------
4168
4169   outer = save_outer
4170   last = outer
4171
4172   local state = {}
4173   state.has_r = false
4174
4175   for q = 1, #nodes do
4176
4177      local item = nodes[q][1]
4178
4179      outer = nodes[q][3] or outer
4180
4181      local d = nodes[q][2]
4182
4183      if d == 'nsm' then d = last end              -- W1
4184      if d == 'en' then d = 'an' end
4185      local isdir = (d == 'r' or d == 'l')
4186
4187      if outer == 'l' and d == 'an' then
4188        state.san = state.san or item
4189        state.ean = item
4190      elseif state.san then
4191        head, state = insert_numeric(head, state)
4192      end
4193
4194      if outer == 'l' then
4195        if d == 'an' or d == 'r' then     -- im -> implicit
4196          if d == 'r' then state.has_r = true end
4197          state.sim = state.sim or item
4198          state.eim = item
4199        elseif d == 'l' and state.sim and state.has_r then
4200          head, state = insert_implicit(head, state, outer)
4201        elseif d == 'l' then
4202          state.sim, state.eim, state.has_r = nil, nil, false
4203        end
4204      else
4205        if d == 'an' or d == 'l' then
4206          state.sim = state.sim or item
4207          state.eim = item
4208        elseif d == 'r' and state.sim then
4209          head, state = insert_implicit(head, state, outer)
4210        elseif d == 'r' then
4211          state.sim, state.eim = nil, nil
4212        end
4213      end
4214
4215      if isdir then
4216        last = d              -- Don't search back - best save now
4217      elseif d == 'on' and state.san  then
4218        state.san = state.san or item
4219        state.ean = item
4220      end
```

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```
4221
4222   end
4223
4224   return node.prev(head) or head
4225 end
```
4226 ⟨/basic⟩

15 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.

4227 ⟨*nil⟩
4228 \ProvidesLanguage{nil}[⟨⟨date⟩⟩ ⟨⟨version⟩⟩ Nil language]
4229 \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.

4230 \ifx\l@nohyphenation\@undefined
4231   \@nopatterns{nil}
4232   \adddialect\l@nil0
4233 \else
4234   \let\l@nil\l@nohyphenation
4235 \fi

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

4236 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}

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

\captionnil
  \datenil   4237 \let\captionsnil\@empty
             4238 \let\datenil\@empty

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.

4239 \ldf@finish{nil}
4240 ⟨/nil⟩

16 Support for Plain TeX (plain.def)

16.1 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
TeX-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 localhyphen.tex or whatever they like, but they mustn't diddle
> with hyphen.tex (or plain.tex except to preload additional fonts).

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The files `bplain.tex` and `blplain.tex` can be used as replacement wrappers around `plain.tex` and `lplain.tex` to acheive 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`

```
4241 ⟨∗bplain | blplain⟩
4242 \catcode`\{=1 % left brace is begin-group character
4243 \catcode`\}=2 % right brace is end-group character
4244 \catcode`\#=6 % hash mark is macro parameter character
```

Now let's see if a file called `hyphen.cfg` can be found somewhere on TeX's input path by trying to open it for reading...

```
4245 \openin 0 hyphen.cfg
```

If the file wasn't found the following test turns out true.

```
4246 \ifeof0
4247 \else
```

When `hyphen.cfg` could be opened we make sure that *it* will be read instead of the file `hyphen.tex` which should (according to Don Knuth's ruling) contain the american English hyphenation patterns and nothing else.
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).

```
4248   \let\a\input
```

Then `\input` is defined to forget about its argument and load `hyphen.cfg` instead.

```
4249   \def\input #1 {%
4250     \let\input\a
4251     \a hyphen.cfg
```

Once that's done the original meaning of `\input` can be restored and the definition of `\a` can be forgotten.

```
4252     \let\a\undefined
4253   }
4254 \fi
4255 ⟨/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`.

```
4256 ⟨bplain⟩\a plain.tex
4257 ⟨blplain⟩\a lplain.tex
```

Finally we change the contents of `\fmtname` to indicate that this is *not* the plain format, but a format based on plain with the babel package preloaded.

```
4258 ⟨bplain⟩\def\fmtname{babel-plain}
4259 ⟨blplain⟩\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.

16.2 Emulating some LaTeX features

The following code duplicates or emulates parts of LaTeX 2_ε that are needed for babel.

```
4260 ⟨∗plain⟩
4261 \def\@empty{}
4262 \def\loadlocalcfg#1{%
```

```
4263    \openin0#1.cfg
4264    \ifeof0
4265      \closein0
4266    \else
4267      \closein0
4268      {\immediate\write16{**********************************}%
4269       \immediate\write16{* Local config file #1.cfg used}%
4270       \immediate\write16{*}%
4271       }
4272      \input #1.cfg\relax
4273    \fi
4274    \@endofldf}
```

16.3   General tools

A number of LaTeX macro's that are needed later on.

```
4275 \long\def\@firstofone#1{#1}
4276 \long\def\@firstoftwo#1#2{#1}
4277 \long\def\@secondoftwo#1#2{#2}
4278 \def\@nnil{\@nil}
4279 \def\@gobbletwo#1#2{}
4280 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
4281 \def\@star@or@long#1{%
4282    \@ifstar
4283    {\let\l@ngrel@x\relax#1}%
4284    {\let\l@ngrel@x\long#1}}
4285 \let\l@ngrel@x\relax
4286 \def\@car#1#2\@nil{#1}
4287 \def\@cdr#1#2\@nil{#2}
4288 \let\@typeset@protect\relax
4289 \let\protected@edef\edef
4290 \long\def\@gobble#1{}
4291 \edef\@backslashchar{\expandafter\@gobble\string\\}
4292 \def\strip@prefix#1>{}
4293 \def\g@addto@macro#1#2{{%
4294    \toks@\expandafter{#1#2}%
4295    \xdef#1{\the\toks@}}}
4296 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
4297 \def\@nameuse#1{\csname #1\endcsname}
4298 \def\@ifundefined#1{%
4299    \expandafter\ifx\csname#1\endcsname\relax
4300      \expandafter\@firstoftwo
4301    \else
4302      \expandafter\@secondoftwo
4303    \fi}
4304 \def\@expandtwoargs#1#2#3{%
4305    \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a
4306 \def\zap@space#1 #2{%
4307    #1%
4308    \ifx#2\@empty\else\expandafter\zap@space\fi
4309    #2}
```

LaTeX2_ε has the command \@onlypreamble which adds commands to a list of commands that are no longer needed after \begin{document}.

```
4310 \ifx\@preamblecmds\@undefined
4311    \def\@preamblecmds{}
4312 \fi
4313 \def\@onlypreamble#1{%
```

```
4314    \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
4315      \@preamblecmds\do#1}}
4316 \@onlypreamble\@onlypreamble
```

Mimick LaTeX's \AtBeginDocument; for this to work the user needs to add \begindocument to his file.

```
4317 \def\begindocument{%
4318    \@begindocumenthook
4319    \global\let\@begindocumenthook\@undefined
4320    \def\do##1{\global\let##1\@undefined}%
4321    \@preamblecmds
4322    \global\let\do\noexpand}

4323 \ifx\@begindocumenthook\@undefined
4324    \def\@begindocumenthook{}
4325 \fi
4326 \@onlypreamble\@begindocumenthook
4327 \def\AtBeginDocument{\g@addto@macro\@begindocumenthook}
```

We also have to mimick LaTeX's \AtEndOfPackage. Our replacement macro is much simpler; it stores its argument in \@endofldf.

```
4328 \def\AtEndOfPackage#1{\g@addto@macro\@endofldf{#1}}
4329 \@onlypreamble\AtEndOfPackage
4330 \def\@endofldf{}
4331 \@onlypreamble\@endofldf
4332 \let\bbl@afterlang\@empty
4333 \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.

```
4334 \ifx\if@filesw\@undefined
4335    \expandafter\let\csname if@filesw\expandafter\endcsname
4336      \csname iffalse\endcsname
4337 \fi
```

Mimick LaTeX's commands to define control sequences.

```
4338 \def\newcommand{\@star@or@long\new@command}
4339 \def\new@command#1{%
4340    \@testopt{\@newcommand#1}0}
4341 \def\@newcommand#1[#2]{%
4342    \@ifnextchar [{\@xargdef#1[#2]}%
4343                  {\@argdef#1[#2]}}
4344 \long\def\@argdef#1[#2]#3{%
4345    \@yargdef#1\@ne{#2}{#3}}
4346 \long\def\@xargdef#1[#2][#3]#4{%
4347    \expandafter\def\expandafter#1\expandafter{%
4348      \expandafter\@protected@testopt\expandafter #1%
4349      \csname\string#1\expandafter\endcsname{#3}}%
4350    \expandafter\@yargdef \csname\string#1\endcsname
4351    \tw@{#2}{#4}}
4352 \long\def\@yargdef#1#2#3{%
4353    \@tempcnta#3\relax
4354    \advance \@tempcnta \@ne
4355    \let\@hash@\relax
4356    \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
4357    \@tempcntb #2%
4358    \@whilenum\@tempcntb <\@tempcnta
4359    \do{%
4360      \edef\reserved@a{\reserved@a\@hash@\the\@tempcntb}%
```

```
4361       \advance\@tempcntb \@ne}%
4362    \let\@hash@##%
4363    \l@ngrel@x\expandafter\def\expandafter#1\reserved@a}
4364 \def\providecommand{\@star@or@long\provide@command}
4365 \def\provide@command#1{%
4366    \begingroup
4367       \escapechar\m@ne\xdef\@gtempa{{\string#1}}%
4368    \endgroup
4369    \expandafter\@ifundefined\@gtempa
4370       {\def\reserved@a{\new@command#1}}%
4371       {\let\reserved@a\relax
4372        \def\reserved@a{\new@command\reserved@a}}%
4373    \reserved@a}%

4374 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
4375 \def\declare@robustcommand#1{%
4376    \edef\reserved@a{\string#1}%
4377    \def\reserved@b{#1}%
4378    \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
4379    \edef#1{%
4380       \ifx\reserved@a\reserved@b
4381          \noexpand\x@protect
4382          \noexpand#1%
4383       \fi
4384       \noexpand\protect
4385       \expandafter\noexpand\csname
4386          \expandafter\@gobble\string#1 \endcsname
4387    }%
4388    \expandafter\new@command\csname
4389       \expandafter\@gobble\string#1 \endcsname
4390 }
4391 \def\x@protect#1{%
4392    \ifx\protect\@typeset@protect\else
4393       \@x@protect#1%
4394    \fi
4395 }
4396 \def\@x@protect#1\fi#2#3{%
4397    \fi\protect#1%
4398 }
```

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.

```
4399 \def\bbl@tempa{\csname newif\endcsname\ifin@}
4400 \ifx\in@\@undefined
4401    \def\in@#1#2{%
4402       \def\in@@##1#1##2##3\in@@{%
4403          \ifx\in@##2\in@false\else\in@true\fi}%
4404       \in@@#2#1\in@\in@@}
4405 \else
4406    \let\bbl@tempa\@empty
4407 \fi
4408 \bbl@tempa
```

LaTeX 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).

```
4409 \def\@ifpackagewith#1#2#3#4{#3}
```

The LaTeX 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.

```
4410 \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 LaTeX 2ε versions; just enough to make things work in plain TeXenvironments.

```
4411 \ifx\@tempcnta\@undefined
4412  \csname newcount\endcsname\@tempcnta\relax
4413 \fi
4414 \ifx\@tempcntb\@undefined
4415  \csname newcount\endcsname\@tempcntb\relax
4416 \fi
```

To prevent wasting two counters in LaTeX 2.09 (because counters with the same name are allocated later by it) we reset the counter that holds the next free counter (\count10).

```
4417 \ifx\bye\@undefined
4418  \advance\count10 by -2\relax
4419 \fi
4420 \ifx\@ifnextchar\@undefined
4421  \def\@ifnextchar#1#2#3{%
4422    \let\reserved@d=#1%
4423    \def\reserved@a{#2}\def\reserved@b{#3}%
4424    \futurelet\@let@token\@ifnch}
4425  \def\@ifnch{%
4426    \ifx\@let@token\@sptoken
4427      \let\reserved@c\@xifnch
4428    \else
4429      \ifx\@let@token\reserved@d
4430        \let\reserved@c\reserved@a
4431      \else
4432        \let\reserved@c\reserved@b
4433      \fi
4434    \fi
4435    \reserved@c}
4436  \def\:{\let\@sptoken= } \:  % this makes \@sptoken a space token
4437  \def\:{\@xifnch} \expandafter\def\: {\futurelet\@let@token\@ifnch}
4438 \fi
4439 \def\@testopt#1#2{%
4440  \@ifnextchar[{#1}{#1[#2]}}
4441 \def\@protected@testopt#1{%
4442  \ifx\protect\@typeset@protect
4443    \expandafter\@testopt
4444  \else
4445    \@x@protect#1%
4446  \fi}
4447 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
4448      #2\relax}\fi}
4449 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
4450          \else\expandafter\@gobble\fi{#1}}
```

16.4 Encoding related macros

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

```
4451 \def\DeclareTextCommand{%
4452   \@dec@text@cmd\providecommand
4453 }
4454 \def\ProvideTextCommand{%
4455   \@dec@text@cmd\providecommand
4456 }
4457 \def\DeclareTextSymbol#1#2#3{%
4458   \@dec@text@cmd\chardef#1{#2}#3\relax
4459 }
4460 \def\@dec@text@cmd#1#2#3{%
4461   \expandafter\def\expandafter#2%
4462     \expandafter{%
4463       \csname#3-cmd\expandafter\endcsname
4464       \expandafter#2%
4465       \csname#3\string#2\endcsname
4466     }%
4467 %   \let\@ifdefinable\@rc@ifdefinable
4468   \expandafter#1\csname#3\string#2\endcsname
4469 }
4470 \def\@current@cmd#1{%
4471   \ifx\protect\@typeset@protect\else
4472     \noexpand#1\expandafter\@gobble
4473   \fi
4474 }
4475 \def\@changed@cmd#1#2{%
4476   \ifx\protect\@typeset@protect
4477     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
4478       \expandafter\ifx\csname ?\string#1\endcsname\relax
4479         \expandafter\def\csname ?\string#1\endcsname{%
4480           \@changed@x@err{#1}%
4481         }%
4482       \fi
4483       \global\expandafter\let
4484         \csname\cf@encoding \string#1\expandafter\endcsname
4485         \csname ?\string#1\endcsname
4486     \fi
4487     \csname\cf@encoding\string#1%
4488       \expandafter\endcsname
4489   \else
4490     \noexpand#1%
4491   \fi
4492 }
4493 \def\@changed@x@err#1{%
4494   \errhelp{Your command will be ignored, type <return> to proceed}%
4495   \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
4496 \def\DeclareTextCommandDefault#1{%
4497   \DeclareTextCommand#1?%
4498 }
4499 \def\ProvideTextCommandDefault#1{%
4500   \ProvideTextCommand#1?%
4501 }
4502 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
4503 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
4504 \def\DeclareTextAccent#1#2#3{%
4505   \DeclareTextCommand#1{#2}[1]{\accent#3 ##1}
4506 }
4507 \def\DeclareTextCompositeCommand#1#2#3#4{%
4508   \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
4509   \edef\reserved@b{\string##1}%
```

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```
4510    \edef\reserved@c{%
4511      \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
4512    \ifx\reserved@b\reserved@c
4513      \expandafter\expandafter\expandafter\ifx
4514        \expandafter\@car\reserved@a\relax\relax\@nil
4515        \@text@composite
4516      \else
4517        \edef\reserved@b##1{%
4518          \def\expandafter\noexpand
4519            \csname#2\string#1\endcsname####1{%
4520            \noexpand\@text@composite
4521              \expandafter\noexpand\csname#2\string#1\endcsname
4522              ####1\noexpand\@empty\noexpand\@text@composite
4523              {##1}%
4524          }%
4525        }%
4526        \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
4527      \fi
4528      \expandafter\def\csname\expandafter\string\csname
4529        #2\endcsname\string#1-\string#3\endcsname{#4}
4530    \else
4531      \errhelp{Your command will be ignored, type <return> to proceed}%
4532      \errmessage{\string\DeclareTextCompositeCommand\space used on
4533        inappropriate command \protect#1}
4534    \fi
4535 }
4536 \def\@text@composite#1#2#3\@text@composite{%
4537    \expandafter\@text@composite@x
4538      \csname\string#1-\string#2\endcsname
4539 }
4540 \def\@text@composite@x#1#2{%
4541    \ifx#1\relax
4542      #2%
4543    \else
4544      #1%
4545    \fi
4546 }
4547 %
4548 \def\@@strip@args#1:#2-#3\@strip@args{#2}
4549 \def\DeclareTextComposite#1#2#3#4{%
4550    \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
4551    \bgroup
4552      \lccode`\@=#4%
4553      \lowercase{%
4554    \egroup
4555      \reserved@a @%
4556    }%
4557 }
4558 %
4559 \def\UseTextSymbol#1#2{%
4560 %    \let\@curr@enc\cf@encoding
4561 %    \@use@text@encoding{#1}%
4562    #2%
4563 %    \@use@text@encoding\@curr@enc
4564 }
4565 \def\UseTextAccent#1#2#3{%
4566 %    \let\@curr@enc\cf@encoding
4567 %    \@use@text@encoding{#1}%
4568 %    #2{\@use@text@encoding\@curr@enc\selectfont#3}%
```

```
4569 %    \@use@text@encoding\@curr@enc
4570 }
4571 \def\@use@text@encoding#1{%
4572 %    \edef\f@encoding{#1}%
4573 %    \xdef\font@name{%
4574 %        \csname\curr@fontshape/\f@size\endcsname
4575 %    }%
4576 %    \pickup@font
4577 %    \font@name
4578 %    \@@enc@update
4579 }
4580 \def\DeclareTextSymbolDefault#1#2{%
4581     \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
4582 }
4583 \def\DeclareTextAccentDefault#1#2{%
4584     \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
4585 }
4586 \def\cf@encoding{OT1}
```

Currently we only use the LaTeX 2ε method for accents for those that are known to be made active in *some* language definition file.

```
4587 \DeclareTextAccent{\"}{OT1}{127}
4588 \DeclareTextAccent{\'}{OT1}{19}
4589 \DeclareTextAccent{\^}{OT1}{94}
4590 \DeclareTextAccent{\`}{OT1}{18}
4591 \DeclareTextAccent{\~}{OT1}{126}
```

The following control sequences are used in babel.def but are not defined for PLAIN TeX.

```
4592 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
4593 \DeclareTextSymbol{\textquotedblright}{OT1}{`\"}
4594 \DeclareTextSymbol{\textquoteleft}{OT1}{`\`}
4595 \DeclareTextSymbol{\textquoteright}{OT1}{`\'}
4596 \DeclareTextSymbol{\i}{OT1}{16}
4597 \DeclareTextSymbol{\ss}{OT1}{25}
```

For a couple of languages we need the LaTeX-control sequence \scriptsize to be available. Because plain TeX doesn't have such a sofisticated font mechanism as LaTeX has, we just \let it to \sevenrm.

```
4598 \ifx\scriptsize\@undefined
4599   \let\scriptsize\sevenrm
4600 \fi
4601 ⟨/plain⟩
```

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