

Babel

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Johannes L. Braams
Original author

Javier Bezos
Current maintainer

Localization and
internationalization

Unicode

T_EX

pdfT_EX

LuaT_EX

XeT_EX

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Part I

User guide

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

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

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

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

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

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

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

1 The user interface

1.1 Monolingual documents

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

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

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

PDFTEX

```
\documentclass{article}

\usepackage[T1]{fontenc}

\usepackage[french]{babel}

\begin{document}

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

\end{document}
```

Now consider something like:

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

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

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

LUATEX/XETEX

```
\documentclass[russian]{article}

\usepackage{babel}

\babelfont{rm}{DejaVu Serif}

\begin{document}

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

\end{document}
```

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

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

Or the more explanatory:

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

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

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

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

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

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

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

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

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

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

1.2 Multilingual documents

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

EXAMPLE In \LaTeX , the preamble of the document:

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

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

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

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

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

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

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

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

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

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

To switch the language there are two basic macros, described below in detail:

`\selectlanguage` is used for blocks of text, while `\foreignlanguage` is for chunks of text inside paragraphs.

EXAMPLE A full bilingual document with pdf_{tex} follows. The main language is french, which is activated when the document begins. It assumes UTF-8:

PDF_{TEX}

```
\documentclass{article}  
  
\usepackage[T1]{fontenc}  
  
\usepackage[english,french]{babel}  
  
\begin{document}  
  
Plus ça change, plus c'est la même chose!  
  
\selectlanguage{english}  
  
And an English paragraph, with a short text in  
\foreignlanguage{french}{français}.  
  
\end{document}
```

EXAMPLE With x_{etex} and l_{uatex}, the following bilingual, single script document in UTF-8 encoding just prints a couple of ‘captions’ and `\today` in Danish and Vietnamese. No additional packages are required.

LUATEX/XETEX

```
\documentclass{article}  
  
\usepackage[vietnamese,danish]{babel}  
  
\begin{document}  
  
\prefacename{} -- \alsoname{} -- \today  
  
\selectlanguage{vietnamese}  
  
\prefacename{} -- \alsoname{} -- \today  
  
\end{document}
```

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

1.3 Mostly monolingual documents

New 3.39 Very often, multilingual documents consist of a main language with small pieces of text in another languages (words, idioms, short sentences). Typically, all you need is to set the line breaking rules and, perhaps, the font. In such a case, babel now does not require declaring these secondary languages explicitly, because the basic settings are loaded on the fly when the language is selected (and also when provided in the optional argument of `\babel font`, if used.)

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

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

LUATEX/XETEX

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

\babelfont[russian]{rm}{FreeSerif}

\begin{document}

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

\end{document}
```

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

1.4 Modifiers

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

1.5 Troubleshooting

- Loading directly sty files in L^AT_EX (ie, `\usepackage{<language>}`) is deprecated and you will get the error:²

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

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

```
! 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

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

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

1.6 Plain

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

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

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

1.7 Basic language selectors

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

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

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

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

```
\selectlanguage{german}
```

This command can be used as environment, too.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.8 Auxiliary language selectors

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

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

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

```

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

```

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

Spaces after the environment are ignored.

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

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

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

1.9 More on selection

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

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

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

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

EXAMPLE With

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

you can write

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

and

```

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

```

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

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 the option `fontenc`.⁴ A couple of examples:

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

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

1.10 Shorthands

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

NOTE Keep in mind the following:

1. Activated chars used for two-char shorthands cannot be followed by a closing brace `}` and the spaces following are gobbled. With one-char shorthands (eg, `:`), they are preserved.

⁴With it, encoded strings may not work as expected.

2. If on a certain level (system, language, user, language user) there is a one-char shorthand, two-char ones starting with that char and on the same level are ignored.
3. Since they are active, a shorthand cannot contain the same character in its definition (except if deactivated with, eg, `\string`).

TROUBLESHOOTING A typical error when using shorthands is the following:

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

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

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

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

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

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

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

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

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

`\usesshorthands` `*{\char}`

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

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

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

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

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

New 3.9a An optional argument allows to (re)define language and system shorthands (some languages do not activate shorthands, so you may want to add

`\languageshorthands{⟨lang⟩}` to the corresponding `\extras⟨lang⟩`, as explained below). By default, user shorthands are (re)defined.

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

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

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

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

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

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

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

`\languageshorthands` {⟨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).⁵ Note that for this to work the language should have been specified as an option when loading the babel package. For example, you can use in english the shorthands defined by ngerman with

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

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

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

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

`\babelshorthand` {⟨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 your own user shorthands provided they do not overlap.)

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

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

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

For your records, here is a list of shorthands, but you must double check them, as they may change:⁶

Languages with no shorthands Croatian, English (any variety), Indonesian, Hebrew, Interlingua, Irish, Lower Sorbian, Malaysian, North Sami, Romanian, Scottish, Welsh
Languages with only " as defined shorthand character Albanian, Bulgarian, Danish, Dutch, Finnish, German (old and new orthography, also Austrian), Icelandic, Italian, Norwegian, Polish, Portuguese (also Brazilian), Russian, Serbian (with Latin script), Slovene, Swedish, Ukrainian, Upper Sorbian

Basque " ' ~

Breton : ; ? !

Catalan " ' `

Czech " -

Esperanto ^

Estonian " ~

French (all varieties) : ; ? !

Galician " . ' ~ < >

Greek ~

Hungarian `

Kurmanji ^

Latin " ^ =

Slovak " ^ ' -

Spanish " . < > ' ~

Turkish : ! =

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

`\ifbabelshorthand` $\{\langle character \rangle\}\{\langle true \rangle\}\{\langle false \rangle\}$

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

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

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

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

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

⁶Thanks to Enrico Gregorio

⁷This declaration serves to nothing, but it is preserved for backward compatibility.


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

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

1.11 Package options

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

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

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

activegrave Same for ```.

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

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

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

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

safe= `none | ref | bib`

Some \TeX macros are redefined so that using shorthands is safe. With `safe=bib` only `\nocite`, `\bibcite` and `\bibitem` are redefined. With `safe=ref` only `\newlabel`, `\ref` and `\pageref` are redefined (as well as a few macros from `varioref` and `ifthen`).

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

New 3.34, in $\epsilon\TeX$ based engines (ie, almost every engine except the oldest ones) shorthands can be used in these macros (formerly you could not).

math= `active | normal`

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

- config=** `<file>`
Load `<file>.cfg` instead of the default config file `bblopts.cfg` (the file is loaded even with `noconfigs`).
- main=** `<language>`
Sets the main language, as explained above, ie, this language is always loaded last. If it is not given as package or global option, it is added to the list of requested languages.
- headfoot=** `<language>`
By default, headlines and footlines are not touched (only marks), and if they contain language-dependent macros (which is not usual) there may be unexpected results. With this option you may set the language in heads and foots.
- noconfigs** Global and language default config files are not loaded, so you can make sure your document is not spoilt by an unexpected `.cfg` file. However, if the key `config` is set, this file is loaded.
- showlanguages** Prints to the log the list of languages loaded when the format was created: number (remember dialects can share it), name, hyphenation file and exceptions file.
- nocase** New 3.9l Language settings for uppercase and lowercase mapping (as set by `\SetCase`) are ignored. Use only if there are incompatibilities with other packages.
- silent** New 3.9l No warnings and no *infos* are written to the log file.⁸
- strings=** `generic` | `unicode` | `encoded` | `<label>` | ``
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` | `first` | `select` | `other` | `other*`
New 3.9g Sets the behavior of case mapping for hyphenation, provided the language defines it.⁹ 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;¹⁰
- 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

⁸You can use alternatively the package `silence`.

⁹Turned off in plain.

¹⁰Duplicated options count as several ones.

language options have been stated. The option `first` can be regarded as an optimized version of `other*` for monolingual documents.¹¹

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

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

layout=

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

1.12 The base option

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

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

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

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

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

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

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

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

1.13 ini files

An alternative approach to define a language (or, more precisely, a *locale*) is by means of an `ini` file. Currently `babel` provides about 200 of these files containing the basic data required for a locale.

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

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

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

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

LUATEX/XETEX

```
\documentclass{book}

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

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

\begin{document}

\tableofcontents

\chapter{სამზარეულო და სუფრის ტრადიციები}

ქართული ტრადიციული სამზარეულო ერთ-ერთი უმდიდრესია მთელ მსოფლიოში.

\end{document}
```

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

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

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

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

Or also:

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

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

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

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

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

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

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

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

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

```
\babelprovide[import, hyphenrules=+]{lao}
\babelpatterns[lao]{ໂ ນ ມ ລ ອ ນ ງ ນ າ} % Random
```

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

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

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

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

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

af	Afrikaans ^{ul}	as	Assamese
agq	Aghem	asa	Asu
ak	Akan	ast	Asturian ^{ul}
am	Amharic ^{ul}	az-Cyrl	Azerbaijani
ar	Arabic ^{ul}	az-Latn	Azerbaijani
ar-DZ	Arabic ^{ul}	az	Azerbaijani ^{ul}
ar-MA	Arabic ^{ul}	bas	Basaa
ar-SY	Arabic ^{ul}	be	Belarusian ^{ul}

bem	Bemba	fr-CA	French ^{ul}
bez	Bena	fr-CH	French ^{ul}
bg	Bulgarian ^{ul}	fr-LU	French ^{ul}
bm	Bambara	fur	Friulian ^{ul}
bn	Bangla ^{ul}	fy	Western Frisian
bo	Tibetan ^u	ga	Irish ^{ul}
brx	Bodo	gd	Scottish Gaelic ^{ul}
bs-Cyrl	Bosnian	gl	Galician ^{ul}
bs-Latn	Bosnian ^{ul}	grc	Ancient Greek ^{ul}
bs	Bosnian ^{ul}	gsw	Swiss German
ca	Catalan ^{ul}	gu	Gujarati
ce	Chechen	guz	Gusii
cgg	Chiga	gv	Manx
chr	Cherokee	ha-GH	Hausa
ckb	Central Kurdish	ha-NE	Hausa ^l
cop	Coptic	ha	Hausa
cs	Czech ^{ul}	haw	Hawaiian
cu	Church Slavic	he	Hebrew ^{ul}
cu-Cyrs	Church Slavic	hi	Hindi ^u
cu-Glag	Church Slavic	hr	Croatian ^{ul}
cy	Welsh ^{ul}	hsb	Upper Sorbian ^{ul}
da	Danish ^{ul}	hu	Hungarian ^{ul}
dav	Taita	hy	Armenian ^u
de-AT	German ^{ul}	ia	Interlingua ^{ul}
de-CH	German ^{ul}	id	Indonesian ^{ul}
de	German ^{ul}	ig	Igbo
dje	Zarma	ii	Sichuan Yi
dsb	Lower Sorbian ^{ul}	is	Icelandic ^{ul}
dua	Duala	it	Italian ^{ul}
dyo	Jola-Fonyi	ja	Japanese
dz	Dzongkha	jgo	Ngomba
ebu	Embu	jmc	Machame
ee	Ewe	ka	Georgian ^{ul}
el	Greek ^{ul}	kab	Kabyle
el-polyton	Polytonic Greek ^{ul}	kam	Kamba
en-AU	English ^{ul}	kde	Makonde
en-CA	English ^{ul}	kea	Kabuverdianu
en-GB	English ^{ul}	khq	Koyra Chiini
en-NZ	English ^{ul}	ki	Kikuyu
en-US	English ^{ul}	kk	Kazakh
en	English ^{ul}	kkj	Kako
eo	Esperanto ^{ul}	kl	Kalaallisut
es-MX	Spanish ^{ul}	kln	Kalenjin
es	Spanish ^{ul}	km	Khmer
et	Estonian ^{ul}	kn	Kannada ^{ul}
eu	Basque ^{ul}	ko	Korean
ewo	Ewondo	kok	Konkani
fa	Persian ^{ul}	ks	Kashmiri
ff	Fulah	ksb	Shambala
fi	Finnish ^{ul}	ksf	Bafia
fil	Filipino	ksh	Colognian
fo	Faroese	kw	Cornish
fr	French ^{ul}	ky	Kyrgyz
fr-BE	French ^{ul}	lag	Langi

lb	Luxembourgish	rof	Rombo
lg	Ganda	ru	Russian ^{ul}
lkt	Lakota	rw	Kinyarwanda
ln	Lingala	rwk	Rwa
lo	Lao ^{ul}	sa-Beng	Sanskrit
lrc	Northern Luri	sa-Deva	Sanskrit
lt	Lithuanian ^{ul}	sa-Gujr	Sanskrit
lu	Luba-Katanga	sa-Knda	Sanskrit
luo	Luo	sa-Mlym	Sanskrit
luy	Luyia	sa-Telu	Sanskrit
lv	Latvian ^{ul}	sa	Sanskrit
mas	Masai	sah	Sakha
mer	Meru	saq	Samburu
mfe	Morisyen	sbp	Sangu
mg	Malagasy	se	Northern Sami ^{ul}
mgf	Makhuwa-Meetto	seh	Sena
mgo	Meta'	ses	Koyraboro Senni
mk	Macedonian ^{ul}	sg	Sango
ml	Malayalam ^{ul}	shi-Latn	Tachelhit
mn	Mongolian	shi-Tfng	Tachelhit
mr	Marathi ^{ul}	shi	Tachelhit
ms-BN	Malay ^l	si	Sinhala
ms-SG	Malay ^l	sk	Slovak ^{ul}
ms	Malay ^{ul}	sl	Slovenian ^{ul}
mt	Maltese	smn	Inari Sami
mua	Mundang	sn	Shona
my	Burmese	so	Somali
mzn	Mazanderani	sq	Albanian ^{ul}
naq	Nama	sr-Cyrl-BA	Serbian ^{ul}
nb	Norwegian Bokmål ^{ul}	sr-Cyrl-ME	Serbian ^{ul}
nd	North Ndebele	sr-Cyrl-XK	Serbian ^{ul}
ne	Nepali	sr-Cyrl	Serbian ^{ul}
nl	Dutch ^{ul}	sr-Latn-BA	Serbian ^{ul}
nmg	Kwasio	sr-Latn-ME	Serbian ^{ul}
nn	Norwegian Nynorsk ^{ul}	sr-Latn-XK	Serbian ^{ul}
nnh	Ngiemboon	sr-Latn	Serbian ^{ul}
nus	Nuer	sr	Serbian ^{ul}
nyn	Nyankole	sv	Swedish ^{ul}
om	Oromo	sw	Swahili
or	Odia	ta	Tamil ^u
os	Ossetic	te	Telugu ^{ul}
pa-Arab	Punjabi	teo	Teso
pa-Guru	Punjabi	th	Thai ^{ul}
pa	Punjabi	ti	Tigrinya
pl	Polish ^{ul}	tk	Turkmen ^{ul}
pms	Piedmontese ^{ul}	to	Tongan
ps	Pashto	tr	Turkish ^{ul}
pt-BR	Portuguese ^{ul}	twq	Tasawaq
pt-PT	Portuguese ^{ul}	tzm	Central Atlas Tamazight
pt	Portuguese ^{ul}	ug	Uyghur
qu	Quechua	uk	Ukrainian ^{ul}
rm	Romansh ^{ul}	ur	Urdu ^{ul}
rn	Rundi	uz-Arab	Uzbek
ro	Romanian ^{ul}	uz-Cyrl	Uzbek

uz-Latn	Uzbek	yue	Cantonese
uz	Uzbek	zgh	Standard Moroccan Tamazight
vai-Latn	Vai	zh-Hans-HK	Chinese
vai-Vaii	Vai	zh-Hans-MO	Chinese
vai	Vai	zh-Hans-SG	Chinese
vi	Vietnamese ^{ul}	zh-Hans	Chinese
vun	Vunjo	zh-Hant-HK	Chinese
wae	Walser	zh-Hant-MO	Chinese
xog	Soga	zh-Hant	Chinese
yav	Yangben	zh	Chinese
yi	Yiddish	zu	Zulu
yo	Yoruba		

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

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

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

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

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

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

Modifying and adding values to ini files

New 3.39 There is a way to modify the values of ini files when they get loaded with `\babelprovide` and `import`. To set, say, `digits.native` in the `numbers` section, use something like `numbers/digits.native=abcdefghijklj`. Keys may be added, too. Without `import` you may modify the identification keys.

This can be used to create private variants easily. All you need is to import the same ini file with a different locale name and different parameters.

1.14 Selecting fonts

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

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

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

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

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

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

¹³See also the package `combofont` for a complementary approach.

On the other hand, if there is one or more languages in the optional argument, the font will be assigned to them, overriding the default one. Alternatively, you may set a font for a script – just precede its name (lowercase) with a star (eg, `*devanagari`). With this optional argument, the font is *not* yet defined, but just predeclared. This means you may define as many fonts as you want ‘just in case’, because if the language is never selected, the corresponding `\babelfont` declaration is just ignored.

Babel takes care of the font language and the font script when languages are selected (as well as the writing direction); see the recognized languages above. In most cases, you will not need *font-options*, which is the same as in `fontspec`, but you may add further key/value pairs if necessary.

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

LUATEX/XETEX

```
\documentclass{article}

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

\babelprovide[import]{hebrew}

\babelfont{rm}{FreeSerif}

\begin{document}

Svenska \foreignlanguage{hebrew}{עברית} svenska.

\end{document}
```

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

LUATEX/XETEX

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

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

EXAMPLE Here is how to do it:

LUATEX/XETEX

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

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

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

LUATEX/XETEX

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

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

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

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

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

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

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

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

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

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

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

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

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

1.15 Modifying a language

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

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

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

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

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

NOTE There are a few alternative methods:

- With data imported from ini files, you can modify the values of specific keys, like:

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

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

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

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

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

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

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

This redefinition is immediate.

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

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

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

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

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

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

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

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

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

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

1.16 Creating a language

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

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

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

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

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

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

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

EXAMPLE If you need a language named arhinish:

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

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

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

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

The main language is not changed (danish in this example). So, you must add `\selectlanguage{arhinish}` or other selectors where necessary.

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

`import=` *⟨language-tag⟩*

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

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

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

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

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

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

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

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

captions= *<language-tag>*

Loads only the strings. For example:

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

hyphenrules= *<language-list>*

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

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

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

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

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

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

New 3.58 Another special value is `unhyphenated`, which activates a line breking mode that allows spaces to be stretched to arbitrary amounts.

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

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

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

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


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

Remember there is an alternative syntax for the latter:

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

script= $\langle script-name \rangle$

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

language= $\langle language-name \rangle$

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

alph= $\langle counter-name \rangle$

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

Alph= $\langle counter-name \rangle$

Same for `\Alph`.

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

onchar= ids | fonts

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

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

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

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

intrapenalty= $\langle penalty \rangle$

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

justification= kashida | elongated | unhyphenated

New 3.59 There are currently three options, mainly for the Arabic script. It sets the linebreaking and justification method, which can be based on the the ARABIC TATWEEL character or in the ‘justification alternatives’ OpenType table (jalt). For an explanation see the [babel site](#).

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

mapfont= direction

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

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

1.17 Digits and counters

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

For example:

```
\babelprovide[import]{telugu} % 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:

Arabic	Central Kurdish	Khmer	Northern Luri	Nepali
Assamese	Dzongkha	Kannada	Malayalam	Odia
Bangla	Persian	Konkani	Marathi	Punjabi
Tibetar	Gujarati	Kashmiri	Burmese	Pashto
Bodo	Hindi	Lao	Mazanderani	Tamil

Telugu	Uyghur	Uzbek	Cantonese
Thai	Urdu	Vai	Chinese

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

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

New 4.41 Many ‘ini’ locale files has been extended with information about non-positional numerical systems, based on those predefined in CSS. They only work with `xetex` and `luatex` and are fully expendable (even inside an unprotected `\edef`). Currently, they are limited to numbers below 10000. There are several ways to use them (for the available styles in each language, see the list below):

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

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

The styles are:

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

Chinese cjk-earthly-branch, cjk-heavenly-stem, fullwidth.lower.alpha, fullwidth.upper.alpha

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

1.18 Dates

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

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

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

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

1.19 Accessing language info

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

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

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

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

\localeinfo {*<field>*}

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

`name.english` as provided by the Unicode CLDR.

`tag.ini` is the tag of the ini file (the way this file is identified in its name).

`tag.bcp47` is the full BCP 47 tag (see the warning below).

`language.tag.bcp47` is the BCP 47 language tag.

`tag.opentype` is the tag used by OpenType (usually, but not always, the same as BCP 47).

`script.name`, as provided by the Unicode CLDR.

`script.tag.bcp47` is the BCP 47 tag of the script used by this locale.

`script.tag.opentype` is the tag used by OpenType (usually, but not always, the same as BCP 47).

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

`\getlocaleproperty` *`{<macro>}{<locale>}{<property>}`

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

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

the macro `\hechap` will contain the string פרק.

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

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

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

`\localeid`

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

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

1.20 Hyphenation and line breaking

Babel deals with three kinds of line breaking rules: Western, typically the LGC group, South East Asian, like Thai, and CJK, but support depends on the engine: `pdftex` only deals with the former, `xetex` also with the second one (although in a limited way), while `luatex` provides basic rules for the latter, too.

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

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

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

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

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

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

There are also some differences with \TeX : (1) the character used is that set for the current font, while in \TeX it is hardwired to `-` (a typical value); (2) the hyphen to be used in fonts with a negative `\hyphenchar` is `-`, like in \TeX , 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.

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

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

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

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

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

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

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

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

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

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

1.21 Transforms

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

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

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

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

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

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

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

Here are the transforms currently predefined. (More to follow in future releases.)

Arabic	<code>transliteration.dad</code>	Applies the transliteration system devised by Yannis Haralambous for dad (simple and \TeX -friendly). Not yet complete, but sufficient for most texts.
--------	----------------------------------	---

¹⁴With *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.

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

Croatian	digraphs.ligatures	Ligatures <i>DŽ, Dž, dž, LJ, Lj, lj, NJ, Nj, nj</i> . It assumes they exist. This is not the recommended way to make these transformations (the best way is with OTF features), but it can get you out of a hurry.
Czech, Polish, Portuguese, Slovak, Spanish	hyphen.repeat	Explicit hyphens behave like <code>\babelhyphen{repeat}</code> .
Czech, Polish, Slovak	oneletter.nobreak	Converts a space after a non-syllabic preposition or conjunction into a non-breaking space.
Greek	diaeresis.hyphen	Removes the diaeresis above iota and upsilon if hyphenated just before. It works with the three variants.
Greek	transliteration.omega	Although he provided combinations are not exactly the same, this transform follows the syntax of Omega: = for the circumflex, v for digamma, and so on. For better compatibility with Levy's system, ~ (as 'string') is an alternative to =. ' is tonos in Monotonic Greek, but oxia in Polytonic and Ancient Greek.
Greek	sigma.final	The transliteration system above does not convert the sigma at the end of a word (on purpose). This transforms does it. To prevent the conversion (an abbreviation, for example), write "s.
Hindi, Sanskrit	transliteration.hk	The Harvard-Kyoto system to romanize Devanagari.
Hindi, Sanskrit	punctuation.space	Inserts a space before the following four characters: !?;.
Hungarian	digraphs.hyphen	Hyphenates the long digraphs <i>ccs, ddz, ggy, lly, nny, ssz, tty</i> and <i>zsz</i> as <i>cs-cs, dz-dz</i> , etc.
Indic scripts	danda.nobreak	Prevents a line break before a danda or double danda if there is a space. For Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Oriya, Tamil, Telugu.
Latin	digraphs.ligatures	Replaces the groups <i>ae, AE, oe, OE</i> with <i>æ, Æ, œ, Æ</i> .
Latin	letters.noj	Replaces <i>j, J</i> with <i>i, I</i> .
Latin	letters.uv	Replaces <i>v, U</i> with <i>u, V</i> .
Serbian	transliteration.gajica	(Note serbian with ini files refers to the Cyrillic script, which is here the target.) The standard system devised by Ljudevit Gaj.
Arabic, Persian	kashida.plain	Experimental. A very simple and basic transform for 'plain' Arabic fonts, which attempts to distribute the tatwil as evenly as possible (starting at the end of the line). See the news for version 3.59.

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

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

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

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

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

New 3.67 With the optional argument you can associate a user defined transform to an attribute, so that it’s active only when it’s set (currently its attribute value is ignored). With this mechanism transforms can be set or unset even in the middle of paragraphs, and applied to single words. To define, set and unset the attribute, the LaTeX kernel provides the macros `\newattribute`, `\setattribute` and `\unsetattribute`. The following example shows how to use it, provided an attribute named `\latinnoj` has been declared:

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

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

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

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

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

New 3.44-3.52 It is similar to the latter, but (as its name implies) applied before hyphenation, which is particularly useful in transliterations. There are other differences: (1) the first argument is the locale instead of the name of the hyphenation patterns; (2) in the search patterns = has no special meaning, while | stands for an ordinary space; (3) in the replacement, discretionaries are not accepted.

See the description above for the optional argument.

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

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

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

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

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

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

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

1.22 Selection based on BCP 47 tags

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

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

Here is a minimal example:

```
\documentclass{article}

\usepackage[danish]{babel}

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

\begin{document}

Chapter in Danish: \chaptername.

\selectlanguage{de-AT}

\localedate{2020}{1}{30}

\end{document}
```

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

`autoload.bcp47` with values on and off.

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

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

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

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

(You can deactivate it with off.) So, if dutch is one of the package (or class) options, you can write `\selectlanguage{nl}`. Note the language name does not change (in this example is still dutch), but you can get it with `\localeinfo` or `\getlanguageproperty`. It must be turned on explicitly for similar reasons to those explained above.

1.23 Selecting scripts

Currently babel provides no standard interface to select scripts, because they are best selected with either `\fontencoding` (low-level) or a language name (high-level). Even the Latin script may require different encodings (ie, sets of glyphs) depending on the language, and therefore such a switch would be in a sense incomplete.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 it was somewhat buggy because in some cases it messed up encodings and fonts (for example, if the main Latin encoding was LY1), and therefore it has been deprecated.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

¹⁶The 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.

¹⁷But still defined for backwards compatibility.

for “ordinary” text (they are stored in `\BabelNonText`, used in some special cases when no Latin encoding is explicitly set).

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

1.24 Selecting directions

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

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

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

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

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

There are some package options controlling bidi writing.

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

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

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

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

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

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

```
\documentclass{article}

\usepackage[bidi=basic]{babel}
```

```

\babelprovide[import, main]{arabic}

\babelfont{rm}{FreeSerif}

\begin{document}

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

\end{document}

```

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

```

\documentclass{book}

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

\babelprovide[onchar=ids fonts]{arabic}

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

\begin{document}

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

\end{document}

```

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

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

```

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

```

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

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

New 3.16 *To be expanded.* Selects which layout elements are adapted in `bidi` documents, including some text elements (except with options loading the `bidi` package, which

provides its own mechanism to control these elements). You may use several options with a dot-separated list (eg, `layout=counters.contents.sectioning`). This list will be expanded in future releases. Note not all options are required by all engines.

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

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

With counters, `\arabic` is not only considered L text always (with `\babelsublr`, see below), but also an “isolated” block which does not interact with the surrounding chars. So, while 1.2 in R text is rendered in that order with `bidi=basic` (as a decimal number), in `\arabic{c1}.\arabic{c2}` the visual order is `c2.c1`. Of course, you may always adjust the order by changing the language, if necessary.¹⁸

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

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

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

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

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

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

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

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

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

EXAMPLE Typically, in an Arabic document you would need:

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

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

¹⁸Next on the roadmap are counters and numeral systems in general. Expect some minor readjustments.

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

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

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

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

`\BabelPatchSection` $\langle section\text{-}name \rangle$

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

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

New 3.17 Something like:

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

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

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

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

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

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

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

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

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

1.25 Language attributes

`\languageattribute`

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

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

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

1.26 Hooks

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

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

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

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

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

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

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

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

defaultcommands Used (locally) in `\StartBabelCommands`.

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

stopcommands Used to reset the above, if necessary.

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

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

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


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

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

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

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

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

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

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

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

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

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

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

1.27 Languages supported by babel with ldf files

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

Afrikaans afrikaans

Azerbaijani azerbaijani

Basque basque

Breton breton

Bulgarian bulgarian

Catalan catalan

Croatian croatian

Czech czech

Danish danish

Dutch dutch

English english, USenglish, american, UKenglish, british, canadian, australian, newzealand

Esperanto esperanto

Estonian estonian

Finnish finnish

French french, francais, canadien, acadian

Galician galician

German austrian, german, germanb, ngerman, naustrian
Greek greek, polutonikogreek
Hebrew hebrew
Icelandic icelandic
Indonesian indonesian (bahasa, indon, bahasai)
Interlingua interlingua
Irish Gaelic irish
Italian italian
Latin latin
Lower Sorbian lowersorbian
Malay malay, melayu (bahasam)
North Sami samin
Norwegian norsk, nynorsk
Polish polish
Portuguese portuguese, brazilian (portuges, brazil)¹⁹
Romanian romanian
Russian russian
Scottish Gaelic scottish
Spanish spanish
Slovakian slovak
Slovenian slovene
Swedish swedish
Serbian serbian
Turkish turkish
Ukrainian ukrainian
Upper Sorbian uppersorbian
Welsh welsh

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

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

```

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

```

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

1.28 Unicode character properties in luatex

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

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

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

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

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

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

```
\babelcharproperty{\,}{locale}{english}
```

1.29 Tweaking some features

\babeladjust $\langle key-value-list \rangle$

New 3.36 Sometimes you might need to disable some babel features. Currently this macro understands the following keys (and only for luatex), with values on or off: bidi.text, bidi.mirroring, bidi.mapdigits, layout.lists, layout.tabular, linebreak.sea, linebreak.cjk, justify.arabic. For example, you can set \babeladjust{bidi.text=off} if you are using an alternative algorithm or with large sections not requiring it. Use with care, because these options do not deactivate other related options (like paragraph direction with bidi.text).

1.30 Tips, workarounds, known issues and notes

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

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

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

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

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

- For the hyphenation to work correctly, lccodes cannot change, because T_EX 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 `\foreignlanguage`, the apostrophes might not be taken into account. This is a limitation of T_EX, not of babel. Alternatively, you may use `\usesorthands` to activate ' and `\definesorthand`, or redefine `\textquoteright` (the latter is called by the non-ASCII right quote).
- `\bibitem` is out of sync with `\selectlanguage` in the .aux file. The reason is `\bibitem` uses `\immediate` (and others, in fact), while `\selectlanguage` doesn't. There is a similar issue with floats, too. There is no known workaround.
- Babel does not take into account `\normalsfcodes` and (non-)French spacing is not always properly (un)set by languages. However, problems are unlikely to happen and therefore this part remains untouched in version 3.9 (but it is in the 'to do' list).
- Using a character mathematically active (ie, with math code "8000) as a shorthand can make T_EX 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.

1.31 Current and future work

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

Useful additions would be, for example, time, currency, addresses and personal names.²¹

But that is the easy part, because they don't require modifying the L^AT_EX internals.

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

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

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

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

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

1.32 Tentative and experimental code

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

Options for locales loaded on the fly

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

Labels

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

2 Loading languages with `language.dat`

\TeX and most engines based on it (pdf \TeX , xetex, $\epsilon\text{\TeX}$, the main exception being luatex) require hyphenation patterns to be preloaded when a format is created (eg, \LaTeX , Xe \LaTeX , pdf \LaTeX). babel provides a tool which has become standard in many distributions and based on a “configuration file” named `language.dat`. The exact way this file is used depends on the distribution, so please, read the documentation for the latter (note also some distributions generate the file with some tool).

New 3.9q With luatex, however, patterns are loaded on the fly when requested by the language (except the “0th” language, typically english, which is preloaded always).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 stored²⁴. 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:

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

²³The 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`.

²⁴This 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 encoding when the language is selected is T1 then the patterns in `hyphenT1.ger` are used, but otherwise use those in `hyphen.ger` (note the encoding can be set in `\extras<lang>`).

A typical error when using babel is the following:

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

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

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

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

The following assumptions are made:

- Some of the language-specific definitions might be used by plain \TeX users, so the files have to be coded so that they can be read by both \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

²⁵This is 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 unknown language is selected, babel will attempt setting it after lowercasing its name.
- The semantics of modifiers is not defined (on purpose). In most cases, they will just be simple separated options (eg, spanish), but a language might require, say, a set of options organized as a tree with suboptions (in such a case, the recommended separator is `/`).

Some recommendations:

- The preferred shorthand is `"`, which is not used in \LaTeX (quotes are entered as ``` and `'`). Other good choices are characters which are not used in a certain context (eg, `=` in an ancient language). Note however `=`, `<`, `>`, `:` and the like can be dangerous, because they may be used as part of the syntax of some elements (numeric expressions, key/value pairs, etc.).
- Captions should not contain shorthands or encoding-dependent commands (the latter is not always possible, but should be clearly documented). They should be defined using the LICR. You may also use the new tools for encoded strings, described below.
- Avoid adding things to `\noextras⟨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

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

As to ldf files, now language files are “outsourced” and are located in a separate directory (`/macros/latex/contrib/babel-contrib`), so that they are contributed directly to CTAN (please, do not send to me language styles just to upload them to CTAN).

Of course, placing your style files in this directory is not mandatory, but if you want to do it, here are a few guidelines.

²⁶But not removed, for backward compatibility.

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

The following page provides a starting point for ldf files:

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

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

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

3.2 Basic macros

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

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

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

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

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

(Assigning \lefthyphenmin and \righthyphenmin directly in \extras<lang> has no effect.)

\providehyphenmins The macro \providehyphenmins should be used in the language definition files to set \lefthyphenmin and \righthyphenmin. This macro will check whether these parameters were provided by the hyphenation file before it takes any action. If these values have been already set, this command is ignored (currently, default pattern files do *not* set them).

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

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

\extras<lang> The macro \extras<lang> contains all the extra definitions needed for a specific language. This macro, like the following, is a hook – you can add things to it, but it must not be used directly.

\noextras<lang> Because we want to let the user switch between languages, but we do not know what state 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>.

<code>\bbl@declare@ttribute</code>	This is a command to be used in the language definition files for declaring a language attribute. It takes three arguments: the name of the language, the attribute to be defined, and the code to be executed when the attribute is to be used.
<code>\main@language</code>	To postpone the activation of the definitions needed for a language until the beginning of a document, all language definition files should use <code>\main@language</code> instead of <code>\selectlanguage</code> . This will just store the name of the language, and the proper language will be activated at the start of the document.
<code>\ProvidesLanguage</code>	The macro <code>\ProvidesLanguage</code> should be used to identify the language definition files. Its syntax is similar to the syntax of the \TeX command <code>\ProvidesPackage</code> .
<code>\LdfInit</code>	The macro <code>\LdfInit</code> performs a couple of standard checks that must be made at the beginning of a language definition file, such as checking the category code of the <code>@</code> -sign, preventing the <code>.ldf</code> file from being processed twice, etc.
<code>\ldf@quit</code>	The macro <code>\ldf@quit</code> does work needed if a <code>.ldf</code> file was processed earlier. This includes resetting the category code of the <code>@</code> -sign, preparing the language to be activated at <code>\begin{document}</code> time, and ending the input stream.
<code>\ldf@finish</code>	The macro <code>\ldf@finish</code> does work needed at the end of each <code>.ldf</code> file. This includes resetting the category code of the <code>@</code> -sign, loading a local configuration file, and preparing the language to be activated at <code>\begin{document}</code> time.
<code>\loadlocalcfg</code>	After processing a language definition file, \TeX can be instructed to load a local configuration file. This file can, for instance, be used to add strings to <code>\captions{<lang>}</code> to support local document classes. The user will be informed that this configuration file has been loaded. This macro is called by <code>\ldf@finish</code> .
<code>\substitutefontfamily</code>	(Deprecated.) This command takes three arguments, a font encoding and two font family names. It creates a font description file for the first font in the given encoding. This <code>.fd</code> file will instruct \TeX to use a font from the second family when a font from the first family in the given encoding seems to be needed.

3.3 Skeleton

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

```

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

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

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

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

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

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

\StartBabelCommands*{<language>}{date}

```

```

\SetString\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>}

```

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

```

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

```

3.4 Support for active characters

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

`\initiate@active@char` The internal macro `\initiate@active@char` is used in language definition files to instruct \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 \TeX book states: “Plain \TeX includes a macro called `\dospecials` that is essentially a set macro, representing the set of all characters that have a special category code.” [4, p. 380]
`\bbl@remove@special` It is used to set text ‘verbatim’. To make this work if more characters get a special category code, you have to add this character to the macro `\dospecial`. \LaTeX adds another macro called `\@sanitize` representing the same character set, but without the curly braces. The macros `\bbl@add@special<char>` and `\bbl@remove@special<char>` add and remove the character `<char>` to these two sets.

3.5 Support for saving macro definitions

Language definition files may want to redefine macros that already exist. Therefore a mechanism for saving (and restoring) the original definition of those macros is provided. We provide two macros for this²⁷.

`\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.

3.6 Support for extending macros

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

3.7 Macros common to a number of languages

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

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

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

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

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

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

3.8 Encoding-dependent strings

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

Furthermore, it must be activated explicitly, with the package option `strings`. If there is no `strings`, these blocks are ignored, except `\SetCases` (and except if forced as described

²⁷This mechanism was introduced by Bernd Raichle.

below). In other words, the old way of defining/switching strings still works and it's used by default.

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

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

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

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

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

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

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

The $\langle\textit{category}\rangle$ is either `captions`, `date` or `extras`. You must stick to these three categories, even if no error is raised when using other name.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:

²⁸In future releases further categories may be added.

```

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

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

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

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


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

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

\EndBabelCommands

```

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

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

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

$\backslash EndBabelCommands$ Marks the end of the series of blocks.

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

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

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

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

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

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

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

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

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

#1 is replaced by the roman numeral.

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

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

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

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

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

\EndBabelCommands
```

(Note the mapping for OT1 is not complete.)

\SetHyphenMap {<to-lower-macros>}

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

There are three helper macros to be used inside `\SetHyphenMap`:

- `\BabelLower{⟨ucode⟩}{⟨lcode⟩}` is similar to `\lcode` but it's ignored if the char has been set and saves the original `lcode` to restore it when switching the language (except with `hyphenmap=first`).
- `\BabelLowerMM{⟨ucode-from⟩}{⟨ucode-to⟩}{⟨step⟩}{⟨lcode-from⟩}` loops through the given uppercase codes, using the step, and assigns them the `lcode`, which is also increased (MM stands for *many-to-many*).
- `\BabelLowerMO{⟨ucode-from⟩}{⟨ucode-to⟩}{⟨step⟩}{⟨lcode⟩}` loops through the given uppercase codes, using the step, and assigns them the `lcode`, which is fixed (MO stands for *many-to-one*).

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

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

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

3.9 Executing code based on the selector

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

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

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

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

4 Changes

4.1 Changes in babel version 3.9

Most of the changes in version 3.9 were 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 `\language`. 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 can happen. It worked incorrectly with `^` (if activated) and also if deactivated.
- Active chars were not reset at the end of language options, and that led to incompatibilities between languages.
- `\textormath` raised an 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.

Part II

Source code

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

5 Identification and loading of required files

Code documentation is still under revision.

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

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

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

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

`babel.sty` is the LaTeX package, which sets options and loads language styles.

`plain.def` defines some LaTeX macros required by `babel.def` and provides a few tools for Plain.

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

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

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 (which start always with a lowercase case). There is an exception, however: the section counters has been devised to have arbitrary keys, so you can add lowercased keys if you want.

7 Tools

```
1 <<version=3.67.2585>>
2 <<date=2021/12/13>>
```

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

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

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

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

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

\bbl@afterelse Because the code that is used in the handling of active characters may need to look ahead, we take \bbl@afterfi

extra care to ‘throw’ it over the `\else` and `\fi` parts of an `\if`-statement³⁰. These macros will break if another `\if... \fi` statement appears in one of the arguments and it is not enclosed in braces.

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

`\bbl@exp` Now, just syntactical sugar, but it makes partial expansion of some code a lot more simple and readable. Here `\` stands for `\noexpand` 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.

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

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

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

`\bbl@ifunset` To check if a macro is defined, we create a new macro, which does the same as `\@ifundefined`. However, in an ϵ -tex engine, it is based on `\ifcsname`, which is more efficient, and does not waste memory.

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

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

```

66      \bbl@afterfi\expandafter\@secondoftwo
67      \fi
68      \else
69      \expandafter\@firstoftwo
70      \fi}}
71 \endgroup

```

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

```

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

```

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

```

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

```

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

```

88 \def\bbl@vforeach#1#2{%
89   \def\bbl@forcmd##1{#2}%
90   \bbl@fornext#1,\@nil,}
91 \def\bbl@fornext#1,{%
92   \ifx\@nil#1\relax\else
93     \bbl@ifblank{#1}{\bbl@trim\bbl@forcmd{#1}}}%
94     \expandafter\bbl@fornext
95   \fi}
96 \def\bbl@foreach#1{\expandafter\bbl@vforeach\expandafter{#1}}

```

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

```

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

```

An extension to the previous macro. It takes into account the parameters, and it is string based (ie, if you replace `elax` by `ho`, then `\relax` becomes `\rho`). No checking is done at all, because it is not a general purpose macro, and it is used by babel only when it works (an example where it does *not*

work is in `\bbl@TG@@date`, and also fails if there are macros with spaces, because they are retokenized). It may change! (or even merged with `\bbl@replace`; I'm not sure ckecking the replacement is really necessary or just paranoia).

```

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

```

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

```

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

```

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

```

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

```

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

```

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

```

An alternative to `\IfFormatAtLeastTF` for old versions. Temporary.

```

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

```

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

```

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

```

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

```

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

```

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 require loading `switch.def` in the format.

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

`\last@language` Another counter is used to keep track of the allocated languages. $\mathrm{T}_{\mathrm{E}}\mathrm{X}$ and $\mathrm{L}_{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$ reserves for this purpose the count 19.

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

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

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

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

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

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

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

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

```

238 \def\{\MessageBreak}%
239 \GenericWarning
240 {(babel) \@spaces\@spaces\@spaces}%
241 {Package babel Info: #1}%
242 \endgroup}
243 \def\bbl@info#1{%
244 \begingroup
245 \def\{\MessageBreak}%
246 \PackageInfo{babel}{#1}%
247 \endgroup}

```

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

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

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

```

248 <<Basic macros>>
249 \@ifpackagewith{babel}{silent}
250 {\let\bbl@info@gobble
251 \let\bbl@infowarn@gobble
252 \let\bbl@warning@gobble}
253 {}
254 %
255 \def\AfterBabelLanguage#1{%
256 \global\expandafter\bbl@add\csname#1.ldf-h@@k\endcsname}%

```

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

```

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

```

7.3 base

The first 'real' option to be processed is base, which set the hyphenation patterns then resets `ver@babel.sty` so that \TeX forgets about the first loading. After a subset of `babel.def` has been loaded (the old `switch.def`) and `\AfterBabelLanguage` defined, it exits.

Now the base option. With it we can define (and load, with `luatex`) hyphenation patterns, even if we are not interested in the rest of babel.

```

275 \bbl@trace{Defining option 'base'}
276 \@ifpackagewith{babel}{base}{%
277 \let\bbl@onlyswitch\empty
278 \let\bbl@provide@locale\relax
279 \input babel.def

```

```

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

```

7.4 key=value options and other general option

The following macros extract language modifiers, and only real package options are kept in the option list. Modifiers are saved and assigned to `\BabelModifiers` at `\bbl@load@language`; when no modifiers have been given, the former is `\relax`. How modifiers are handled are left to language styles; they can use `\in@`, loop them with `\@for` or `load keyval`, for example.

```

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

```

The next option tells babel to leave shorthand characters active at the end of processing the package. This is *not* the default as it can cause problems with other packages, but for those who want to use the shorthand characters in the preamble of their documents this can help.

```

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

```



```

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

```

Handling of package options is done in three passes. (I [JBL] am not very happy with the idea, anyway.) The first one processes options which has been declared above or follow the syntax <key>=<value>, the second one loads the requested languages, except the main one if set with the key main, and the third one loads the latter. First, we “flag” valid keys with a nil value.

```

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

```

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

```

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

```

Now the option list is processed, taking into account only currently declared options (including those declared with a =), and <key>=<value> options (the former take precedence). Unrecognized options are saved in \bbl@language@opts, because they are language options.

```

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

```

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

```

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

```

```

373      \def\bbl@opt@provide{#2}%
374      \bbl@replace\bbl@opt@provide{;}{,}%
375      \fi}
376 \fi
377 %

```

7.5 Conditional loading of shorthands

If there is no `shorthands=<chars>`, the original babel macros are left untouched, but if there is, these macros are wrapped (in `babel.def`) to define only those given.

A bit of optimization: if there is no `shorthands=`, then `\bbl@ifshorthand` is always true, and it is always false if `shorthands` is empty. Also, some code makes sense only with `shorthands=...`

```

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

```

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

```

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

```

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

```

399   \edef\bbl@opt@shorthands{%
400     \expandafter\bbl@sh@string\bbl@opt@shorthands\@empty}%

```

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

```

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

```

With `headfoot=lang` we can set the language used in heads/foots. For example, in `babel/3796` just adds `headfoot=english`. It misuses `\@resetactivechars` but seems to work.

```

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

```

For the option `safe` we use a different approach – `\bbl@opt@safe` says which macros are redefined (B for bibs and R for refs). By default, both are set.

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

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

```
415 \bbl@trace{Defining IfBabelLayout}
416 \ifx\bbl@opt@layout\@nnil
417   \newcommand\IfBabelLayout[3]{#3}%
418 \else
419   \newcommand\IfBabelLayout[1]{%
420     \@expandtwoargs\in@{.#1.}{.\bbl@opt@layout.}%
421     \ifin@
422       \expandafter\@firstoftwo
423     \else
424       \expandafter\@secondoftwo
425     \fi}
426 \fi
427 </package>
428 <*core>
```

7.6 Interlude for Plain

Because of the way `docstrip` works, we need to insert some code for Plain here. However, the tools provided by the babel installer for literate programming makes this section a short interlude, because the actual code is below, tagged as *Emulate LaTeX*.

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

That is all for the moment. Now follows some common stuff, for both Plain and \LaTeX . After it, we will resume the \LaTeX -only stuff.

```
436 </core>
437 <*package | core>
```

8 Multiple languages

This is not a separate file (`switch.def`) anymore.

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.

```
438 \def\bbl@version{\<<version>>}
439 \def\bbl@date{\<<date>>}
440 <<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.

```
441 \def\adddialect#1#2{%
442   \global\chardef#1#2\relax
443   \bbl@usehooks{adddialect}{\#1}{\#2}%
444   \begingroup
445     \count@#1\relax
```

```

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

```

\bbl@iflanguage executes code only if the language l@ exists. Otherwise raises an error. The argument of \bbl@fixname has to be a macro name, as it may get “fixed” if casing (lc/uc) is wrong. It’s an attempt to fix a long-standing bug when \foreignlanguage and the like appear in a \MakeXXXcase. However, a lowercase form is not imposed to improve backward compatibility (perhaps you defined a language named MYLANG, but unfortunately mixed case names cannot be trapped). Note l@ is encapsulated, so that its case does not change.

```

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

```

After a name has been ‘fixed’, the selectors will try to load the language. If even the fixed name is not defined, will load it on the fly, either based on its name, or if activated, its BCP47 code.

We first need a couple of macros for a simple BCP 47 look up. It also makes sure, with \bbl@bcpcase, casing is the correct one, so that sr-latn-ba becomes fr-Latn-BA. Note #4 may contain some \@empty’s, but they are eventually removed. \bbl@bcpllookup either returns the found ini or it is \relax.

```

474 \def\bbl@bcpcase#1#2#3#4\@@#5{%
475 \ifx\@empty#3%
476 \uppercase{\def#5{#1#2}}%
477 \else
478 \uppercase{\def#5{#1}}%
479 \lowercase{\edef#5{#5#2#3#4}}%
480 \fi}
481 \def\bbl@bcpllookup#1-#2-#3-#4\@@{%
482 \let\bbl@bcp\relax
483 \lowercase{\def\bbl@tempa{#1}}%
484 \ifx\@empty#2%
485 \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
486 \else\ifx\@empty#3%
487 \bbl@bcpcase#2\@empty\@empty\@@\bbl@tempb
488 \IfFileExists{babel-\bbl@tempa-\bbl@tempb.ini}%
489 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb}}%
490 {}%
491 \ifx\bbl@bcp\relax

```

```

492 \IfFileExists{babel-\bb@tempa.ini}{\let\bb@bcp\bb@tempa}{}%
493 \fi
494 \else
495 \bb@bcp#2\@empty\@empty\@empty\@empty\bb@tempb
496 \bb@bcp#3\@empty\@empty\@empty\@empty\bb@tempc
497 \IfFileExists{babel-\bb@tempa-\bb@tempb-\bb@tempc.ini}%
498 {\edef\bb@bcp{\bb@tempa-\bb@tempb-\bb@tempc}}%
499 {}%
500 \ifx\bb@bcp\relax
501 \IfFileExists{babel-\bb@tempa-\bb@tempc.ini}%
502 {\edef\bb@bcp{\bb@tempa-\bb@tempc}}%
503 {}%
504 \fi
505 \ifx\bb@bcp\relax
506 \IfFileExists{babel-\bb@tempa-\bb@tempc.ini}%
507 {\edef\bb@bcp{\bb@tempa-\bb@tempc}}%
508 {}%
509 \fi
510 \ifx\bb@bcp\relax
511 \IfFileExists{babel-\bb@tempa.ini}{\let\bb@bcp\bb@tempa}{}%
512 \fi
513 \fi\fi}
514 \let\bb@initload\relax
515 \def\bb@provide@locale{%
516 \ifx\babelprovide\undefined
517 \bb@error{For a language to be defined on the fly 'base'\\%
518 is not enough, and the whole package must be\\%
519 loaded. Either delete the 'base' option or\\%
520 request the languages explicitly}%
521 {See the manual for further details.}%
522 \fi
523 % TODO. Option to search if loaded, with \LocaleForEach
524 \let\bb@auxname\language % Still necessary. TODO
525 \bb@ifunset{\bb@bcp@map@\language}{}% Move uplevel??
526 {\edef\language{\@nameuse{\bb@bcp@map@\language}}}%
527 \ifbb@bcp@allowed
528 \expandafter\ifx\csname date\language\endcsname\relax
529 \expandafter
530 \bb@bcp@lookup\language-\@empty-\@empty-\@empty\@empty
531 \ifx\bb@bcp\relax\else % Returned by \bb@bcp@lookup
532 \edef\language{\bb@bcp@prefix\bb@bcp}%
533 \edef\localename{\bb@bcp@prefix\bb@bcp}%
534 \expandafter\ifx\csname date\language\endcsname\relax
535 \let\bb@initload\bb@bcp
536 \bb@exp{\babelprovide[\bb@autoload@bcptoptions]{\language}}%
537 \let\bb@initload\relax
538 \fi
539 \bb@csarg\xdef{bcp@map@\bb@bcp}{\localename}%
540 \fi
541 \fi
542 \fi
543 \expandafter\ifx\csname date\language\endcsname\relax
544 \IfFileExists{babel-\language.tex}%
545 {\bb@exp{\babelprovide[\bb@autoload@options]{\language}}}%
546 {}%
547 \fi}

```

`\iflanguage` Users might want to test (in a private package for instance) which language is currently active. For this we provide a test macro, `\iflanguage`, that has three arguments. It checks whether the first

argument is a known language. If so, it compares the first argument with the value of `\language`. Then, depending on the result of the comparison, it executes either the second or the third argument.

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

8.1 Selecting the language

`\selectlanguage` The macro `\selectlanguage` checks whether the language is already defined before it performs its actual task, which is to update `\language` and activate language-specific definitions.

```
555 \let\bbl@select@type\z@
556 \edef\selectlanguage{%
557   \noexpand\protect
558   \expandafter\noexpand\csname selectlanguage \endcsname}
```

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

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

The following definition is preserved for backwards compatibility (eg, arabi, koma). It is related to a trick for 2.09, now discarded.

```
560 \let\xstring\string
```

Since version 3.5 babel writes entries to the auxiliary files in order to typeset table of contents etc. in the correct language environment.

`\bbl@pop@language` But when the language change happens *inside* a group the end of the group doesn't write anything to the auxiliary files. Therefore we need TeX's `aftergroup` mechanism to help us. The command `\aftergroup` stores the token immediately following it to be executed when the current group is closed. So we define a temporary control sequence `\bbl@pop@language` to be executed at the end of the group. It calls `\bbl@set@language` with the name of the current language as its argument.

`\bbl@language@stack` The previous solution works for one level of nesting groups, but as soon as more levels are used it is no longer adequate. For that case we need to keep track of the nested languages using a stack mechanism. This stack is called `\bbl@language@stack` and initially empty.

```
561 \def\bbl@language@stack{}
```

When using a stack we need a mechanism to push an element on the stack and to retrieve the information afterwards.

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

```
562 \def\bbl@push@language{%
563   \ifx\language\@undefined\else
564     \ifx\currentgroup\@undefined
565       \xdef\bbl@language@stack{\language+\bbl@language@stack}%
566     \else
567       \ifnum\currentgroup=1\z@
568         \xdef\bbl@language@stack{\language+}%
569       \else
570         \xdef\bbl@language@stack{\language+\bbl@language@stack}%
571       \fi
572     \fi
573   \fi}
```

Retrieving information from the stack is a little bit less simple, as we need to remove the element from the stack while storing it in the macro `\language`. For this we first define a helper function.

`\bbl@pop@lang` This macro stores its first element (which is delimited by the ‘+’-sign) in `\language` and stores the rest of the string in `\bbl@language@stack`.

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

The reason for the somewhat weird arrangement of arguments to the helper function is the fact it is called in the following way. This means that before `\bbl@pop@lang` is executed \TeX first *expands* the stack, stored in `\bbl@language@stack`. The result of that is that the argument string of `\bbl@pop@lang` contains one or more language names, each followed by a ‘+’-sign (zero language names won’t occur as this macro will only be called after something has been pushed on the stack).

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

Once the name of the previous language is retrieved from the stack, it is fed to `\bbl@set@language` to do the actual work of switching everything that needs switching.

An alternative way to identify languages (in the babel sense) with a numerical value is introduced in 3.30. This is one of the first steps for a new interface based on the concept of locale, which explains the name of `\localeid`. This means `\l@...` will be reserved for hyphenation patterns (so that two locales can share the same rules).

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

The unprotected part of `\selectlanguage`.

```
601 \expandafter\def\csname selectlanguage \endcsname#1{%
602   \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\tw@%fi
603   \bbl@push@language
604   \aftergroup\bbl@pop@language
605   \bbl@set@language{#1}}
```

`\bbl@set@language` The macro `\bbl@set@language` takes care of switching the language environment *and* of writing entries on the auxiliary files. For historical reasons, language names can be either language of `\language`. To catch either form a trick is used, but unfortunately as a side effect the catcodes of letters in `\language` are messed up. This is a bug, but preserved for backwards compatibility.

The list of auxiliary files can be extended by redefining `\BabelContentsFiles`, but make sure they are loaded inside a group (as `aux`, `toc`, `lof`, and `lot` do) or the last language of the document will remain active afterwards.

We also write a command to change the current language in the auxiliary files.

`\bbl@savelastskip` is used to deal with skips before the write whatsit (as suggested by U Fischer).

Adapted from `hyperref`, but it might fail, so I'll consider it a temporary hack, while I study other options (the ideal, but very likely unfeasible except perhaps in `luatex`, is to avoid the `\write` altogether when not needed).

```

606 \def\BabelContentsFiles{toc,lof,lot}
607 \def\bbl@set@language#1{% from selectlanguage, pop@
608   % The old buggy way. Preserved for compatibility.
609   \edef\language#1%
610     \ifnum\escapechar=\expandafter`\string#1\@empty
611     \else\string#1\@empty\fi}%
612 \ifcat\relax\noexpand#1%
613   \expandafter\ifx\csname date\language\endcsname\relax
614     \edef\language{#1}%
615     \let\localename\language
616   \else
617     \bbl@info{Using '\string\language' instead of 'language' is\\%
618       deprecated. If what you want is to use a\\%
619       macro containing the actual locale, make\\%
620       sure it does not not match any language.\\%
621       Reported}%
622     \ifx\scantokens\@undefined
623       \def\localename{??}%
624     \else
625       \scantokens\expandafter{\expandafter
626         \def\expandafter\localename\expandafter{\language}}%
627     \fi
628   \fi
629 \else
630   \def\localename{#1}% This one has the correct catcodes
631 \fi
632 \select@language{\language}%
633 % write to auxs
634 \expandafter\ifx\csname date\language\endcsname\relax\else
635   \if@filesw
636     \ifx\babel@aux\@gobbletwo\else % Set if single in the first, redundant
637       \bbl@savelastskip
638       \protected@write\@auxout{}\string\babel@aux{\bbl@auxname}{}}%
639       \bbl@restorelastskip
640     \fi
641     \bbl@usehooks{write}{}%
642   \fi
643 \fi}
644 %
645 \let\bbl@restorelastskip\relax
646 \let\bbl@savelastskip\relax
647 %
648 \newif\ifbbl@bcpallowed
649 \bbl@bcpallowedfalse
650 \def\select@language#1{% from set@, babel@aux
651   \ifx\bbl@selectorname\@empty
652     \def\bbl@selectorname{select}%
653   % set hymap
654   \fi
655   \ifnum\bbl@hymapsel=\@cclv\chardef\bbl@hymapsel4\relax\fi

```



```

656 % set name
657 \edef\language{#1}%
658 \bbl@fixname\language
659 % TODO. name@map must be here?
660 \bbl@provide@locale
661 \bbl@iflanguage\language{%
662   \expandafter\ifx\csname date\language\endcsname\relax
663     \bbl@error
664     {Unknown language '\language'. Either you have\\%
665      misspelled its name, it has not been installed,\\%
666      or you requested it in a previous run. Fix its name,\\%
667      install it or just rerun the file, respectively. In\\%
668      some cases, you may need to remove the aux file}%
669     {You may proceed, but expect wrong results}%
670   \else
671     % set type
672     \let\bbl@select@type\z@
673     \expandafter\bbl@switch\expandafter{\language}%
674     \fi}}
675 \def\babel@aux#1#2{%
676   \select@language{#1}%
677   \bbl@foreach\BabelContentsFiles{% \relax -> don't assume vertical mode
678     \@writefile{##1}{\babel@toc{#1}{#2}\relax}}% TODO - plain?
679 \def\babel@toc#1#2{%
680   \select@language{#1}}

```

First, check if the user asks for a known language. If so, update the value of `\language` and call `\originalTeX` to bring \TeX in a certain pre-defined state.

The name of the language is stored in the control sequence `\language`.

Then we have to redefine `\originalTeX` to compensate for the things that have been activated. To save memory space for the macro definition of `\originalTeX`, we construct the control sequence name for the `\noextras<lang>` command at definition time by expanding the `\csname` primitive. Now activate the language-specific definitions. This is done by constructing the names of three macros by concatenating three words with the argument of `\selectlanguage`, and calling these macros.

The switching of the values of `\lefthyphenmin` and `\righthyphenmin` is somewhat different. First we save their current values, then we check if `\<lang>hyphenmins` is defined. If it is not, we set default values (2 and 3), otherwise the values in `\<lang>hyphenmins` will be used.

```

681 \newif\ifbbl@usedatagroup
682 \def\bbl@switch#1{% from select@, foreign@
683   % make sure there is info for the language if so requested
684   \bbl@ensureinfo{#1}%
685   % restore
686   \originalTeX
687   \expandafter\def\expandafter\originalTeX\expandafter{%
688     \csname noextras#1\endcsname
689     \let\originalTeX\@empty
690     \babel@beginsave}%
691   \bbl@usehooks{afterreset}}%
692   \languageshorthands{none}%
693   % set the locale id
694   \bbl@id@assign
695   % switch captions, date
696   % No text is supposed to be added here, so we remove any
697   % spurious spaces.
698   \bbl@bsphack
699   \ifcase\bbl@select@type
700     \csname captions#1\endcsname\relax
701     \csname date#1\endcsname\relax

```

```

702 \else
703 \bbl@xin@{,captions,}{, \bbl@select@opts,}%
704 \ifin@
705 \csname captions#1\endcsname\relax
706 \fi
707 \bbl@xin@{,date,}{, \bbl@select@opts,}%
708 \ifin@ % if \foreign... within \<lang>date
709 \csname date#1\endcsname\relax
710 \fi
711 \fi
712 \bbl@esphack
713 % switch extras
714 \bbl@usehooks{beforeextras}{}%
715 \csname extras#1\endcsname\relax
716 \bbl@usehooks{afterextras}{}%
717 % > babel-ensure
718 % > babel-sh-<short>
719 % > babel-bidi
720 % > babel-fontspec
721 % hyphenation - case mapping
722 \ifcase\bbl@opt@hyphenmap\or
723 \def\BabelLower##1##2{\lccode##1=##2\relax}%
724 \ifnum\bbl@hymapsel>4\else
725 \csname\language\name @bbl@hyphenmap\endcsname
726 \fi
727 \chardef\bbl@opt@hyphenmap\z@
728 \else
729 \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
730 \csname\language\name @bbl@hyphenmap\endcsname
731 \fi
732 \fi
733 \let\bbl@hymapsel@cclv
734 % hyphenation - select rules
735 \ifnum\csname l@\language\name\endcsname=\l@unhyphenated
736 \edef\bbl@tempa{u}%
737 \else
738 \edef\bbl@tempa{\bbl@c1\lnbrk}%
739 \fi
740 % linebreaking - handle u, e, k (v in the future)
741 \bbl@xin@{/u}{/\bbl@tempa}%
742 \ifin@ \else \bbl@xin@{/e}{/\bbl@tempa} \fi % elongated forms
743 \ifin@ \else \bbl@xin@{/k}{/\bbl@tempa} \fi % only kashida
744 \ifin@ \else \bbl@xin@{/v}{/\bbl@tempa} \fi % variable font
745 \ifin@
746 % unhyphenated/kashida/elongated = allow stretching
747 \language\l@unhyphenated
748 \babel@savevariable\emergencystretch
749 \emergencystretch\maxdimen
750 \babel@savevariable\hbadness
751 \hbadness\@M
752 \else
753 % other = select patterns
754 \bbl@patterns{#1}%
755 \fi
756 % hyphenation - mins
757 \babel@savevariable\lefthyphenmin
758 \babel@savevariable\righthyphenmin
759 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
760 \set@hyphenmins\tw@\thr@\@relax

```

```

761 \else
762 \expandafter\expandafter\expandafter\set@hyphenmins
763 \csname #1hyphenmins\endcsname\relax
764 \fi
765 \let\bbl@selectorname\@empty}

```

`otherlanguage` The `otherlanguage` environment can be used as an alternative to using the `\selectlanguage` declarative command. When you are typesetting a document which mixes left-to-right and right-to-left typesetting you have to use this environment in order to let things work as you expect them to.

The `\ignorespaces` command is necessary to hide the environment when it is entered in horizontal mode.

```

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

```

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

```

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

```

`otherlanguage*` The `otherlanguage` environment is meant to be used when a large part of text from a different language needs to be typeset, but without changing the translation of words such as ‘figure’. This environment makes use of `\foreign@language`.

```

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

```

At the end of the environment we need to switch off the extra definitions. The grouping mechanism of the environment will take care of resetting the correct hyphenation rules and “extras”.

```

780 \expandafter\let\csname endotherlanguage*\endcsname\relax

```

`\foreignlanguage` The `\foreignlanguage` command is another substitute for the `\selectlanguage` command. This command takes two arguments, the first argument is the name of the language to use for typesetting the text specified in the second argument.

Unlike `\selectlanguage` this command doesn’t switch *everything*, it only switches the hyphenation rules and the extra definitions for the language specified. It does this within a group and assumes the `\extras<lang>` command doesn’t make any `\global` changes. The coding is very similar to part of `\selectlanguage`.

`\bbl@beforeforeign` is a trick to fix a bug in bidi texts. `\foreignlanguage` is supposed to be a ‘text’ command, and therefore it must emit a `\leavevmode`, but it does not, and therefore the indent is placed on the opposite margin. For backward compatibility, however, it is done only if a right-to-left script is requested; otherwise, it is no-op.

(3.11) `\foreignlanguage*` is a temporary, experimental macro for a few lines with a different script direction, while preserving the paragraph format (thank the braces around `\par`, things like `\hangindent` are not reset). Do not use it in production, because its semantics and its syntax may change (and very likely will, or even it could be removed altogether). Currently it enters in vmode and then selects the language (which in turn sets the paragraph direction).

(3.11) Also experimental are the hook `foreign` and `foreign*`. With them you can redefine `\BabelText` which by default does nothing. Its behavior is not well defined yet. So, use it in horizontal mode only if you do not want surprises.

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

```

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

```

`\foreign@language` This macro does the work for `\foreignlanguage` and the other `language*` environment. First we need to store the name of the language and check that it is a known language. Then it just calls `bbl@switch`.

```

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

```

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

```

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

```

\bbl@patterns This macro selects the hyphenation patterns by changing the `\language` register. If special hyphenation patterns are available specifically for the current font encoding, use them instead of the default.

It also sets hyphenation exceptions, but only once, because they are global (here language `\lccode`'s has been set, too). `\bbl@hyphenation@` is set to relax until the very first `\babelhyphenation`, so do nothing with this value. If the exceptions for a language (by its number, not its name, so that `:ENC` is taken into account) has been set, then use `\hyphenation` with both global and language exceptions and empty the latter to mark they must not be set again.

```

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

```

hyphenrules The environment `hyphenrules` can be used to select *just* the hyphenation rules. This environment does *not* change `\language` and when the hyphenation rules specified were not loaded it has no effect. Note however, `\lccode`'s and font encodings are not set at all, so in most cases you should use `otherlanguage*`.

```

868 \def\hyphenrules#1{%
869   \edef\bbl@tempf{#1}%
870   \bbl@fixname\bbl@tempf
871   \bbl@iflanguage\bbl@tempf{%
872     \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
873     \ifx\languageshorthands\undefined\else
874       \languageshorthands{none}%
875     \fi
876     \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax

```

```

877 \set@hyphenmins\tw@\thr@@\relax
878 \else
879 \expandafter\expandafter\expandafter\set@hyphenmins
880 \csname\bbl@tempf hyphenmins\endcsname\relax
881 \fi}}
882 \let\endhyphenrules\@empty

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

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

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

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

\ProvidesLanguage The identification code for each file is something that was introduced in  $\text{\LaTeX 2\epsilon}$ . When the
command \ProvidesFile does not exist, a dummy definition is provided temporarily. For use in the
language definition file the command \ProvidesLanguage is defined by babel.
Depending on the format, ie, on if the former is defined, we use a similar definition or not.

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

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

906 \ifx\originalTeX\@undefined\let\originalTeX\@empty\fi

Because this part of the code can be included in a format, we make sure that the macro which
initializes the save mechanism, \babel@beginsave, is not considered to be undefined.

907 \ifx\babel@beginsave\@undefined\let\babel@beginsave\relax\fi

A few macro names are reserved for future releases of babel, which will use the concept of ‘locale’:

908 \providecommand\setlocale{%
909 \bbl@error
910 {Not yet available}%
911 {Find an armchair, sit down and wait}}
912 \let\uselocale\setlocale
913 \let\locale\setlocale
914 \let\selectlocale\setlocale

```

```

915 \let\textlocale\setlocale
916 \let\textlanguage\setlocale
917 \let\language\setlocale

```

8.2 Errors

`\@nolanerr` `\@nopatterns` The babel package will signal an error when a documents tries to select a language that hasn't been defined earlier. When a user selects a language for which no hyphenation patterns were loaded into the format he will be given a warning about that fact. We revert to the patterns for `\language=0` in that case. In most formats that will be (US)english, but it might also be empty.

`\@noopterr` When the package was loaded without options not everything will work as expected. An error message is issued in that case.
 When the format knows about `\PackageError` it must be \TeX 2_{ϵ} , so we can safely use its error handling interface. Otherwise we'll have to 'keep it simple'.
 Infos are not written to the console, but on the other hand many people think warnings are errors, so a further message type is defined: an important info which is sent to the console.

```

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

```

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

```

954 \ifx\directlua\@undefined\else
955   \ifx\bbl@luapatterns\@undefined
956     \input luababel.def
957   \fi

```

```

958 \fi
959 <<Basic macros>>
960 \bbl@trace{Compatibility with language.def}
961 \ifx\bbl@languages@undefined
962   \ifx\directlua@undefined
963     \openin1 = language.def % TODO. Remove hardcoded number
964     \ifeof1
965       \closein1
966       \message{I couldn't find the file language.def}
967     \else
968       \closein1
969       \begingroup
970         \def\addlanguage#1#2#3#4#5{%
971           \expandafter\ifx\csname lang@#1\endcsname\relax\else
972             \global\expandafter\let\csname l@#1\expandafter\endcsname
973               \csname lang@#1\endcsname
974           \fi}%
975         \def\uselanguage#1{%
976           \input language.def
977         \endgroup
978       \fi
979     \fi
980   \chardef\l@english\z@
981 \fi

```

`\addto` It takes two arguments, a *<control sequence>* and TeX-code to be added to the *<control sequence>*. If the *<control sequence>* has not been defined before it is defined now. The control sequence could also expand to `\relax`, in which case a circular definition results. The net result is a stack overflow. Note there is an inconsistency, because the assignment in the last branch is global.

```

982 \def\addto#1#2{%
983   \ifx#1\@undefined
984     \def#1{#2}%
985   \else
986     \ifx#1\relax
987       \def#1{#2}%
988     \else
989       {\toks@\expandafter{#1#2}%
990        \xdef#1{the\toks@}}%
991   \fi
992 \fi}

```

The macro `\initiate@active@char` below takes all the necessary actions to make its argument a shorthand character. The real work is performed once for each character. But first we define a little tool. TODO. Always used with additional expansions. Move them here? Move the macro to basic?

```

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

```

`\bbl@redefine` To redefine a command, we save the old meaning of the macro. Then we redefine it to call the original macro with the ‘sanitized’ argument. The reason why we do it this way is that we don’t want to redefine the TeX macros completely in case their definitions change (they have changed in the past). A macro named `\macro` will be saved new control sequences named `\org@macro`.

```

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

```


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

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

`\bbl@redefineroobust` For commands that are redefined, but which *might* be robust we need a slightly more intelligent macro. A robust command `foo` is defined to expand to `\protect\foo_`. So it is necessary to check whether `\foo_` exists. The result is that the command that is being redefined is always robust afterwards. Therefore all we need to do now is define `\foo_`.

```
1007 \def\bbl@redefineroobust#1{%
1008   \edef\bbl@tempa{\bbl@stripslash#1}%
1009   \bbl@ifunset{\bbl@tempa\space}%
1010     {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
1011       \bbl@exp{\def\#1{\protect\<\bbl@tempa\space>}}}%
1012     {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}}%
1013     \@namedef{\bbl@tempa\space}}
1014 \@onlypreamble\bbl@redefineroobust
```

8.3 Hooks

Admittedly, the current implementation is a somewhat simplistic and does very little to catch errors, but it is meant for developers, after all. `\bbl@usehooks` is the commands used by babel to execute hooks defined for an event.

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

To ensure forward compatibility, arguments in hooks are set implicitly. So, if a further argument is added in the future, there is no need to change the existing code. Note events intended for `hyphen.cfg` are also loaded (just in case you need them for some reason).

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

```

1044 \def\bbl@tempa#1=#2\@{\NewHook{babel/#1}}
1045 \bbl@foreach\bbl@evargs{\bbl@tempa#1\@}%
1046 \fi

```

`\babelensure` The user command just parses the optional argument and creates a new macro named `\bbl@e@<language>`. We register a hook at the `afterextras` event which just executes this macro in a “complete” selection (which, if undefined, is `\relax` and does nothing). This part is somewhat involved because we have to make sure things are expanded the correct number of times. The macro `\bbl@e@<language>` contains `\bbl@ensure{<include>}{<exclude>}{<fontenc>}`, which in turn loops over the macros names in `\bbl@captionslist`, excluding (with the help of `\in@`) those in the exclude list. If the fontenc is given (and not `\relax`), the `\fontencoding` is also added. Then we loop over the include list, but if the macro already contains `\foreignlanguage`, nothing is done. Note this macro (1) is not restricted to the preamble, and (2) changes are local.

```

1047 \bbl@trace{Defining babelensure}
1048 \newcommand\babelensure[2][{}]{% TODO - revise test files
1049   \AddBabelHook{babel-ensure}{afterextras}{%
1050     \ifcase\bbl@select@type
1051       \bbl@cl{e}%
1052     \fi}%
1053   \begingroup
1054     \let\bbl@ens@include\@empty
1055     \let\bbl@ens@exclude\@empty
1056     \def\bbl@ens@fontenc{\relax}%
1057     \def\bbl@tempb##1{%
1058       \ifx\@empty##1\else\noexpand##1\expandafter\bbl@tempb\fi}%
1059     \edef\bbl@tempa{\bbl@tempb#1\@empty}%
1060     \def\bbl@tempb##1=#2\@{\@namedef{\bbl@ens@##1}{##2}}%
1061     \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
1062     \def\bbl@tempc{\bbl@ensure}%
1063     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1064       \expandafter{\bbl@ens@include}}%
1065     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1066       \expandafter{\bbl@ens@exclude}}%
1067     \toks@\expandafter{\bbl@tempc}%
1068     \bbl@exp{%
1069   \endgroup
1070   \def\<bbl@e@#2>{\the\toks@{\bbl@ens@fontenc}}}%
1071 \def\bbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
1072   \def\bbl@tempb##1{% elt for (excluding) \bbl@captionslist list
1073     \ifx##1\undefined % 3.32 - Don't assume the macro exists
1074       \edef##1{\noexpand\bbl@nocaption
1075         {\bbl@stripslash##1}{\language\name\bbl@stripslash##1}}%
1076     \fi
1077     \ifx##1\@empty\else
1078       \in@{##1}{#2}%
1079     \ifin\else
1080       \bbl@ifunset{\bbl@ensure@\language\name}%
1081       {\bbl@exp{%
1082         \\\DeclareRobustCommand\<bbl@ensure@\language\name>[1]{%
1083           \\\foreignlanguage{\language\name}%
1084           {\ifx\relax#3\else
1085             \\\fontencoding{#3}\selectfont
1086             \fi
1087             #####1}}}%
1088       }%
1089       \toks@\expandafter{##1}%
1090       \edef##1{%
1091         \bbl@csarg\noexpand{\ensure@\language\name}%
1092         {\the\toks@}}%

```

```

1093      \fi
1094      \expandafter\bb1@tempb
1095      \fi}%
1096 \expandafter\bb1@tempb\bb1@captionslist\today\@empty
1097 \def\bb1@tempa##1{% elt for include list
1098   \ifx##1\@empty\else
1099     \bb1@csarg\in{\ensure@\language\expandafter}\expandafter{##1}%
1100     \ifin\@else
1101       \bb1@tempb##1\@empty
1102     \fi
1103     \expandafter\bb1@tempa
1104   \fi}%
1105 \bb1@tempa#1\@empty}
1106 \def\bb1@captionslist{%
1107 \prefacename\refname\abstractname\bibname\chaptername\appendixname
1108 \contentsname\listfigurename\listtablename\indexname\figurename
1109 \tablename\partname\enclname\ccname\headtoname\pagename\seename
1110 \alsiname\proofname\glossaryname}

```

8.4 Setting up language files

`\LdfInit` `\LdfInit` macro takes two arguments. The first argument is the name of the language that will be defined in the language definition file; the second argument is either a control sequence or a string from which a control sequence should be constructed. The existence of the control sequence indicates that the file has been processed before.

At the start of processing a language definition file we always check the category code of the 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`.

```

1111 \bb1@trace{Macros for setting language files up}
1112 \def\bb1@ldfinit{%
1113   \let\bb1@screset\@empty
1114   \let\BabelStrings\bb1@opt@string
1115   \let\BabelOptions\@empty
1116   \let\BabelLanguages\relax
1117   \ifx\originalTeX\@undefined
1118     \let\originalTeX\@empty
1119   \else
1120     \originalTeX
1121   \fi}
1122 \def\LdfInit#1#2{%
1123   \chardef\atcatcode=\catcode`\@
1124   \catcode`\@=11\relax
1125   \chardef\eqcatcode=\catcode`\=
1126   \catcode`\==12\relax
1127   \expandafter\if\expandafter\@backslashchar
1128     \expandafter\@car\string#2\@nil
1129   \ifx#2\@undefined\else

```

```

1130 \ldf@quit{#1}%
1131 \fi
1132 \else
1133 \expandafter\ifx\csname#2\endcsname\relax\else
1134 \ldf@quit{#1}%
1135 \fi
1136 \fi
1137 \bbl@ldfinit}

```

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

```

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

```

`\ldf@finish` This macro takes one argument. It is the name of the language that was defined in the language definition file.
We load the local configuration file if one is present, we set the main language (taking into account that the argument might be a control sequence that needs to be expanded) and reset the category code of the @-sign.

```

1143 \def\bbl@afterldf#1{% TODO. Merge into the next macro? Unused elsewhere
1144 \bbl@afterlang
1145 \let\bbl@afterlang\relax
1146 \let\BabelModifiers\relax
1147 \let\bbl@screset\relax}%
1148 \def\ldf@finish#1{%
1149 \loadlocalcfg{#1}%
1150 \bbl@afterldf{#1}%
1151 \expandafter\main@language\expandafter{#1}%
1152 \catcode\@=\atcatcode \let\atcatcode\relax
1153 \catcode\==\eqcatcode \let\eqcatcode\relax}

```

After the preamble of the document the commands `\LdfInit`, `\ldf@quit` and `\ldf@finish` are no longer needed. Therefore they are turned into warning messages in `MTX`.

```

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

```

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

```

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

```

We also have to make sure that some code gets executed at the beginning of the document, either when the aux file is read or, if it does not exist, when the `\AtBeginDocument` is executed. Languages do not set `\pagedir`, so we set here for the whole document to the main `\bodydir`.

```

1162 \def\bbl@beforestart{%
1163 \def\@nolanerr##1{%
1164 \bbl@warning{Undefined language '##1' in aux.\Reported}}%
1165 \bbl@usehooks{beforestart}}}%
1166 \global\let\bbl@beforestart\relax}
1167 \AtBeginDocument{%
1168 {\@nameuse{bbl@beforestart}}% Group!
1169 \if@filesw

```

```

1170 \providecommand\babel@aux[2]{}%
1171 \immediate\write\@mainaux{%
1172 \string\providecommand\string\babel@aux[2]{}%
1173 \immediate\write\@mainaux{\string\nameuse{bbl@beforestart}}%
1174 \fi
1175 \expandafter\selectlanguage\expandafter{\bbl@main@language}%
1176 \ifbbl@single % must go after the line above.
1177 \renewcommand\selectlanguage[1]{}%
1178 \renewcommand\foreignlanguage[2]{#2}%
1179 \global\let\babel@aux\@gobbletwo % Also as flag
1180 \fi
1181 \ifcase\bbl@engine\or\pagedir\bodydir\fi} % TODO - a better place

```

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

```

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

```

8.5 Shorthands

`\bbl@add@special` The macro `\bbl@add@special` is used to add a new character (or single character control sequence) to the macro `\dospecials` (and `\@sanitize` if \LaTeX is used). It is used only at one place, namely when `\initiate@active@char` is called (which is ignored if the char has been made active before). Because `\@sanitize` can be undefined, we put the definition inside a conditional. Items are added to the lists without checking its existence or the original catcode. It does not hurt, but should be fixed. It's already done with `\nfss@catcodes`, added in 3.10.

```

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

```

`\bbl@remove@special` The companion of the former macro is `\bbl@remove@special`. It removes a character from the set macros `\dospecials` and `\@sanitize`, but it is not used at all in the babel core.

```

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

```

1214 \x}

`\initiate@active@char` A language definition file can call this macro to make a character active. This macro takes one argument, the character that is to be made active. When the character was already active this macro does nothing. Otherwise, this macro defines the control sequence `\normal@char⟨char⟩` to expand to the character in its ‘normal state’ and it defines the active character to expand to `\normal@char⟨char⟩` by default (`⟨char⟩` being the character to be made active). Later its definition can be changed to expand to `\active@char⟨char⟩` by calling `\bbl@activate{⟨char⟩}`. For example, to make the double quote character active one could have `\initiate@active@char{"}` in a language definition file. This defines " as `\active@prefix "\active@char"` (where the first " is the character with its original catcode, when the shorthand is created, and `\active@char` is a single token). In protected contexts, it expands to `\protect "` or `\noexpand "` (ie, with the original "); otherwise `\active@char` is executed. This macro in turn expands to `\normal@char` in “safe” contexts (eg, `\label`), but `\user@active` in normal “unsafe” ones. The latter search a definition in the user, language and system levels, in this order, but if none is found, `\normal@char` is used. However, a deactivated shorthand (with `\bbl@deactivate` is defined as `\active@prefix "\normal@char"`. The following macro is used to define shorthands in the three levels. It takes 4 arguments: the (string’ed) character, `\<level>@group`, `<level>@active` and `<next-level>@active` (except in system).

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

```

When there is also no current-level shorthand with an argument we will check whether there is a next-level defined shorthand for this active character.

```
1222 \long\@namedef{#3@arg#1}##1{%
1223   \expandafter\ifx\csname#2@sh@#1\string##1\endcsname\relax
1224     \bbl@afterelse\csname#4#1\endcsname##1%
1225   \else
1226     \bbl@afterfi\csname#2@sh@#1\string##1\endcsname
1227   \fi}%

```

`\initiate@active@char` calls `\@initiate@active@char` with 3 arguments. All of them are the same character with different catcodes: active, other (`\string’ed`) and the original one. This trick simplifies the code a lot.

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

```

The very first thing to do is saving the original catcode and the original definition, even if not active, which is possible (undefined characters require a special treatment to avoid making them `\relax` and preserving some degree of protection).

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

```

If the character is already active we provide the default expansion under this shorthand mechanism. Otherwise we write a message in the transcript file, and define `\normal@char⟨char⟩` to expand to the character in its default state. If the character is mathematically active when babel is loaded (for example `'`) the normal expansion is somewhat different to avoid an infinite loop (but it does not prevent the loop if the mathcode is set to `"8000 a posteriori`).

```

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

```

To prevent problems with the loading of other packages after babel we reset the catcode of the character to the original one at the end of the package and of each language file (except with `KeepShorthandsActive`). It is re-activate again at `\begin{document}`. We also need to make sure that the shorthands are active during the processing of the `.aux` file. Otherwise some citations may give unexpected results in the printout when a shorthand was used in the optional argument of `\bibitem` for example. Then we make it active (not strictly necessary, but done for backward compatibility).

```

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

```

Now we have set `\normal@char⟨char⟩`, we must define `\active@char⟨char⟩`, to be executed when the character is activated. We define the first level expansion of `\active@char⟨char⟩` to check the status of the `@safe@actives` flag. If it is set to true we expand to the `'normal'` version of this character, otherwise we call `\user@active⟨char⟩` to start the search of a definition in the user, language and system levels (or eventually `normal@char⟨char⟩`).

```

1262 \let\bbl@tempa\@firstoftwo
1263 \if\string^#2%
1264 \def\bbl@tempa{\noexpand\textormath}%
1265 \else
1266 \ifx\bbl@mathnormal\@undefined\else
1267 \let\bbl@tempa\bbl@mathnormal
1268 \fi
1269 \fi
1270 \expandafter\edef\csname active@char#2\endcsname{%
1271 \bbl@tempa
1272 {\noexpand\if@safe@actives
1273 \noexpand\expandafter
1274 \expandafter\noexpand\csname normal@char#2\endcsname
1275 \noexpand\else
1276 \noexpand\expandafter
1277 \expandafter\noexpand\csname bbl@doactive#2\endcsname
1278 \noexpand\fi}%
1279 {\expandafter\noexpand\csname normal@char#2\endcsname}}%
1280 \bbl@csarg\edef{doactive#2}{%
1281 \expandafter\noexpand\csname user@active#2\endcsname}%

```

We now define the default values which the shorthand is set to when activated or deactivated. It is set to the deactivated form (globally), so that the character expands to

`\active@prefix <char> \normal@char <char>`

(where `\active@char <char>` is one control sequence!).

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

The next level of the code checks whether a user has defined a shorthand for himself with this character. First we check for a single character shorthand. If that doesn't exist we check for a shorthand with an argument.

```
1289 \bbl@active@def#2\user@group{user@active}{language@active}%
1290 \bbl@active@def#2\language@group{language@active}{system@active}%
1291 \bbl@active@def#2\system@group{system@active}{normal@char}%
```

In order to do the right thing when a shorthand with an argument is used by itself at the end of the line we provide a definition for the case of an empty argument. For that case we let the shorthand character expand to its non-active self. Also, When a shorthand combination such as `' '` ends up in a heading \TeX would see `\protect'\protect'`. To prevent this from happening a couple of shorthand needs to be defined at user level.

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

Finally, a couple of special cases are taken care of. (1) If we are making the right quote (`'`) active we need to change `\pr@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.

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

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

```
1301 <<{*More package options}>> ≡
1302 \DeclareOption{math=active}{}
1303 \DeclareOption{math=normal}{\def\bbl@mathnormal{\noexpand\textormath}}
1304 <</More package options>>
```

Initiating a shorthand makes active the char. That is not strictly necessary but it is still done for backward compatibility. So we need to restore the original catcode at the end of package *and* the end of the ldf.

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


`\bbl@sh@select` This command helps the shorthand supporting macros to select how to proceed. Note that this macro needs to be expandable as do all the shorthand macros in order for them to work in expansion-only environments such as the argument of `\hyphenation`. This macro expects the name of a group of shorthands in its first argument and a shorthand character in its second argument. It will expand to either `\bbl@firstcs` or `\bbl@scndcs`. Hence two more arguments need to follow it.

```

1314 \def\bbl@sh@select#1#2{%
1315   \expandafter\ifx\csname#1@sh@#2@sel\endcsname\relax
1316     \bbl@afterelse\bbl@scndcs
1317   \else
1318     \bbl@afterfi\csname#1@sh@#2@sel\endcsname
1319   \fi}

```

`\active@prefix` The command `\active@prefix` which is used in the expansion of active characters has a function similar to `\OT1-cmd` in that it `\protect`s the active character whenever `\protect` is *not* `\@typeset@protect`. The `\@gobble` is needed to remove a token such as `\activechar:` (when the double colon was the active character to be dealt with). There are two definitions, depending of `\ifincsname` is available. If there is, the expansion will be more robust.

```

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

```

`\if@safe@actives` In some circumstances it is necessary to be able to change the expansion of an active character on the fly. For this purpose the switch `@safe@actives` is available. The setting of this switch should be checked in the first level expansion of `\active@char⟨char⟩`.

```

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

```

`\bbl@restore@actives` When the output routine kicks in while the active characters were made “safe” this must be undone in the headers to prevent unexpected typeset results. For this situation we define a command to make them “unsafe” again.

```

1350 \def\bbl@restore@actives{\if@safe@actives\@safe@activesfalse\fi}

```

`\bbl@activate` Both macros take one argument, like `\initiate@active@char`. The macro is used to change the definition of an active character to expand to `\active@char<char>` in the case of `\bbl@activate`, or `\normal@char<char>` in the case of `\bbl@deactivate`.

```

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

```

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

```

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

```

`\declare@shorthand` The command `\declare@shorthand` is used to declare a shorthand on a certain level. It takes three arguments:

1. a name for the collection of shorthands, i.e. 'system', or 'dutch';
2. the character (sequence) that makes up the shorthand, i.e. `~` or `"a`;
3. the code to be executed when the shorthand is encountered.

The auxiliary macro `\babel@texpdf` improves the interoperativity with `hyperref` and takes 4 arguments: (1) The \TeX code in text mode, (2) the string for `hyperref`, (3) the \TeX code in math mode, and (4), which is currently ignored, but it's meant for a string in math mode, like a minus sign instead of an hyphen (currently `hyperref` doesn't discriminate the mode). This macro may be used in `ldf` files.

```

1362 \def\babel@texpdf#1#2#3#4{%
1363   \ifx\texorpdfstring\undefined
1364     \textormath{#1}{#3}%
1365   \else
1366     \texorpdfstring{\textormath{#1}{#3}}{#2}%
1367     % \texorpdfstring{\textormath{#1}{#3}}{\textormath{#2}{#4}}%
1368   \fi}
1369 %
1370 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
1371 \def\@decl@short#1#2#3\@nil#4{%
1372   \def\bbl@tempa{#3}%
1373   \ifx\bbl@tempa\@empty
1374     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
1375     \bbl@ifunset{#1@sh@\string#2@}{}%
1376     {\def\bbl@tempa{#4}%
1377      \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbl@tempa
1378      \else
1379        \bbl@info
1380        {Redefining #1 shorthand \string#2\%
1381         in language \CurrentOption}%
1382      \fi}%
1383     \@namedef{#1@sh@\string#2@}{#4}%
1384   \else
1385     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@firstcs
1386     \bbl@ifunset{#1@sh@\string#2@\string#3@}{}%
1387     {\def\bbl@tempa{#4}%
1388      \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bbl@tempa
1389      \else
1390        \bbl@info
1391        {Redefining #1 shorthand \string#2\string#3\%

```

```

1392         in language \CurrentOption}%
1393     \fi}%
1394     \@namedef{#1@sh@\string#2@\string#3@}{#4}%
1395     \fi}

\textormath  Some of the shorthands that will be declared by the language definition files have to be usable in
              both text and mathmode. To achieve this the helper macro \textormath is provided.

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

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

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

\useshorthands This is the user level macro. It initializes and activates the character for use as a shorthand character
               (ie, it's active in the preamble). Languages can deactivate shorthands, so a starred version is also
               provided which activates them always after the language has been switched.

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

\defineshorthand Currently we only support two groups of user level shorthands, named internally user and
                 user@<lang> (language-dependent user shorthands). By default, only the first one is taken into
                 account, but if the former is also used (in the optional argument of \defineshorthand) a new level is
                 inserted for it (user@generic, done by \bb1@set@user@generic); we make also sure {} and
                 \protect are taken into account in this new top level.

1421 \def\user@language@group{user@\language@group}
1422 \def\bb1@set@user@generic#1#2{%
1423     \bb1@ifunset{user@generic@active#1}%
1424     {\bb1@active@def#1\user@language@group{user@active}{user@generic@active}%
1425         \bb1@active@def#1\user@group{user@generic@active}{language@active}%
1426         \expandafter\edef\csname#2@sh@#1@\endcsname{%
1427             \expandafter\noexpand\csname normal@char#1\endcsname}%
1428             \expandafter\edef\csname#2@sh@#1@\string\protect\endcsname{%
1429                 \expandafter\noexpand\csname user@active#1\endcsname}}%
1430     \@empty}
1431 \newcommand\defineshorthand[3][user]{%
1432     \edef\bb1@tempa{\zap@space#1 \@empty}%

```

```

1433 \bbl@for\bbl@tempb\bbl@tempa{%
1434 \if*\expandafter\@car\bbl@tempb\@nil
1435 \edef\bbl@tempb{user@\expandafter\@gobble\bbl@tempb}%
1436 \expandtwoargs
1437 \bbl@set@user@generic{\expandafter\string\@car#2\@nil}\bbl@tempb
1438 \fi
1439 \declare@shorthand{\bbl@tempb}{#2}{#3}}

```

`\languageshorthands` A user level command to change the language from which shorthands are used. Unfortunately, babel currently does not keep track of defined groups, and therefore there is no way to catch a possible change in casing to fix it in the same way languages names are fixed. [TODO].

```

1440 \def\languageshorthands#1{\def\language@group{#1}}

```

`\aliasshorthand` First the new shorthand needs to be initialized. Then, we define the new shorthand in terms of the original one, but note with `\aliasshorthands{"}{/}` is `\active@prefix /\active@char/`, so we still need to let the latest to `\active@char`.

```

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

```

`\@notshorthand`

```

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

```

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

```

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

```

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

```

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

```

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

```

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

```

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

or off.

```
1525 \newcommand\ifbabelshorthand[3]{\bbl@ifunset\bbl@active@string#1}{#3}{#2}}
```

`\bbl@prim@s` One of the internal macros that are involved in substituting `\prime` for each right quote in
`\bbl@pr@m@s` mathmode is `\prim@s`. This checks if the next character is a right quote. When the right quote is active, the definition of this macro needs to be adapted to look also for an active right quote; the hat could be active, too.

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

Usually the `~` is active and expands to `\penalty\@M\.`. When it is written to the `.aux` file it is written expanded. To prevent that and to be able to use the character `~` as a start character for a shorthand, it is redefined here as a one character shorthand on system level. The system declaration is in most cases redundant (when `~` is still a non-break space), and in some cases is inconvenient (if `~` has been redefined); however, for backward compatibility it is maintained (some existing documents may rely on the babel value).

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

`\OT1dqpos` The position of the double quote character is different for the OT1 and T1 encodings. It will later be
`\T1dqpos` selected using the `\f@encoding` macro. Therefore we define two macros here to store the position of the character in these encodings.

```
1548 \expandafter\def\csname OT1dqpos\endcsname{127}
1549 \expandafter\def\csname T1dqpos\endcsname{4}
```

When the macro `\f@encoding` is undefined (as it is in plain \TeX) we define it here to expand to OT1

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

8.6 Language attributes

Language attributes provide a means to give the user control over which features of the language definition files he wants to enable.

`\languageattribute` The macro `\languageattribute` checks whether its arguments are valid and then activates the selected language attribute. First check whether the language is known, and then process each attribute in the list.

```
1553 \bbl@trace{Language attributes}
1554 \newcommand\languageattribute[2]{%
```

```

1555 \def\bbl@tempc{#1}%
1556 \bbl@fixname\bbl@tempc
1557 \bbl@iflanguage\bbl@tempc{%
1558   \bbl@vforeach{#2}{%

```

We want to make sure that each attribute is selected only once; therefore we store the already selected attributes in `\bbl@known@attrs`. When that control sequence is not yet defined this attribute is certainly not selected before.

```

1559   \ifx\bbl@known@attrs\undefined
1560     \in@false
1561   \else
1562     \bbl@xin@{,\bbl@tempc-##1,}{,\bbl@known@attrs,}%
1563   \fi
1564   \ifin@
1565     \bbl@warning{%
1566       You have more than once selected the attribute '##1'\%
1567       for language #1. Reported}%
1568   \else

```

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

```

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

```

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

```

1577 \newcommand*{\@attrerr}[2]{%
1578   \bbl@error
1579   {The attribute #2 is unknown for language #1.}%
1580   {Your command will be ignored, type <return> to proceed}}

```

`\bbl@declare@ttribute` This command adds the new language/attribute combination to the list of known attributes. Then it defines a control sequence to be executed when the attribute is used in a document. The result of this should be that the macro `\extras...` for the current language is extended, otherwise the attribute will not work as its code is removed from memory at `\begin{document}`.

```

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

```

`\bbl@ifattributeset` This internal macro has 4 arguments. It can be used to interpret \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.

```

1588 \def\bbl@ifattributeset#1#2#3#4{%
1589   \ifx\bbl@known@attrs\undefined
1590     \in@false
1591   \else
1592     \bbl@xin@{,#1-#2,}{,\bbl@known@attrs,}%
1593   \fi

```

```

1594 \ifin@
1595 \bbl@afterelse#3%
1596 \else
1597 \bbl@afterfi#4%
1598 \fi}

```

`\bbl@ifknown@ttrib` An internal macro to check whether a given language/attribute is known. The macro takes 4 arguments, the language/attribute, the attribute list, the TeX-code to be executed when the attribute is known and the TeX-code to be executed otherwise. We first assume the attribute is unknown. Then we loop over the list of known attributes, trying to find a match.

```

1599 \def\bbl@ifknown@ttrib#1#2{%
1600 \let\bbl@tempa\@secondoftwo
1601 \bbl@loopx\bbl@tempb{#2}{%
1602 \expandafter\in\expandafter{\expandafter,\bbl@tempb,}{, #1,}%
1603 \ifin@
1604 \let\bbl@tempa\@firstoftwo
1605 \else
1606 \fi}%
1607 \bbl@tempa}

```

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

```

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

```

8.7 Support for saving macro definitions

To save the meaning of control sequences using `\babel@save`, we use temporary control sequences. To save hash table entries for these control sequences, we don't use the name of the control sequence to be saved to construct the temporary name. Instead we simply use the value of a counter, which is reset to zero each time we begin to save new values. This works well because we release the saved meanings before we begin to save a new set of control sequence meanings (see `\selectlanguage` and `\originalTeX`). Note undefined macros are not undefined any more when saved – they are `\relax`'ed.

`\babel@savecnt` The initialization of a new save cycle: reset the counter to zero.
`\babel@beginsave`

```

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

```

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

```

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

```

`\babel@save` The macro `\babel@save{<csname>}` saves the current meaning of the control sequence `<csname>` to `\originalTeX`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. The macro `\babel@savevariable{<variable>}` saves the value of the variable. `<variable>` can be anything allowed after the `\the` primitive.

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


```

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

```

`\bbl@frenchspacing` Some languages need to have `\frenchspacing` in effect. Others don't want that. The command `\bbl@nonfrenchspacing` switches it on when it isn't already in effect and `\bbl@nonfrenchspacing` switches it off if necessary. A more refined way to switch the catcodes is done with ini files. Here an auxiliary macro is defined, but the main part is in `\babelprovide`. This new method should be ideally the default one.

```

1631 \def\bbl@frenchspacing{%
1632   \ifnum\the\sfcode`\.=\@m
1633     \let\bbl@nonfrenchspacing\relax
1634   \else
1635     \frenchspacing
1636     \let\bbl@nonfrenchspacing\nonfrenchspacing
1637   \fi}
1638 \let\bbl@nonfrenchspacing\nonfrenchspacing
1639 \let\bbl@elt\relax
1640 \edef\bbl@fs@chars{%
1641   \bbl@elt{\string.}\@m{3000}\bbl@elt{\string?}\@m{3000}%
1642   \bbl@elt{\string!}\@m{3000}\bbl@elt{\string:}\@m{2000}%
1643   \bbl@elt{\string;}\@m{1500}\bbl@elt{\string,}\@m{1250}}
1644 \def\bbl@pre@fs{%
1645   \def\bbl@elt##1##2##3{\sfcode`##1=\the\sfcode`##1\relax}%
1646   \edef\bbl@save@sfcodes{\bbl@fs@chars}}%
1647 \def\bbl@post@fs{%
1648   \bbl@save@sfcodes
1649   \edef\bbl@tempa{\bbl@cl{frspc}}%
1650   \edef\bbl@tempa{\expandafter\@car\bbl@tempa\@nil}%
1651   \if u\bbl@tempa      % do nothing
1652   \else\if n\bbl@tempa % non french
1653     \def\bbl@elt##1##2##3{%
1654       \ifnum\sfcode`##1=##2\relax
1655         \babel@savevariable{\sfcode`##1}%
1656         \sfcode`##1=##3\relax
1657       \fi}%
1658     \bbl@fs@chars
1659   \else\if y\bbl@tempa % french
1660     \def\bbl@elt##1##2##3{%
1661       \ifnum\sfcode`##1=##3\relax
1662         \babel@savevariable{\sfcode`##1}%
1663         \sfcode`##1=##2\relax
1664       \fi}%
1665     \bbl@fs@chars
1666   \fi\fi\fi}

```

8.8 Short tags

`\babeltags` This macro is straightforward. After zapping spaces, we loop over the list and define the macros `\text{<tag>}` and `\<tag>`. Definitions are first expanded so that they don't contain `\csname` but the actual macro.

```

1667 \bbl@trace{Short tags}

```

```

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

```

8.9 Hyphens

`\babelhyphenation` This macro saves hyphenation exceptions. Two macros are used to store them: `\bbl@hyphenation@` for the global ones and `\bbl@hyphenation<lang>` for language ones. See `\bbl@patterns` above for further details. We make sure there is a space between words when multiple commands are used.

```

1682 \bbl@trace{Hyphens}
1683 \@onlypreamble\babelhyphenation
1684 \AtEndOfPackage{%
1685   \newcommand\babelhyphenation[2][\@empty]{%
1686     \ifx\bbl@hyphenation@relax
1687       \let\bbl@hyphenation@\@empty
1688     \fi
1689     \ifx\bbl@hyphlist\@empty\else
1690       \bbl@warning{%
1691         You must not intermingle \string\selectlanguage\space and\\%
1692         \string\babelhyphenation\space or some exceptions will not\\%
1693         be taken into account. Reported}%
1694     \fi
1695     \ifx\@empty#1%
1696       \protected@edef\bbl@hyphenation@{\bbl@hyphenation@\space#2}%
1697     \else
1698       \bbl@vforeach{#1}{%
1699         \def\bbl@tempa{##1}%
1700         \bbl@fixname\bbl@tempa
1701         \bbl@iflanguage\bbl@tempa{%
1702           \bbl@csarg\protected@edef{hyphenation@\bbl@tempa}{%
1703             \bbl@ifunset{bbl@hyphenation@\bbl@tempa}%
1704             {}%
1705             {\csname bbl@hyphenation@\bbl@tempa\endcsname\space}%
1706             #2}}}%
1707       \fi}}

```

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

```

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

³² $\mathrm{T}_{\mathrm{E}}\mathrm{X}$ begins and ends a word for hyphenation at a glue node. The penalty prevents a linebreak at this glue node.

```

1711 \newcommand\babelnullhyphen{\char\hyphenchar\font}
1712 \def\babelhyphen{\active@prefix\babelhyphen\bb1@hyphen}
1713 \def\bb1@hyphen{%
1714   \@ifstar{\bb1@hyphen@i @}{\bb1@hyphen@i \@empty}}
1715 \def\bb1@hyphen@i#1#2{%
1716   \bb1@ifunset{\bb1@hy@#1#2\@empty}%
1717   {\csname bb1@#1usehyphen\endcsname{\discretionary{#2}{}{#2}}}%
1718   {\csname bb1@hy@#1#2\@empty\endcsname}}

```

The following two commands are used to wrap the “hyphen” and set the behavior of the rest of the word – the version with a single @ is used when further hyphenation is allowed, while that with @@ if no more hyphens are allowed. In both cases, if the hyphen is preceded by a positive space, breaking after the hyphen is disallowed.

There should not be a discretionary after a hyphen at the beginning of a word, so it is prevented if preceded by a skip. Unfortunately, this does handle cases like “(-suffix)”. \nobreak is always preceded by \leavevmode, in case the shorthand starts a paragraph.

```

1719 \def\bb1@usehyphen#1{%
1720   \leavevmode
1721   \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
1722   \nobreak\hskip\z@skip}
1723 \def\bb1@@usehyphen#1{%
1724   \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}

```

The following macro inserts the hyphen char.

```

1725 \def\bb1@hyphenchar{%
1726   \ifnum\hyphenchar\font=\m@ne
1727     \babelnullhyphen
1728   \else
1729     \char\hyphenchar\font
1730   \fi}

```

Finally, we define the hyphen “types”. Their names will not change, so you may use them in ldf’s. After a space, the \mbox in \bb1@hy@nobreak is redundant.

```

1731 \def\bb1@hy@soft{\bb1@usehyphen{\discretionary{\bb1@hyphenchar}{}}{}}
1732 \def\bb1@hy@@soft{\bb1@usehyphen{\discretionary{\bb1@hyphenchar}{}}{}}
1733 \def\bb1@hy@hard{\bb1@usehyphen\bb1@hyphenchar}
1734 \def\bb1@hy@@hard{\bb1@usehyphen\bb1@hyphenchar}
1735 \def\bb1@hy@nobreak{\bb1@usehyphen{\mbox{\bb1@hyphenchar}}{}}
1736 \def\bb1@hy@@nobreak{\mbox{\bb1@hyphenchar}}
1737 \def\bb1@hy@repeat{%
1738   \bb1@usehyphen{%
1739     \discretionary{\bb1@hyphenchar}{\bb1@hyphenchar}{\bb1@hyphenchar}}}
1740 \def\bb1@hy@@repeat{%
1741   \bb1@usehyphen{%
1742     \discretionary{\bb1@hyphenchar}{\bb1@hyphenchar}{\bb1@hyphenchar}}}
1743 \def\bb1@hy@empty{\hskip\z@skip}
1744 \def\bb1@hy@@empty{\discretionary{}{}{}}

```

\bb1@disc For some languages the macro \bb1@disc is used to ease the insertion of discretionaries for letters that behave ‘abnormally’ at a breakpoint.

```

1745 \def\bb1@disc#1#2{\nobreak\discretionary{#2-}{#1}\bb1@allowhyphens}

```

8.10 Multiencoding strings

The aim following commands is to provide a common interface for strings in several encodings. They also contains several hooks which can be used by luatex and xetex. The code is organized here with pseudo-guards, so we start with the basic commands.

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

```

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

```

The second one. We need to patch `\@uclclist`, but it is done once and only if `\SetCase` is used or if strings are encoded. The code is far from satisfactory for several reasons, including the fact `\@uclclist` is not a list any more. Therefore a package option is added to ignore it. Instead of gobbling the macro getting the next two elements (usually `\reserved@a`), we pass it as argument to `\bbl@uclc`. The parser is restarted inside `\langle lang\rangle\bbl@uclc` because we do not know how many expansions are necessary (depends on whether strings are encoded). The last part is tricky – when uppercasing, we have:

```
\let\bbl@tolower\@empty\bbl@toupper\@empty
```

and starts over (and similarly when lowercasing).

```

1757 \@ifpackagewith{babel}{nocase}%
1758   {\let\bbl@patchuclc\relax}%
1759   {\def\bbl@patchuclc{%
1760     \global\let\bbl@patchuclc\relax
1761     \g@addto@macro\@uclclist{\reserved@b{\reserved@b\bbl@uclc}}%
1762     \gdef\bbl@uclc##1{%
1763       \let\bbl@encoded\bbl@encoded@uclc
1764       \bbl@ifunset{\language @bbl@uclc}% and resumes it
1765       {##1}%
1766       {\let\bbl@tempa##1\relax % Used by LANG@bbl@uclc
1767        \csname\language @bbl@uclc\endcsname}%
1768       {\bbl@tolower\@empty}{\bbl@toupper\@empty}}%
1769     \gdef\bbl@tolower{\csname\language @bbl@lc\endcsname}%
1770     \gdef\bbl@toupper{\csname\language @bbl@uc\endcsname}}}
1771 \langle *More package options\rangle \equiv
1772 \DeclareOption{nocase}{}
1773 \rangle /More package options\rangle

```

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

```

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

```

Main command This is the main command. With the first use it is redefined to omit the basic setup in subsequent blocks. We make sure strings contain actual letters in the range 128-255, not active characters.

```

1780 \@onlypreamble\StartBabelCommands
1781 \def\StartBabelCommands{%
1782   \begingroup

```

```

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

```

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

Select the behavior of \SetString. There are two main cases, depending on if there is an optional argument: without it and strings=encoded, strings are defined always; otherwise, they are set only if they are still undefined (ie, fallback values). With labelled blocks and strings=encoded, define the strings, but with another value, define strings only if the current label or font encoding is the value of strings; otherwise (ie, no strings or a block whose label is not in strings=) do nothing.

We presume the current block is not loaded, and therefore set (above) a couple of default values to gobble the arguments. Then, these macros are redefined if necessary according to several parameters.

```

1813 \newcommand\bbl@startcmds@ii[1][\@empty]{%
1814   \let\SetString\@gobbletwo
1815   \let\bbl@stringdef\@gobbletwo
1816   \let\AfterBabelCommands\@gobble
1817   \ifx\@empty#1%
1818     \def\bbl@sc@label{generic}%
1819     \def\bbl@encstring##1##2{%
1820       \ProvideTextCommandDefault##1{##2}%
1821       \bbl@tglobal##1%
1822       \expandafter\bbl@tglobal\csname\string?\string##1\endcsname}%
1823     \let\bbl@sc@test\in@true
1824   \else
1825     \let\bbl@sc@charset\space % <- zapped below
1826     \let\bbl@sc@fontenc\space % <- " "
1827     \def\bbl@tempa##1=##2\@nil{%
1828       \bbl@csarg\edef{sc\zap@space##1 \@empty}{##2 }}%
1829     \bbl@vforeach{label=#1}{\bbl@tempa##1\@nil}%
1830     \def\bbl@tempa##1 ##2{% space -> comma
1831       ##1%

```

```

1832 \ifx\@empty##2\else\ifx,##1,\else,\fi\bbl@afterfi\bbl@tempa##2\fi}%
1833 \edef\bbl@sc@fontenc{\expandafter\bbl@tempa\bbl@sc@fontenc\@empty}%
1834 \edef\bbl@sc@label{\expandafter\zap@space\bbl@sc@label\@empty}%
1835 \edef\bbl@sc@charset{\expandafter\zap@space\bbl@sc@charset\@empty}%
1836 \def\bbl@encstring##1##2{%
1837 \bbl@foreach\bbl@sc@fontenc{%
1838 \bbl@ifunset{T####1}%
1839 {}%
1840 {\ProvideTextCommand##1{####1}{##2}%
1841 \bbl@tglobal##1%
1842 \expandafter
1843 \bbl@tglobal\csname####1\string##1\endcsname}}}%
1844 \def\bbl@sctest{%
1845 \bbl@xin@{\, \bbl@opt@strings,}{, \bbl@sc@label, \bbl@sc@fontenc,}}%
1846 \fi
1847 \ifx\bbl@opt@strings\@nnil % ie, no strings key -> defaults
1848 \else\ifx\bbl@opt@strings\relax % ie, strings=encoded
1849 \let\AfterBabelCommands\bbl@aftercmds
1850 \let\SetString\bbl@setstring
1851 \let\bbl@stringdef\bbl@encstring
1852 \else % ie, strings=value
1853 \bbl@sctest
1854 \fin@
1855 \let\AfterBabelCommands\bbl@aftercmds
1856 \let\SetString\bbl@setstring
1857 \let\bbl@stringdef\bbl@provstring
1858 \fi\fi\fi
1859 \bbl@scswitch
1860 \ifx\bbl@G\@empty
1861 \def\SetString##1##2{%
1862 \bbl@error{Missing group for string \string##1}%
1863 {You must assign strings to some category, typically\\%
1864 captions or extras, but you set none}}%
1865 \fi
1866 \ifx\@empty#1%
1867 \bbl@usehooks{defaultcommands}}}%
1868 \else
1869 \@expandtwoargs
1870 \bbl@usehooks{encodedcommands}{\bbl@sc@charset}{\bbl@sc@fontenc}}%
1871 \fi}

```

There are two versions of `\bbl@scswitch`. The first version is used when `ldfs` are read, and it makes sure `\langle group \rangle \langle language \rangle` is reset, but only once (`\bbl@screset` is used to keep track of this). The second version is used in the preamble and packages loaded after `babel` and does nothing. The macro `\bbl@forlang` loops `\bbl@L` but its body is executed only if the value is in `\BabelLanguages` (inside `babel`) or `\date \langle language \rangle` is defined (after `babel` has been loaded). There are also two version of `\bbl@forlang`. The first one skips the current iteration if the language is not in `\BabelLanguages` (used in `ldfs`), and the second one skips undefined languages (after `babel` has been loaded).

```

1872 \def\bbl@forlang#1#2{%
1873 \bbl@for#1\bbl@L{%
1874 \bbl@xin@{, #1,}{, \BabelLanguages,}%
1875 \ifin@#2\relax\fi}}
1876 \def\bbl@scswitch{%
1877 \bbl@forlang\bbl@tempa{%
1878 \ifx\bbl@G\@empty\else
1879 \ifx\SetString\@gobbletwo\else
1880 \edef\bbl@GL{\bbl@G\bbl@tempa}%
1881 \bbl@xin@{\, \bbl@GL,}{, \bbl@screset,}%

```

```

1882     \ifin@ \else
1883     \global\expandafter\let\csname\bbl@GL\endcsname\@undefined
1884     \xdef\bbl@screset{\bbl@screset,\bbl@GL}%
1885     \fi
1886   \fi
1887 \fi}}
1888 \AtEndOfPackage{%
1889   \def\bbl@forlang#1#2{\bbl@for#1\bbl@L{\bbl@ifunset{date#1}{#2}}}%
1890   \let\bbl@scswitch\relax}
1891 \@onlypreamble\EndBabelCommands
1892 \def\EndBabelCommands{%
1893   \bbl@usehooks{stopcommands}{}%
1894   \endgroup
1895   \endgroup
1896   \bbl@scafter}
1897 \let\bbl@endcommands\EndBabelCommands

```

Now we define commands to be used inside \StartBabelCommands.

Strings The following macro is the actual definition of \SetString when it is “active” First save the “switcher”. Create it if undefined. Strings are defined only if undefined (ie, like \providescommand). With the event stringprocess you can preprocess the string by manipulating the value of \BabelString. If there are several hooks assigned to this event, preprocessing is done in the same order as defined. Finally, the string is set.

```

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

```

Now, some additional stuff to be used when encoded strings are used. Captions then include \bbl@encoded for string to be expanded in case transformations. It is \relax by default, but in \MakeUppercase and \MakeLowercase its value is a modified expandable \@changed@cmd.

```

1909 \ifx\bbl@opt@strings\relax
1910   \def\bbl@scset#1#2{\def#1{\bbl@encoded#2}}
1911   \bbl@patchuclc
1912   \let\bbl@encoded\relax
1913   \def\bbl@encoded@uclc#1{%
1914     \@inmathwarn#1%
1915     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
1916       \expandafter\ifx\csname ?\string#1\endcsname\relax
1917         \TextSymbolUnavailable#1%
1918       \else
1919         \csname ?\string#1\endcsname
1920       \fi
1921     \else
1922       \csname\cf@encoding\string#1\endcsname
1923     \fi}
1924 \else
1925   \def\bbl@scset#1#2{\def#1{#2}}
1926 \fi

```

Define `\SetStringLoop`, which is actually set inside `\StartBabelCommands`. The current definition is somewhat complicated because we need a count, but `\count@` is not under our control (remember `\SetString` may call hooks). Instead of defining a dedicated count, we just “pre-expand” its value.

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

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

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

Case mapping The command `\SetCase` provides a way to change the behavior of `\MakeUppercase` and `\MakeLowercase`. `\bbl@tempa` is set by the patched `\@uclclist` to the parsing command.

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

Macros to deal with case mapping for hyphenation. To decide if the document is monolingual or multilingual, we make a rough guess – just see if there is a comma in the languages list, built in the first pass of the package options.

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

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

```
1958 \newcommand\BabelLower[2]{% one to one.
1959   \ifnum\lccode#1=#2\else
1960     \babel@savevariable{\lccode#1}%
1961     \lccode#1=#2\relax
1962   \fi}
1963 \newcommand\BabelLowerMM[4]{% many-to-many
1964   \@tempcnta=#1\relax
1965   \@tempcntb=#4\relax
1966   \def\bbl@tempa{%
1967     \ifnum\@tempcnta>#2\else
1968       \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
```



```

1969      \advance\@tempcnta#3\relax
1970      \advance\@tempcntb#3\relax
1971      \expandafter\bb1@tempa
1972      \fi}%
1973      \bb1@tempa}
1974 \newcommand\BabelLowerM0[4]{% many-to-one
1975   \@tempcnta=#1\relax
1976   \def\bb1@tempa{%
1977     \ifnum\@tempcnta>#2\else
1978       \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
1979       \advance\@tempcnta#3
1980       \expandafter\bb1@tempa
1981       \fi}%
1982   \bb1@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

1983 <<(*More package options)>> ≡
1984 \DeclareOption{hyphenmap=off}{\chardef\bb1@opt@hyphenmap\z@}
1985 \DeclareOption{hyphenmap=first}{\chardef\bb1@opt@hyphenmap\@ne}
1986 \DeclareOption{hyphenmap=select}{\chardef\bb1@opt@hyphenmap\tw@}
1987 \DeclareOption{hyphenmap=other}{\chardef\bb1@opt@hyphenmap\thr@@}
1988 \DeclareOption{hyphenmap=other*}{\chardef\bb1@opt@hyphenmap4\relax}
1989 <</More package options>>

```

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

```

1990 \AtEndOfPackage{%
1991   \ifx\bb1@opt@hyphenmap\undefined
1992     \bb1@xin@{,}{\bb1@language@opts}%
1993     \chardef\bb1@opt@hyphenmap\ifin4\else\@ne\fi
1994   \fi}

```

This sections ends with a general tool for resetting the caption names with a unique interface. With the old way, which mixes the switcher and the string, we convert it to the new one, which separates these two steps.

```

1995 \newcommand\setlocalecaption{% TODO. Catch typos. What about ensure?
1996   \@ifstar\bb1@setcaption@s\bb1@setcaption@x}
1997 \def\bb1@setcaption@x#1#2#3{% language caption-name string
1998   \bb1@trim@def\bb1@tempa{#2}%
1999   \bb1@xin@{.template}{\bb1@tempa}%
2000   \ifin@
2001     \bb1@ini@captions@template{#3}{#1}%
2002   \else
2003     \edef\bb1@tempd{%
2004       \expandafter\expandafter\expandafter
2005       \strip@prefix\expandafter\meaning\csname captions#1\endcsname}%
2006     \bb1@xin@
2007       {\expandafter\string\csname #2name\endcsname}%
2008       {\bb1@tempd}%
2009     \ifin@ % Renew caption
2010       \bb1@xin@{\string\bb1@scset}{\bb1@tempd}%
2011       \ifin@
2012         \bb1@exp{%
2013           \\bb1@ifsamestring{\bb1@tempa}{\language\name}%
2014           {\bb1@scset\<#2name>\<#1#2name>}%
2015           {}}%
2016       \else % Old way converts to new way
2017         \bb1@ifunset{#1#2name}%
2018         {\bb1@exp{%
2019           \\bb1@add\<captions#1>\def\<#2name>\<#1#2name>}}%

```

```

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

```

8.11 Macros common to a number of languages

`\set@low@box` The following macro is used to lower quotes to the same level as the comma. It prepares its argument in box register 0.

```

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

```

`\save@sf@q` The macro `\save@sf@q` is used to save and reset the current space factor.

```

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

```

8.12 Making glyphs available

This section makes a number of glyphs available that either do not exist in the OT1 encoding and have to be ‘faked’, or that are not accessible through `T1enc.def`.

8.12.1 Quotation marks

`\quotedblbase` In the T1 encoding the opening double quote at the baseline is available as a separate character, accessible via `\quotedblbase`. In the OT1 encoding it is not available, therefore we make it available by lowering the normal open quote character to the baseline.

```

2058 \ProvideTextCommand{\quotedblbase}{OT1}{%
2059     \save@sf@q{\set@low@box{\textquotedblright\}}%

```

```
2060 \box\z@\kern-.04em\bb1@allowhyphens}}
```

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

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

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

```
2063 \ProvideTextCommand{\quotesinglbase}{OT1}{%
2064 \save@sf@q{\set@low@box{\textquoteright\}%
2065 \box\z@\kern-.04em\bb1@allowhyphens}}
```

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

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

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

```
2068 \ProvideTextCommand{\guillemetleft}{OT1}{%
2069 \ifmmode
2070 \ll
2071 \else
2072 \save@sf@q{\nobreak
2073 \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bb1@allowhyphens}%
2074 \fi}
2075 \ProvideTextCommand{\guillemetright}{OT1}{%
2076 \ifmmode
2077 \gg
2078 \else
2079 \save@sf@q{\nobreak
2080 \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bb1@allowhyphens}%
2081 \fi}
2082 \ProvideTextCommand{\guillemotleft}{OT1}{%
2083 \ifmmode
2084 \ll
2085 \else
2086 \save@sf@q{\nobreak
2087 \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bb1@allowhyphens}%
2088 \fi}
2089 \ProvideTextCommand{\guillemotright}{OT1}{%
2090 \ifmmode
2091 \gg
2092 \else
2093 \save@sf@q{\nobreak
2094 \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bb1@allowhyphens}%
2095 \fi}
```

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

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

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

```
2104 \ProvideTextCommand{\guilsinglleft}{OT1}{%
2105 \ifmmode
```

```

2106 <%
2107 \else
2108 \save@sf@q{\nobreak
2109 \raise.2ex\hbox{$\scriptscriptstyle<$}\bbl@allowhyphens}%
2110 \fi}
2111 \ProvideTextCommand{\guilsinglright}{OT1}{%
2112 \ifmmode
2113 >%
2114 \else
2115 \save@sf@q{\nobreak
2116 \raise.2ex\hbox{$\scriptscriptstyle>$}\bbl@allowhyphens}%
2117 \fi}

```

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

```

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

```

8.12.2 Letters

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

```

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

```

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

```

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

```

`\dj` The croatian language needs the letters `\dj` and `\DJ`; they are available in the T1 encoding, but not in
`\DJ` the OT1 encoding by default.

Some code to construct these glyphs for the OT1 encoding was made available to me by Stipčević Mario, (stipcevic@olimp.irb.hr).

```

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

```

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

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

\SS For the T1 encoding \SS is defined and selects a specific glyph from the font, but for other encodings it is not available. Therefore we make it available here.

```
2155 \DeclareTextCommand{\SS}{OT1}{SS}
2156 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}
```

8.12.3 Shorthands for quotation marks

Shorthands are provided for a number of different quotation marks, which make them usable both outside and inside mathmode. They are defined with \ProvideTextCommandDefault, but this is very likely not required because their definitions are based on encoding-dependent macros.

\glq The ‘german’ single quotes.

```
\grq
2157 \ProvideTextCommandDefault{\glq}{%
2158   \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}
```

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

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

\glqq The ‘german’ double quotes.

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

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

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

\flq The ‘french’ single guillemets.

```
\frq
2179 \ProvideTextCommandDefault{\flq}{%
2180   \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}
2181 \ProvideTextCommandDefault{\frq}{%
2182   \textormath{\guilsinglright}{\mbox{\guilsinglright}}}
```

\flqq The ‘french’ double guillemets.

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

8.12.4 Umlauts and tremas

The command `\` needs to have a different effect for different languages. For German for instance, the ‘umlaut’ should be positioned lower than the default position for placing it over the letters a, o, u, A, O and U. When placed over an e, i, E or I it can retain its normal position. For Dutch the same glyph is always placed in the lower position.

`\umlauthigh` To be able to provide both positions of `\` we provide two commands to switch the positioning, the default will be `\umlauthigh` (the normal positioning).

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

`\lower@umlaut` The command `\lower@umlaut` is used to position the `\` closer to the letter. We want the umlaut character lowered, nearer to the letter. To do this we need an extra *<dimen>* register.

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

The following code fools \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.

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

For all vowels we declare `\` to be a composite command which uses `\bbl@umlauta` or `\bbl@umlaute` to position the umlaut character. We need to be sure that these definitions override the ones that are provided when the package `fontenc` with option `OT1` is used. Therefore these declarations are postponed until the beginning of the document. Note these definitions only apply to some languages, but `babel` sets them for *all* languages – you may want to redefine `\bbl@umlauta` and/or `\bbl@umlaute` for a language in the corresponding `ldf` (using the `babel` switching mechanism, of course).

```
2210 \AtBeginDocument{%
2211   \DeclareTextCompositeCommand{\}{OT1}{a}{\bbl@umlauta{a}}%
2212   \DeclareTextCompositeCommand{\}{OT1}{e}{\bbl@umlaute{e}}%
2213   \DeclareTextCompositeCommand{\}{OT1}{i}{\bbl@umlaute{i}}%
2214   \DeclareTextCompositeCommand{\}{OT1}{\i}{\bbl@umlaute{i}}%
2215   \DeclareTextCompositeCommand{\}{OT1}{o}{\bbl@umlauta{o}}%
2216   \DeclareTextCompositeCommand{\}{OT1}{u}{\bbl@umlauta{u}}%
2217   \DeclareTextCompositeCommand{\}{OT1}{A}{\bbl@umlauta{A}}%
```

```

2218 \DeclareTextCompositeCommand{"}{OT1}{E}{\bbl@umlaut{E}}%
2219 \DeclareTextCompositeCommand{"}{OT1}{I}{\bbl@umlaut{I}}%
2220 \DeclareTextCompositeCommand{"}{OT1}{O}{\bbl@umlaut{O}}%
2221 \DeclareTextCompositeCommand{"}{OT1}{U}{\bbl@umlaut{U}}

```

Finally, make sure the default hyphenrules are defined (even if empty). For internal use, another empty \language is defined. Currently used in Amharic.

```

2222 \ifx\l@english\@undefined
2223 \chardef\l@english\z@
2224 \fi
2225 % The following is used to cancel rules in ini files (see Amharic).
2226 \ifx\l@unhyphenated\@undefined
2227 \newlanguage\l@unhyphenated
2228 \fi

```

8.13 Layout

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

```

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

```

8.14 Load engine specific macros

```

2264 \bbl@trace{Input engine specific macros}
2265 \ifcase\bbl@engine

```

```

2266 \input txtbabel.def
2267 \or
2268 \input luababel.def
2269 \or
2270 \input xebabel.def
2271 \fi

```

8.15 Creating and modifying languages

`\babelprovide` is a general purpose tool for creating and modifying languages. It creates the language infrastructure, and loads, if requested, an ini file. It may be used in conjunction to previously loaded ldf files.

```

2272 \bbl@trace{Creating languages and reading ini files}
2273 \let\bbl@extend@ini@gobble
2274 \newcommand\babelprovide[2][]{%
2275   \let\bbl@savelangname\languagename
2276   \edef\bbl@savelocaleid{\the\localeid}%
2277   % Set name and locale id
2278   \edef\languagename{#2}%
2279   \bbl@id@assign
2280   % Initialize keys
2281   \let\bbl@KVP@captions\@nil
2282   \let\bbl@KVP@date\@nil
2283   \let\bbl@KVP@import\@nil
2284   \let\bbl@KVP@main\@nil
2285   \let\bbl@KVP@script\@nil
2286   \let\bbl@KVP@language\@nil
2287   \let\bbl@KVP@hyphenrules\@nil
2288   \let\bbl@KVP@linebreaking\@nil
2289   \let\bbl@KVP@justification\@nil
2290   \let\bbl@KVP@mapfont\@nil
2291   \let\bbl@KVP@maparabic\@nil
2292   \let\bbl@KVP@mapdigits\@nil
2293   \let\bbl@KVP@intraspace\@nil
2294   \let\bbl@KVP@intrapenalty\@nil
2295   \let\bbl@KVP@onchar\@nil
2296   \let\bbl@KVP@transforms\@nil
2297   \global\let\bbl@release@transforms\@empty
2298   \let\bbl@KVP@alph\@nil
2299   \let\bbl@KVP@Alph\@nil
2300   \let\bbl@KVP@labels\@nil
2301   \bbl@csarg\let{KVP@labels*}\@nil
2302   \global\let\bbl@inidata\@empty
2303   \global\let\bbl@extend@ini@gobble
2304   \gdef\bbl@key@list{;}%
2305   \bbl@forkv{#1}{% TODO - error handling
2306     \in@{/}{##1}%
2307     \ifin@
2308       \global\let\bbl@extend@ini\bbl@extend@ini@aux
2309       \bbl@renewinikey##1\@{##2}%
2310     \else
2311       \bbl@csarg\def{KVP@##1}{##2}%
2312     \fi}%
2313   \chardef\bbl@howloaded=% 0:none; 1:ldf without ini; 2:ini
2314   \bbl@ifunset{date#2}\z@{\bbl@ifunset\bbl@llevel#2}\@one\tw@}%
2315   % == init ==
2316   \ifx\bbl@screset\@undefined
2317     \bbl@ldfinit
2318   \fi

```



```

2319 % ==
2320 \let\bbl@lbfkflag\relax % \@empty = do setup linebreak
2321 \ifcase\bbl@howloaded
2322   \let\bbl@lbfkflag\@empty % new
2323 \else
2324   \ifx\bbl@KVP@hyphenrules\@nil\else
2325     \let\bbl@lbfkflag\@empty
2326   \fi
2327   \ifx\bbl@KVP@import\@nil\else
2328     \let\bbl@lbfkflag\@empty
2329   \fi
2330 \fi
2331 % == import, captions ==
2332 \ifx\bbl@KVP@import\@nil\else
2333   \bbl@exp{\@bbl@ifblank{\bbl@KVP@import}}%
2334   {\ifx\bbl@initoload\relax
2335     \begingroup
2336       \def\BabelBeforeIni##1##2{\gdef\bbl@KVP@import{##1}\endinput}%
2337       \bbl@input@texini{#2}%
2338     \endgroup
2339   \else
2340     \xdef\bbl@KVP@import{\bbl@initoload}%
2341   \fi}%
2342 {}%
2343 \fi
2344 \ifx\bbl@KVP@captions\@nil
2345   \let\bbl@KVP@captions\bbl@KVP@import
2346 \fi
2347 % ==
2348 \ifx\bbl@KVP@transforms\@nil\else
2349   \bbl@replace\bbl@KVP@transforms{ }{,}%
2350 \fi
2351 % == Load ini ==
2352 \ifcase\bbl@howloaded
2353   \bbl@provide@new{#2}%
2354 \else
2355   \bbl@ifblank{#1}%
2356   {}% With \bbl@load@basic below
2357   {\bbl@provide@renew{#2}}%
2358 \fi
2359 % Post tasks
2360 % -----
2361 % == subsequent calls after the first provide for a locale ==
2362 \ifx\bbl@inidata\@empty\else
2363   \bbl@extend@ini{#2}%
2364 \fi
2365 % == ensure captions ==
2366 \ifx\bbl@KVP@captions\@nil\else
2367   \bbl@ifunset{\bbl@extracaps@#2}%
2368   {\bbl@exp{\@babelensure[exclude=\@today]{#2}}}%
2369   {\bbl@exp{\@babelensure[exclude=\@today,
2370     include=\[bbl@extracaps@#2]]{#2}}}%
2371   \bbl@ifunset{\bbl@ensure@language}%
2372   {\bbl@exp{%
2373     \\\DeclareRobustCommand\<bbl@ensure@language>[1]{%
2374       \\\foreignlanguage{language}%
2375       {###1}}}%
2376   {}%
2377   \bbl@exp{%

```

```

2378      \\bbl@toglobal\<bbl@ensure@\language\name>%
2379      \\bbl@toglobal\<bbl@ensure@\language\name\space>}%
2380  \fi
2381  % ==
2382  % At this point all parameters are defined if 'import'. Now we
2383  % execute some code depending on them. But what about if nothing was
2384  % imported? We just set the basic parameters, but still loading the
2385  % whole ini file.
2386  \bbl@load@basic{#2}%
2387  % == script, language ==
2388  % Override the values from ini or defines them
2389  \ifx\bbl@KVP@script\@nil\else
2390    \bbl@csarg\edef\sname{#2}{\bbl@KVP@script}%
2391  \fi
2392  \ifx\bbl@KVP@language\@nil\else
2393    \bbl@csarg\edef\lname{#2}{\bbl@KVP@language}%
2394  \fi
2395  % == onchar ==
2396  \ifx\bbl@KVP@onchar\@nil\else
2397    \bbl@luahyphenate
2398    \directlua{
2399      if Babel.locale_mapped == nil then
2400        Babel.locale_mapped = true
2401        Babel.linebreaking.add_before(Babel.locale_map)
2402        Babel.loc_to_scr = {}
2403        Babel.chr_to_loc = Babel.chr_to_loc or {}
2404      end}%
2405  \bbl@xin@{ ids }{ \bbl@KVP@onchar\space}%
2406  \ifin@
2407    \ifx\bbl@starthyphens\@undefined % Needed if no explicit selection
2408      \AddBabelHook{babel-onchar}{beforestart}{\bbl@starthyphens}%
2409    \fi
2410    \bbl@exp{\\bbl@add\\bbl@starthyphens
2411      {\\bbl@patterns@lua{\language\name}}}%
2412    % TODO - error/warning if no script
2413    \directlua{
2414      if Babel.script_blocks['\bbl@cl{sbc}'] then
2415        Babel.loc_to_scr[\the\localeid] =
2416          Babel.script_blocks['\bbl@cl{sbc}']
2417        Babel.locale_props[\the\localeid].lc = \the\localeid\space
2418        Babel.locale_props[\the\localeid].lg = \the\@nameuse{1@language}\space
2419      end
2420    }%
2421  \fi
2422  \bbl@xin@{ fonts }{ \bbl@KVP@onchar\space}%
2423  \ifin@
2424    \bbl@ifunset{bbl@lsys@\language\name}{\bbl@provide@lsys{\language\name}}}%
2425    \bbl@ifunset{bbl@wdir@\language\name}{\bbl@provide@dirs{\language\name}}}%
2426    \directlua{
2427      if Babel.script_blocks['\bbl@cl{sbc}'] then
2428        Babel.loc_to_scr[\the\localeid] =
2429          Babel.script_blocks['\bbl@cl{sbc}']
2430      end}%
2431  \ifx\bbl@mapselect\@undefined % TODO. almost the same as mapfont
2432    \AtBeginDocument{%
2433      \bbl@patchfont{\bbl@mapselect}%
2434      {\selectfont}}%
2435    \def\bbl@mapselect{%
2436      \let\bbl@mapselect\relax

```

```

2437     \edef\bbl@prefontid{\fontid\font}}%
2438 \def\bbl@mapdir##1{%
2439     {\def\language{##1}%
2440     \let\bbl@ifrestoring\@firstoftwo % To avoid font warning
2441     \bbl@switchfont
2442     \ifnum\fontid\font>\z@ % A hack, for the pgf nullfont hack
2443     \directlua{
2444         Babel.locale_props[\the\csname bbl@id@##1\endcsname]%
2445         ['/bbl@prefontid'] = \fontid\font\space}%
2446     \fi}}%
2447 \fi
2448 \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language}}}%
2449 \fi
2450 % TODO - catch non-valid values
2451 \fi
2452 % == mapfont ==
2453 % For bidi texts, to switch the font based on direction
2454 \ifx\bbl@KVP@mapfont\@nil\else
2455     \bbl@ifsamestring{\bbl@KVP@mapfont}{direction}}%
2456     {\bbl@error{Option '\bbl@KVP@mapfont' unknown for\
2457         mapfont. Use 'direction'.%
2458         {See the manual for details.}}}%
2459     \bbl@ifunset{\bbl@lsys@\language}{\bbl@provide@lsys{\language}}}%
2460     \bbl@ifunset{\bbl@wdir@\language}{\bbl@provide@dirs{\language}}}%
2461 \ifx\bbl@mapselect\@undefined % TODO. See onchar.
2462     \AtBeginDocument{%
2463         \bbl@patchfont{\bbl@mapselect}}%
2464     {\selectfont}}%
2465 \def\bbl@mapselect{%
2466     \let\bbl@mapselect\relax
2467     \edef\bbl@prefontid{\fontid\font}}%
2468 \def\bbl@mapdir##1{%
2469     {\def\language{##1}%
2470     \let\bbl@ifrestoring\@firstoftwo % avoid font warning
2471     \bbl@switchfont
2472     \directlua{Babel.fontmap
2473         [\the\csname bbl@wdir@##1\endcsname]%
2474         [\bbl@prefontid]=\fontid\font}}}%
2475 \fi
2476 \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language}}}%
2477 \fi
2478 % == Line breaking: intraspace, intrapenalty ==
2479 % For CJK, East Asian, Southeast Asian, if interspace in ini
2480 \ifx\bbl@KVP@intraspace\@nil\else % We can override the ini or set
2481     \bbl@csarg\edef{intsp@#2}{\bbl@KVP@intraspace}%
2482 \fi
2483 \bbl@provide@intraspace
2484 % == Line breaking: CJK quotes ==
2485 \ifcase\bbl@engine\or
2486     \bbl@xin{/c}{\bbl@c1{lnbrk}}%
2487 \ifin@
2488     \bbl@ifunset{\bbl@quote@\language}{}%
2489     {\directlua{
2490         Babel.locale_props[\the\localeid].cjk_quotes = {}
2491         local cs = 'op'
2492         for c in string.utfvalues(%
2493             [[\csname bbl@quote@\language\endcsname]]) do
2494             if Babel.cjk_characters[c].c == 'qu' then
2495                 Babel.locale_props[\the\localeid].cjk_quotes[c] = cs

```

```

2496         end
2497         cs = ( cs == 'op') and 'cl' or 'op'
2498     end
2499 }}%
2500 \fi
2501 \fi
2502 % == Line breaking: justification ==
2503 \ifx\bb1@KVP@justification\@nil\else
2504     \let\bb1@KVP@linebreaking\bb1@KVP@justification
2505 \fi
2506 \ifx\bb1@KVP@linebreaking\@nil\else
2507     \bb1@xin{,\bb1@KVP@linebreaking,}{,elongated,kashida,cjk,unhyphenated,}%
2508     \ifin@
2509         \bb1@csarg\xdef
2510             {lnbrk@\language\name}{\expandafter\@car\bb1@KVP@linebreaking\@nil}%
2511     \fi
2512 \fi
2513 \bb1@xin{/e}{/\bb1@cl{lnbrk}}%
2514 \ifin@else\bb1@xin{/k}{/\bb1@cl{lnbrk}}\fi
2515 \ifin@\bb1@arabicjust\fi
2516 % == Line breaking: hyphenate.other.(locale|script) ==
2517 \ifx\bb1@lbfkflag\@empty
2518     \bb1@ifunset{\bb1@hyotl@\language\name}{}%
2519     {\bb1@csarg\bb1@replace{hyotl@\language\name}{ },}%
2520     \bb1@startcommands*\language\name}%
2521     \bb1@csarg\bb1@foreach{hyotl@\language\name}{%
2522         \ifcase\bb1@engine
2523             \ifnum##1<257
2524                 \SetHyphenMap{\BabelLower{##1}{##1}}%
2525             \fi
2526             \else
2527                 \SetHyphenMap{\BabelLower{##1}{##1}}%
2528             \fi}%
2529     \bb1@endcommands}%
2530 \bb1@ifunset{\bb1@hyots@\language\name}{}%
2531 {\bb1@csarg\bb1@replace{hyots@\language\name}{ },}%
2532 \bb1@csarg\bb1@foreach{hyots@\language\name}{%
2533     \ifcase\bb1@engine
2534         \ifnum##1<257
2535             \global\lccode##1=##1\relax
2536         \fi
2537         \else
2538             \global\lccode##1=##1\relax
2539         \fi}%
2540 \fi
2541 % == Counters: maparabic ==
2542 % Native digits, if provided in ini (TeX level, xe and lua)
2543 \ifcase\bb1@engine\else
2544     \bb1@ifunset{\bb1@dgnat@\language\name}{}%
2545     {\expandafter\ifx\csname\bb1@dgnat@\language\name\endcsname\@empty\else
2546         \expandafter\expandafter\expandafter
2547         \bb1@setdigits\csname\bb1@dgnat@\language\name\endcsname
2548         \ifx\bb1@KVP@maparabic\@nil\else
2549             \ifx\bb1@latinarabic\@undefined
2550                 \expandafter\let\expandafter\@arabic
2551                 \csname\bb1@counter@\language\name\endcsname
2552             \else % ie, if layout=counters, which redefines \@arabic
2553                 \expandafter\let\expandafter\bb1@latinarabic
2554                 \csname\bb1@counter@\language\name\endcsname

```

```

2555         \fi
2556     \fi
2557 \fi}%
2558 \fi
2559 % == Counters: mapdigits ==
2560 % Native digits (lua level).
2561 \ifodd\bbl@engine
2562     \ifx\bbl@KVP@mapdigits\@nil\else
2563         \bbl@ifunset{bbl@dgnat\@languagename}{}%
2564         {\RequirePackage{luatexbase}%
2565         \bbl@activate@preotf
2566         \directlua{
2567             Babel = Babel or {}  %% -> presets in luababel
2568             Babel.digits_mapped = true
2569             Babel.digits = Babel.digits or {}
2570             Babel.digits[\the\localeid] =
2571                 table.pack(string.utfvalue('\bbl@cl{dgnat}'))
2572             if not Babel.numbers then
2573                 function Babel.numbers(head)
2574                     local LOCALE = Babel.attr_locale
2575                     local GLYPH = node.id'glyph'
2576                     local inmath = false
2577                     for item in node.traverse(head) do
2578                         if not inmath and item.id == GLYPH then
2579                             local temp = node.get_attribute(item, LOCALE)
2580                             if Babel.digits[temp] then
2581                                 local chr = item.char
2582                                 if chr > 47 and chr < 58 then
2583                                     item.char = Babel.digits[temp][chr-47]
2584                                 end
2585                             end
2586                             elseif item.id == node.id'math' then
2587                                 inmath = (item.subtype == 0)
2588                             end
2589                         end
2590                     return head
2591                 end
2592             end
2593         }}%
2594     \fi
2595 \fi
2596 % == Counters: alph, Alph ==
2597 % What if extras<lang> contains a \babel@save\@alph? It won't be
2598 % restored correctly when exiting the language, so we ignore
2599 % this change with the \bbl@alph@saved trick.
2600 \ifx\bbl@KVP@alph\@nil\else
2601     \bbl@extras@wrap{\bbl@alph@saved}%
2602     {\let\bbl@alph@saved\@alph}%
2603     {\let\@alph\bbl@alph@saved
2604     \babel@save\@alph}%
2605     \bbl@exp{%
2606         \bbl@add\<extras\languagename>{%
2607             \let\@alph<bbl@cntr@bbl@KVP@alph @\languagename>}}%
2608 \fi
2609 \ifx\bbl@KVP@Alph\@nil\else
2610     \bbl@extras@wrap{\bbl@Alph@saved}%
2611     {\let\bbl@Alph@saved\@Alph}%
2612     {\let\@Alph\bbl@Alph@saved
2613     \babel@save\@Alph}%

```

```

2614 \bbl@exp{%
2615   \\bbl@add<\extras\language>{%
2616     \let\\@Alph<\bbl@cntr@bbl@KVP@Alph @\language>}}%
2617 \fi
2618 % == require.babel in ini ==
2619 % To load or reload the babel-*.tex, if require.babel in ini
2620 \ifx\bbl@beforestart\relax\else % But not in doc aux or body
2621   \bbl@ifunset{bbl@rqtex@\language}{}%
2622     {\expandafter\ifx\csname bbl@rqtex@\language\endcsname\@empty\else
2623       \let\BabelBeforeIni@gobbletwo
2624       \chardef\atcatcode=\catcode`\@
2625       \catcode`\@=11\relax
2626       \bbl@input@texini{\bbl@cs{rqtex@\language}}%
2627       \catcode`\@=\atcatcode
2628       \let\atcatcode\relax
2629       \global\bbl@csarg\let{rqtex@\language}\relax
2630     \fi}%
2631 \fi
2632 % == frenchspacing ==
2633 \ifcase\bbl@howloaded\in@true\else\in@false\fi
2634 \ifin@else\bbl@xin@{typography/frenchspacing}{\bbl@key@list}\fi
2635 \ifin@
2636   \bbl@extras@wrap{\\bbl@pre@fs}%
2637   {\bbl@pre@fs}%
2638   {\bbl@post@fs}%
2639 \fi
2640 % == Release saved transforms ==
2641 \bbl@release@transforms\relax % \relax closes the last item.
2642 % == main ==
2643 \ifx\bbl@KVP@main\@nil % Restore only if not 'main'
2644   \let\language\bbl@savelangname
2645   \chardef\localeid\bbl@savelocaleid\relax
2646 \fi}

```

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

```

2647 \def\bbl@provide@new#1{%
2648   \@namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
2649   \@namedef{extras#1}{}%
2650   \@namedef{noextras#1}{}%
2651   \bbl@startcommands*{#1}{captions}%
2652   \ifx\bbl@KVP@captions\@nil % and also if import, implicit
2653     \def\bbl@tempb##1{% elt for \bbl@captionslist
2654       \ifx##1\@empty\else
2655         \bbl@exp{%
2656           \\SetString\\##1{%
2657             \\bbl@nocaption{\bbl@stripslash##1}{#1\bbl@stripslash##1}}%
2658           \expandafter\bbl@tempb
2659         \fi}%
2660     \expandafter\bbl@tempb\bbl@captionslist\@empty
2661   \else
2662     \ifx\bbl@initoload\relax
2663       \bbl@read@ini{\bbl@KVP@captions}2% % Here letters cat = 11
2664     \else
2665       \bbl@read@ini{\bbl@initoload}2% % Same
2666     \fi
2667   \fi
2668   \StartBabelCommands*{#1}{date}%
2669   \ifx\bbl@KVP@import\@nil

```

```

2670 \bbl@exp{%
2671 \\\SetString\\today{\\bbl@nocaption{today}{#1today}}}%
2672 \else
2673 \bbl@savetoday
2674 \bbl@savestate
2675 \fi
2676 \bbl@endcommands
2677 \bbl@load@basic{#1}%
2678 % == hyphenmins == (only if new)
2679 \bbl@exp{%
2680 \gdef\<#1hyphenmins>{%
2681 {\bbl@ifunset{bbl@lfthm@#1}{2}{\bbl@cs{lfthm@#1}}}%
2682 {\bbl@ifunset{bbl@rgthm@#1}{3}{\bbl@cs{rgthm@#1}}}}}%
2683 % == hyphenrules (also in renew) ==
2684 \bbl@provide@hyphens{#1}%
2685 \ifx\bbl@KVP@main\@nil\else
2686 \expandafter\main@language\expandafter{#1}%
2687 \fi}
2688 %
2689 \def\bbl@provide@renew#1{%
2690 \ifx\bbl@KVP@captions\@nil\else
2691 \StartBabelCommands*{#1}{captions}%
2692 \bbl@read@ini{\bbl@KVP@captions}2% % Here all letters cat = 11
2693 \EndBabelCommands
2694 \fi
2695 \ifx\bbl@KVP@import\@nil\else
2696 \StartBabelCommands*{#1}{date}%
2697 \bbl@savetoday
2698 \bbl@savestate
2699 \EndBabelCommands
2700 \fi
2701 % == hyphenrules (also in new) ==
2702 \ifx\bbl@lbfkflag\@empty
2703 \bbl@provide@hyphens{#1}%
2704 \fi}

```

Load the basic parameters (ids, typography, counters, and a few more), while captions and dates are left out. But it may happen some data has been loaded before automatically, so we first discard the saved values. (TODO. But preserving previous values would be useful.)

```

2705 \def\bbl@load@basic#1{%
2706 \ifcase\bbl@howloaded\or\or
2707 \ifcase\csname bbl@llevel@\language\endcsname
2708 \bbl@csarg\let{lname@\language}\relax
2709 \fi
2710 \fi
2711 \bbl@ifunset{bbl@lname@#1}%
2712 {\def\BabelBeforeIni##1##2{%
2713 \begingroup
2714 \let\bbl@ini@captions@aux\@gobbletwo
2715 \def\bbl@inidate ####1.####2.####3.####4\relax ####5####6}%
2716 \bbl@read@ini{##1}1%
2717 \ifx\bbl@initoload\relax\endinput\fi
2718 \endgroup}%
2719 \begingroup % boxed, to avoid extra spaces:
2720 \ifx\bbl@initoload\relax
2721 \bbl@input@texini{##1}%
2722 \else
2723 \setbox\z@\hbox{\BabelBeforeIni{\bbl@initoload}}}%
2724 \fi

```

```

2725 \endgroup}%
2726 {}

```

The hyphenrules option is handled with an auxiliary macro.

```

2727 \def\bbbl@provide@hyphens#1{%
2728 \let\bbbl@tempa\relax
2729 \ifx\bbbl@KVP@hyphenrules\@nil\else
2730 \bbbl@replace\bbbl@KVP@hyphenrules{ }{,}%
2731 \bbbl@foreach\bbbl@KVP@hyphenrules{%
2732 \ifx\bbbl@tempa\relax % if not yet found
2733 \bbbl@ifsamestring{##1}{+}%
2734 {\bbbl@exp{\addlanguage\<#1>}}}%
2735 }%
2736 \bbbl@ifunset{#1}%
2737 }%
2738 {\bbbl@exp{\let\bbbl@tempa\<#1>}}%
2739 \fi}%
2740 \fi
2741 \ifx\bbbl@tempa\relax % if no opt or no language in opt found
2742 \ifx\bbbl@KVP@import\@nil
2743 \ifx\bbbl@initoload\relax\else
2744 \bbbl@exp{%
2745 \bbbl@ifblank{\bbbl@cs{hyphr#1}}%
2746 }%
2747 {\let\bbbl@tempa\<#1>\bbbl@cl{hyphr}>}}%
2748 \fi
2749 \else % if importing
2750 \bbbl@exp{%
2751 \bbbl@ifblank{\bbbl@cs{hyphr#1}}%
2752 }%
2753 {\let\bbbl@tempa\<#1>\bbbl@cl{hyphr}>}}%
2754 \fi
2755 \fi
2756 \bbbl@ifunset{\bbbl@tempa}% ie, relax or undefined
2757 {\bbbl@ifunset{#1}% no hyphenrules found - fallback
2758 {\bbbl@exp{\adddialect\<#1>\language}}%
2759 }% so, #1<lang> is ok - nothing to do
2760 {\bbbl@exp{\adddialect\<#1>\bbbl@tempa}}% found in opt list or ini

```

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

```

2761 \def\bbbl@input@texini#1{%
2762 \bbbl@bsphack
2763 \bbbl@exp{%
2764 \catcode\@=14 \catcode\@=0
2765 \catcode\@{1 \catcode\@}=2
2766 \lowercase{\InputIfFileExists{babel-#1.tex}{}}%
2767 \catcode\@=\the\catcode\@relax
2768 \catcode\@=\the\catcode\@relax
2769 \catcode\@=\the\catcode\@relax
2770 \catcode\@=\the\catcode\@relax}%
2771 \bbbl@esphack}

```

The following macros read and store ini files (but don't process them). For each line, there are 3 possible actions: ignore if starts with ;, switch section if starts with [, and store otherwise. There are used in the first step of \bbbl@read@ini.

```

2772 \def\bbbl@inline#1\bbbl@inline{%
2773 \@ifnextchar[\bbbl@inisect{\@ifnextchar\bbbl@iniskip\bbbl@inistore}#1\@}% ]
2774 \def\bbbl@inisect[#1]#2\@{\def\bbbl@section{#1}}
2775 \def\bbbl@iniskip#1\@{\% if starts with ;

```



```

2776 \def\bbl@inistore#1=#2\@@{%      full (default)
2777   \bbl@trim@def\bbl@tempa{#1}%
2778   \bbl@trim\toks@{#2}%
2779   \bbl@xin@{;\bbl@section/\bbl@tempa;}{\bbl@key@list}%
2780   \ifin\else
2781     \bbl@exp{%
2782       \\g@addto@macro\\bbl@inidata{%
2783         \\bbl@elt{\bbl@section}{\bbl@tempa}{\the\toks@}}}%
2784   \fi}
2785 \def\bbl@inistore@min#1=#2\@@{%  minimal (maybe set in \bbl@read@ini)
2786   \bbl@trim@def\bbl@tempa{#1}%
2787   \bbl@trim\toks@{#2}%
2788   \bbl@xin@{.identification.}{.\bbl@section.}%
2789   \ifin@
2790     \bbl@exp{\\g@addto@macro\\bbl@inidata{%
2791       \\bbl@elt{identification}{\bbl@tempa}{\the\toks@}}}%
2792   \fi}

```

Now, the ‘main loop’, which **must be executed inside a group**. At this point, \bbl@inidata may contain data declared in \babelprovide, with ‘slashed’ keys. There are 3 steps: first read the ini file and store it; then traverse the stored values, and process some groups if required (date, captions, labels, counters); finally, ‘export’ some values by defining global macros (identification, typography, characters, numbers). The second argument is 0 when called to read the minimal data for fonts; with \babelprovide it’s either 1 or 2.

```

2793 \ifx\bbl@readstream\undefined
2794   \csname newread\endcsname\bbl@readstream
2795 \fi
2796 \def\bbl@read@ini#1#2{%
2797   \global\let\bbl@extend@ini@gobble
2798   \openin\bbl@readstream=babel-#1.ini
2799   \ifeof\bbl@readstream
2800     \bbl@error
2801     {There is no ini file for the requested language\\%
2802      (#1: \language). Perhaps you misspelled it or your\\%
2803      installation is not complete.}%
2804     {Fix the name or reinstall babel.}%
2805   \else
2806     % == Store ini data in \bbl@inidata ==
2807     \catcode`\[=12 \catcode`\]=12 \catcode`\==12 \catcode`\&=12
2808     \catcode`\;=12 \catcode`\|=12 \catcode`\%=14 \catcode`\-=12
2809     \bbl@info{Importing
2810               \ifcase#2font and identification \or basic \fi
2811               data for \language\\%
2812               from babel-#1.ini. Reported}%
2813     \ifnum#2=\z@
2814       \global\let\bbl@inidata\empty
2815       \let\bbl@inistore\bbl@inistore@min    % Remember it's local
2816     \fi
2817     \def\bbl@section{identification}%
2818     \bbl@exp{\\bbl@inistore tag.ini=#1\\@@}%
2819     \bbl@inistore load.level=#2\@@
2820     \loop
2821     \if T\ifeof\bbl@readstream F\fi T\relax % Trick, because inside \loop
2822       \endlinechar\m@ne
2823       \read\bbl@readstream to \bbl@line
2824       \endlinechar\^^M
2825       \ifx\bbl@line\empty\else
2826         \expandafter\bbl@inline\bbl@line\bbl@inline
2827       \fi

```

```

2828 \repeat
2829 % == Process stored data ==
2830 \bbl@csarg\xdef{lini@language}{#1}%
2831 \bbl@read@ini@aux
2832 % == 'Export' data ==
2833 \bbl@ini@exports{#2}%
2834 \global\bbl@csarg\let{inidata@language}\bbl@inidata
2835 \global\let\bbl@inidata@empty
2836 \bbl@exp{\bbl@add@list\bbl@ini@loaded{language}}%
2837 \bbl@tglobal\bbl@ini@loaded
2838 \fi}
2839 \def\bbl@read@ini@aux{%
2840 \let\bbl@savestrings@empty
2841 \let\bbl@savetoday@empty
2842 \let\bbl@savestate@empty
2843 \def\bbl@elt##1##2##3{%
2844 \def\bbl@section{##1}%
2845 \in{=date.}{=##1}% Find a better place
2846 \ifin@
2847 \bbl@ini@calendar{##1}%
2848 \fi
2849 \bbl@ifunset{bbl@inikv@##1}{}%
2850 {\csname bbl@inikv@##1\endcsname{##2}{##3}}%
2851 \bbl@inidata}

```

A variant to be used when the ini file has been already loaded, because it's not the first \babelprovide for this language.

```

2852 \def\bbl@extend@ini@aux#1{%
2853 \bbl@startcommands*{#1}{captions}%
2854 % Activate captions/... and modify exports
2855 \bbl@csarg\def{inikv@captions.licr}##1##2{%
2856 \setlocalecaption{#1}{##1}{##2}%
2857 \def\bbl@inikv@captions##1##2{%
2858 \bbl@ini@captions@aux{##1}{##2}%
2859 \def\bbl@stringdef##1##2{\gdef##1{##2}}%
2860 \def\bbl@exportkey##1##2##3{%
2861 \bbl@ifunset{bbl@kv@##2}{%
2862 {\expandafter\ifx\csname bbl@kv@##2\endcsname\@empty\else
2863 \bbl@exp{\global\let\bbl@##1@language>\bbl@kv@##2}}%
2864 \fi}}%
2865 % As with \bbl@read@ini, but with some changes
2866 \bbl@read@ini@aux
2867 \bbl@ini@exports\tw@
2868 % Update inidata@lang by pretending the ini is read.
2869 \def\bbl@elt##1##2##3{%
2870 \def\bbl@section{##1}%
2871 \bbl@iniline##2=##3\bbl@iniline}%
2872 \csname bbl@inidata@#1\endcsname
2873 \global\bbl@csarg\let{inidata@#1}\bbl@inidata
2874 \StartBabelCommands*{#1}{date}% And from the import stuff
2875 \def\bbl@stringdef##1##2{\gdef##1{##2}}%
2876 \bbl@savetoday
2877 \bbl@savestate
2878 \bbl@endcommands}

```

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

```

2879 \def\bbl@ini@calendar#1{%
2880 \lowercase{\def\bbl@tempa{=#1=}}%
2881 \bbl@replace\bbl@tempa{=date.gregorian}{}%

```

```

2882 \bbl@replace\bbl@tempa{=date.}{}%
2883 \in@{.licr={}{#1=}}%
2884 \ifin@
2885 \ifcase\bbl@engine
2886 \bbl@replace\bbl@tempa{.licr={}}%
2887 \else
2888 \let\bbl@tempa\relax
2889 \fi
2890 \fi
2891 \ifx\bbl@tempa\relax\else
2892 \bbl@replace\bbl@tempa{=}{}%
2893 \bbl@exp{%
2894 \def\<bbl@inikv@#1>####1####2{%
2895 \\\bbl@inidate####1...\relax{####2}{\bbl@tempa}}}%
2896 \fi}

```

A key with a slash in \babelprovide replaces the value in the ini file (which is ignored altogether). The mechanism is simple (but suboptimal): add the data to the ini one (at this point the ini file has not yet been read), and define a dummy macro. When the ini file is read, just skip the corresponding key and reset the macro (in \bbl@inistore above).

```

2897 \def\bbl@renewinikey#1/#2\@#3{%
2898 \edef\bbl@tempa{\zap@space #1 \@empty}% section
2899 \edef\bbl@tempb{\zap@space #2 \@empty}% key
2900 \bbl@trim\toks@{#3}% value
2901 \bbl@exp{%
2902 \edef\\bbl@key@list{\bbl@key@list \bbl@tempa/\bbl@tempb;}%
2903 \\g@addto@macro\\bbl@inidata{%
2904 \\\bbl@elt{\bbl@tempa}{\bbl@tempb}{\the\toks@}}}%

```

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

```

2905 \def\bbl@exportkey#1#2#3{%
2906 \bbl@ifunset{bbl@kv@#2}%
2907 {\bbl@csarg\gdef{#1@\language}\@empty}%
2908 {\expandafter\ifx\csname bbl@kv@#2\endcsname\@empty
2909 \bbl@csarg\gdef{#1@\language}\@empty}%
2910 \else
2911 \bbl@exp{\global\let\<bbl@#1@\language>\<bbl@kv@#2>}%
2912 \fi}}

```

Key-value pairs are treated differently depending on the section in the ini file. The following macros are the readers for identification and typography. Note \bbl@ini@exports is called always (via \bbl@inise), while \bbl@after@ini must be called explicitly after \bbl@read@ini if necessary.

```

2913 \def\bbl@iniwarning#1{%
2914 \bbl@ifunset{bbl@kv@identification.warning#1}{}%
2915 {\bbl@warning{%
2916 From babel-\bbl@cs{lini@\language}.ini:\\%
2917 \bbl@cs{@kv@identification.warning#1}\\%
2918 Reported }}}
2919 %
2920 \let\bbl@release@transforms\@empty
2921 %
2922 \def\bbl@ini@exports#1{%
2923 % Identification always exported
2924 \bbl@iniwarning}%
2925 \ifcase\bbl@engine
2926 \bbl@iniwarning{.pdf\latex}%
2927 \or
2928 \bbl@iniwarning{.lua\latex}%

```

```

2929 \or
2930 \bbl@iniwarning{.xelatex}%
2931 \fi%
2932 \bbl@exportkey{llevel}{identification.load.level}{}%
2933 \bbl@exportkey{elname}{identification.name.english}{}%
2934 \bbl@exp{\bbl@exportkey{lname}{identification.name.opentype}%
2935 {\csname bbl@elname@language\endcsname}}%
2936 \bbl@exportkey{tbc}{identification.tag.bcp47}{}%
2937 \bbl@exportkey{lbc}{identification.language.tag.bcp47}{}%
2938 \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
2939 \bbl@exportkey{esname}{identification.script.name}{}%
2940 \bbl@exp{\bbl@exportkey{sname}{identification.script.name.opentype}%
2941 {\csname bbl@esname@language\endcsname}}%
2942 \bbl@exportkey{sbc}{identification.script.tag.bcp47}{}%
2943 \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}%
2944 % Also maps bcp47 -> language
2945 \ifbbl@bcptoname
2946 \bbl@csarg\xdef{bcp@map@bbl@cl{tbc}}{\language}%
2947 \fi
2948 % Conditional
2949 \ifnum#1>\z@ % 0 = only info, 1, 2 = basic, (re)new
2950 \bbl@exportkey{lbrk}{typography.linebreaking}{h}%
2951 \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
2952 \bbl@exportkey{lftm}{typography.lefthyphenmin}{2}%
2953 \bbl@exportkey{rgtm}{typography.righthyphenmin}{3}%
2954 \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
2955 \bbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
2956 \bbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
2957 \bbl@exportkey{intsp}{typography.intraspace}{}%
2958 \bbl@exportkey{frspc}{typography.frenchspacing}{u}%
2959 \bbl@exportkey{chrng}{characters.ranges}{}%
2960 \bbl@exportkey{quote}{characters.delimiters.quotes}{}%
2961 \bbl@exportkey{dgnat}{numbers.digits.native}{}%
2962 \ifnum#1=\tw@ % only (re)new
2963 \bbl@exportkey{rqtex}{identification.require.babel}{}%
2964 \bbl@tglobal\bbl@savetoday
2965 \bbl@tglobal\bbl@savestate
2966 \bbl@savestrings
2967 \fi
2968 \fi}

```

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

```

2969 \def\bbl@inikv#1#2{%      key=value
2970 \toks@{#2}%              This hides #'s from ini values
2971 \bbl@csarg\edef{@kv@bbl@section.#1}{\the\toks@}}

```

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

```

2972 \let\bbl@inikv@identification\bbl@inikv
2973 \let\bbl@inikv@typography\bbl@inikv
2974 \let\bbl@inikv@characters\bbl@inikv
2975 \let\bbl@inikv@numbers\bbl@inikv

```

Additive numerals require an additional definition. When .1 is found, two macros are defined – the basic one, without .1 called by \localnumeral, and another one preserving the trailing .1 for the ‘units’.

```

2976 \def\bbl@inikv@counters#1#2{%
2977 \bbl@ifsamestring{#1}{digits}%
2978 {\bbl@error{The counter name 'digits' is reserved for mapping\\%
2979 decimal digits}%

```

```

2980             {Use another name.}}%
2981     {}%
2982 \def\bbl@tempc{#1}%
2983 \bbl@trim@def{\bbl@tempb*}{#2}%
2984 \in@{.1$}{#1$}%
2985 \ifin@
2986     \bbl@replace\bbl@tempc{.1}{}%
2987     \bbl@csarg\protected@xdef{cntr@\bbl@tempc @\languagename}{%
2988         \noexpand\bbl@alphanumeric{\bbl@tempc}}%
2989 \fi
2990 \in@{.F.}{#1}%
2991 \ifin@else\in@{.S.}{#1}\fi
2992 \ifin@
2993     \bbl@csarg\protected@xdef{cntr@#1@\languagename}{\bbl@tempb*}%
2994 \else
2995     \toks@{}% Required by \bbl@buildifcase, which returns \bbl@tempa
2996     \expandafter\bbl@buildifcase\bbl@tempb* \ \ % Space after \ \
2997     \bbl@csarg{\global\expandafter\let}{cntr@#1@\languagename}\bbl@tempa
2998 \fi}

```

Now captions and captions.licr, depending on the engine. And below also for dates. They rely on a few auxiliary macros. It is expected the ini file provides the complete set in Unicode and LICR, in that order.

```

2999 \ifcase\bbl@engine
3000     \bbl@csarg\def{inikv@captions.licr}#1#2{%
3001         \bbl@ini@captions@aux{#1}{#2}}
3002 \else
3003     \def\bbl@inikv@captions#1#2{%
3004         \bbl@ini@captions@aux{#1}{#2}}
3005 \fi

```

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

```

3006 \def\bbl@ini@captions@template#1#2{% string language tempa=capt-name
3007     \bbl@replace\bbl@tempa{.template}{}%
3008     \def\bbl@toreplace{#1}{}%
3009     \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace}}%
3010     \bbl@replace\bbl@toreplace{[ ]}{\csname}%
3011     \bbl@replace\bbl@toreplace{[ ]}{\csname the}%
3012     \bbl@replace\bbl@toreplace{[ ]}{\name\endcsname}}%
3013     \bbl@replace\bbl@toreplace{[ ]}{\endcsname}}%
3014     \bbl@xin@{, \bbl@tempa,}{, chapter, appendix, part,}%
3015 \ifin@
3016     \@nameuse{\bbl@patch\bbl@tempa}%
3017     \global\bbl@csarg\let{\bbl@tempa fmt@#2}\bbl@toreplace
3018 \fi
3019 \bbl@xin@{, \bbl@tempa,}{, figure, table,}%
3020 \ifin@
3021     \toks@\expandafter{\bbl@toreplace}%
3022     \bbl@exp{\gdef\<fnum@\bbl@tempa>{\the\toks@}}%
3023 \fi}
3024 \def\bbl@ini@captions@aux#1#2{%
3025     \bbl@trim@def\bbl@tempa{#1}%
3026     \bbl@xin@{.template}{\bbl@tempa}%
3027 \ifin@
3028     \bbl@ini@captions@template{#2}\languagename
3029 \else
3030     \bbl@ifblank{#2}%
3031     {\bbl@exp{%
3032         \toks@{\ \ \bbl@nocaption{\bbl@tempa}{\languagename\bbl@tempa name}}}%

```

```

3033     {\bbl@trim\toks@{#2}}%
3034     \bbl@exp{%
3035         \\bbl@add\\bbl@savestrings{%
3036             \\SetString\<\bbl@tempa name>{\the\toks@}}}%
3037     \toks@ \expandafter{\bbl@captionslist}%
3038     \bbl@exp{\\in@{\<\bbl@tempa name>}{\the\toks@}}%
3039     \ifin@ \else
3040         \bbl@exp{%
3041             \\bbl@add\<bbl@extracaps@\languagename>{\<\bbl@tempa name>}}%
3042             \\bbl@toglobal\<bbl@extracaps@\languagename>}}%
3043     \fi
3044     \fi}

```

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

```

3045 \def\bbl@list@the{%
3046     part,chapter,section,subsection,subsubsection,paragraph,%
3047     subparagraph,enumi,enumii,enumiii,enumiv,equation,figure,%
3048     table,page,footnote,mpfootnote,mpfn}
3049 \def\bbl@map@cnt#1{% #1:roman,etc, // #2:enumi,etc
3050     \bbl@ifunset{bbl@map@#1@\languagename}%
3051     {\@nameuse{#1}}%
3052     {\@nameuse{bbl@map@#1@\languagename}}}%
3053 \def\bbl@inikv@labels#1#2{%
3054     \in@{.map}{#1}%
3055     \ifin@
3056         \ifx\bbl@KVP@labels\@nil\else
3057             \bbl@xin@{ map }{ \bbl@KVP@labels\space}%
3058             \ifin@
3059                 \def\bbl@tempc{#1}%
3060                 \bbl@replace\bbl@tempc{.map}{}%
3061                 \in@{,#2,}{,arabic,roman,Roman,alph,Alph,fnsymbol,}%
3062                 \bbl@exp{%
3063                     \gdef\<bbl@map@\bbl@tempc @\languagename>%
3064                     {\ifin@\<#2>\else\\localecounter{#2}\fi}}%
3065                 \bbl@foreach\bbl@list@the{%
3066                     \bbl@ifunset{the##1}{}%
3067                     {\bbl@exp{\let\\bbl@tempd\<the##1>}%
3068                     \bbl@exp{%
3069                         \\bbl@sreplace\<the##1>%
3070                         {\<\bbl@tempc>{##1}}{\\\bbl@map@cnt{\bbl@tempc}{##1}}}%
3071                         \\bbl@sreplace\<the##1>%
3072                         {\<\@empty @\bbl@tempc>\<c@##1>}{\\bbl@map@cnt{\bbl@tempc}{##1}}}}}%
3073                 \expandafter\ifx\csname the##1\endcsname\bbl@tempd\else
3074                     \toks@\expandafter\expandafter\expandafter{%
3075                         \csname the##1\endcsname}%
3076                     \expandafter\xdef\csname the##1\endcsname{{\the\toks@}}%
3077                     \fi}}}%
3078     \fi
3079     \fi
3080     %
3081     \else
3082         %
3083         % The following code is still under study. You can test it and make
3084         % suggestions. Eg, enumerate.2 = ([enumi]).([enumii]). It's
3085         % language dependent.
3086         \in@{enumerate.}{#1}%
3087         \ifin@
3088             \def\bbl@tempa{#1}%
3089             \bbl@replace\bbl@tempa{enumerate.}{}%

```

```

3090 \def\bbl@toreplace{#2}%
3091 \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace{}}%
3092 \bbl@replace\bbl@toreplace{[ ]}{\csname the}%
3093 \bbl@replace\bbl@toreplace{[ ]}{\endcsname{}}}%
3094 \toks@ \expandafter{\bbl@toreplace}%
3095 % TODO. Execute only once:
3096 \bbl@exp{%
3097   \\bbl@add\<extras\language>{%
3098     \\babel@save\<labelenum\romannumeral\bbl@tempa>%
3099     \def\<labelenum\romannumeral\bbl@tempa>{\the\toks@}}%
3100   \\bbl@tglobal\<extras\language>}%
3101 \fi
3102 \fi}

```

To show correctly some captions in a few languages, we need to patch some internal macros, because the order is hardcoded. For example, in Japanese the chapter number is surrounded by two string, while in Hungarian is placed after. These replacement works in many classes, but not all. Actually, the following lines are somewhat tentative.

```

3103 \def\bbl@chapttype{chapter}
3104 \ifx\@makechapterhead\undefined
3105 \let\bbl@patchchapter\relax
3106 \else\ifx\thechapter\undefined
3107 \let\bbl@patchchapter\relax
3108 \else\ifx\ps@headings\undefined
3109 \let\bbl@patchchapter\relax
3110 \else
3111 \def\bbl@patchchapter{%
3112   \global\let\bbl@patchchapter\relax
3113   \gdef\bbl@chfmt{%
3114     \bbl@ifunset{\bbl@bbl@chapttype fmt@\language}%
3115     {\@chapapp\space\thechapter}
3116     {\@nameuse{\bbl@bbl@chapttype fmt@\language}}}%
3117   \bbl@add\appendix{\def\bbl@chapttype{appendix}}% Not harmful, I hope
3118   \bbl@sreplace\ps@headings{\@chapapp\ \thechapter}{\bbl@chfmt}%
3119   \bbl@sreplace\chaptermark{\@chapapp\ \thechapter}{\bbl@chfmt}%
3120   \bbl@sreplace\@makechapterhead{\@chapapp\space\thechapter}{\bbl@chfmt}%
3121   \bbl@tglobal\appendix
3122   \bbl@tglobal\ps@headings
3123   \bbl@tglobal\chaptermark
3124   \bbl@tglobal\@makechapterhead}
3125 \let\bbl@patchappendix\bbl@patchchapter
3126 \fi\fi\fi
3127 \ifx\@part\undefined
3128 \let\bbl@patchpart\relax
3129 \else
3130 \def\bbl@patchpart{%
3131   \global\let\bbl@patchpart\relax
3132   \gdef\bbl@partformat{%
3133     \bbl@ifunset{\bbl@partfmt@\language}%
3134     {\partname\nobreakspace\thepart}
3135     {\@nameuse{\bbl@partfmt@\language}}}%
3136   \bbl@sreplace\@part{\partname\nobreakspace\thepart}{\bbl@partformat}%
3137   \bbl@tglobal\@part}
3138 \fi

```

Date. TODO. Document

```

3139 % Arguments are _not_ protected.
3140 \let\bbl@calendar\@empty
3141 \DeclareRobustCommand\localedate[1][\bbl@localedate{#1}]

```

```

3142 \def\bbl@localedate#1#2#3#4{%
3143   \begingroup
3144     \ifx\@empty#1\@empty\else
3145       \let\bbl@ld@calendar\@empty
3146       \let\bbl@ld@variant\@empty
3147       \edef\bbl@tempa{\zap@space#1 \@empty}%
3148       \def\bbl@tempb##1=##2\@{\@namedef{\bbl@ld@##1}{##2}}%
3149       \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
3150       \edef\bbl@calendar{%
3151         \bbl@ld@calendar
3152         \ifx\bbl@ld@variant\@empty\else
3153           .\bbl@ld@variant
3154         \fi}%
3155       \bbl@replace\bbl@calendar{gregorian}{}%
3156     \fi
3157     \bbl@cased
3158     {\@nameuse{\bbl@date@\language @\bbl@calendar}{#2}{#3}{#4}}%
3159   \endgroup}
3160 % eg: 1=months, 2=wide, 3=1, 4=dummy, 5=value, 6=calendar
3161 \def\bbl@inidate#1.#2.#3.#4\relax#5#6{% TODO - ignore with 'captions'
3162   \bbl@trim@def\bbl@tempa{#1.#2}%
3163   \bbl@ifsamestring{\bbl@tempa}{months.wide}%      to savedate
3164   {\bbl@trim@def\bbl@tempa{#3}%
3165     \bbl@trim\toks@{#5}%
3166     \@temptokena\expandafter{\bbl@savestate}%
3167     \bbl@exp{% Reverse order - in ini last wins
3168       \def\\bbl@savestate{%
3169         \\SetString\<month\romannumeral\bbl@tempa#6name>{\the\toks@}%
3170         \the\@temptokena}}}%
3171   {\bbl@ifsamestring{\bbl@tempa}{date.long}%      defined now
3172     {\lowercase{\def\bbl@tempb{#6}}%
3173       \bbl@trim@def\bbl@toreplace{#5}%
3174       \bbl@TG@@date
3175       \bbl@ifunset{\bbl@date@\language @}%
3176       {\bbl@exp{% TODO. Move to a better place.
3177         \gdef\<\language date>{\protect\<\language date >}%
3178         \gdef\<\language date >####1####2####3{%
3179           \\bbl@usedategroupttrue
3180           \<bbl@ensure@\language >{%
3181             \\localedate{####1}{####2}{####3}}}%
3182           \\bbl@add\\bbl@savetoday{%
3183             \\SetString\\today{%
3184               \<\language date>%
3185               {\the\year}{\the\month}{\the\day}}}}}%
3186       }%
3187       \global\bbl@csarg\let{date@\language @}\bbl@toreplace
3188       \ifx\bbl@tempb\@empty\else
3189         \global\bbl@csarg\let{date@\language @\bbl@tempb}\bbl@toreplace
3190       \fi}%
3191     {}%

```

Dates will require some macros for the basic formatting. They may be redefined by language, so “semi-public” names (camel case) are used. Oddly enough, the CLDR places particles like “de” inconsistently in either in the date or in the month name. Note after `\bbl@replace \toks@` contains the resulting string, which is used by `\bbl@replace@finish@iii` (this implicit behavior doesn't seem a good idea, but it's efficient).

```

3192 \let\bbl@calendar\@empty
3193 \newcommand\BabelDateSpace{\nobreakspace}
3194 \newcommand\BabelDateDot{.\@} % TODO. \let instead of repeating

```



```

3195 \newcommand\BabelDated[1]{\number#1}
3196 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}
3197 \newcommand\BabelDateM[1]{\number#1}
3198 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
3199 \newcommand\BabelDateMMMM[1]{%
3200   \csname month\romannumeral#1\bb1@calendar name\endcsname}%
3201 \newcommand\BabelDatey[1]{\number#1}%
3202 \newcommand\BabelDateyy[1]{%
3203   \ifnum#1<10 0\number#1 %
3204   \else\ifnum#1<100 \number#1 %
3205   \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
3206   \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
3207   \else
3208     \bbl@error
3209     {Currently two-digit years are restricted to the\
3210      range 0-9999.}%
3211     {There is little you can do. Sorry.}%
3212   \fi\fi\fi\fi}
3213 \newcommand\BabelDateyyyy[1]{\number#1} % TODO - add leading 0
3214 \def\bbl@replace@finish@iii#1{%
3215   \bbl@exp{\def\#1###1###2###3{\the\toks@}}
3216 \def\bbl@TG@date{%
3217   \bbl@replace\bbl@toreplace{[ ]}{\BabelDateSpace{}}%
3218   \bbl@replace\bbl@toreplace{.}{\BabelDateDot{}}%
3219   \bbl@replace\bbl@toreplace{[d]}{\BabelDated{###3}}%
3220   \bbl@replace\bbl@toreplace{[dd]}{\BabelDatedd{###3}}%
3221   \bbl@replace\bbl@toreplace{[M]}{\BabelDateM{###2}}%
3222   \bbl@replace\bbl@toreplace{[MM]}{\BabelDateMM{###2}}%
3223   \bbl@replace\bbl@toreplace{[MMMM]}{\BabelDateMMMM{###2}}%
3224   \bbl@replace\bbl@toreplace{[y]}{\BabelDatey{###1}}%
3225   \bbl@replace\bbl@toreplace{[yy]}{\BabelDateyy{###1}}%
3226   \bbl@replace\bbl@toreplace{[yyyy]}{\BabelDateyyyy{###1}}%
3227   \bbl@replace\bbl@toreplace{[y|]}{\bbl@datecctr[###1|]}%
3228   \bbl@replace\bbl@toreplace{[m|]}{\bbl@datecctr[###2|]}%
3229   \bbl@replace\bbl@toreplace{[d|]}{\bbl@datecctr[###3|]}%
3230   \bbl@replace@finish@iii\bbl@toreplace}
3231 \def\bbl@datecctr{\expandafter\bbl@xdatecctr\expandafter}
3232 \def\bbl@xdatecctr[#1|#2]{\localenumeral{#2}{#1}}

```

Transforms.

```

3233 \let\bbl@release@transforms\@empty
3234 \@namedef{bbl@inikv@transforms.prehyphenation}{%
3235   \bbl@transforms\babelprehyphenation}
3236 \@namedef{bbl@inikv@transforms.posthyphenation}{%
3237   \bbl@transforms\babelposthyphenation}
3238 \def\bbl@transforms@aux#1#2#3#4,#5\relax{%
3239   #1[#2]{#3}{#4}{#5}}
3240 \begingroup % A hack. TODO. Don't require an specific order
3241   \catcode`\%=12
3242   \catcode`\&=14
3243   \gdef\bbl@transforms#1#2#3{&%
3244     \ifx\bbl@KVP@transforms\@nil\else
3245       \directlua{
3246         local str = [=[#2]=]
3247         str = str:gsub('%.%d+%.%d+$', '')
3248         tex.print([[ \def\string\babeltempa{]] .. str .. [[]])
3249       }&%
3250     \bbl@xin@{,\babeltempa,},{,\bbl@KVP@transforms,}&%
3251     \fin@

```

```

3252     \in@{.0$}{#2$}&%
3253     \ifin@
3254     \directlua{
3255         local str = string.match([[ \bbl@KVP@transforms]],
3256             '^(([%(-)%(%)^%)]-\babeltempa')
3257         if str == nil then
3258             tex.print([[ \def\string\babeltempb{}}])
3259         else
3260             tex.print([[ \def\string\babeltempb{,attribute=} .. str .. [{}]])
3261         end
3262     }
3263     \toks@{#3}&%
3264     \bbl@exp{&%
3265         \\\g@addto@macro\ \bbl@release@transforms{&%
3266             \relax &% Closes previous \bbl@transforms@aux
3267             \\\bbl@transforms@aux
3268                 \\\#1{label=\babeltempa\babeltempb}{\language}\the\toks@}}&%
3269     \else
3270         \g@addto@macro\ \bbl@release@transforms{, {#3}}&%
3271     \fi
3272 \fi
3273 \fi}
3274 \endgroup

```

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

```

3275 \def\bbl@provide@lsys#1{%
3276     \bbl@ifunset{bbl@lname@#1}%
3277     {\bbl@load@info{#1}}%
3278     }%
3279     \bbl@csarg\let{lsys@#1}\empty
3280     \bbl@ifunset{bbl@sname@#1}{\bbl@csarg\gdef{sname@#1}{Default}}{}%
3281     \bbl@ifunset{bbl@sotf@#1}{\bbl@csarg\gdef{sotf@#1}{DFLT}}{}%
3282     \bbl@csarg\bbl@add@list{lsys@#1}{Script=\bbl@cs{sname@#1}}%
3283     \bbl@ifunset{bbl@lname@#1}{%
3284         {\bbl@csarg\bbl@add@list{lsys@#1}{Language=\bbl@cs{lname@#1}}}%
3285     \ifcase\bbl@engine\or\or
3286         \bbl@ifunset{bbl@prehc@#1}{%
3287             {\bbl@exp{\ \bbl@ifblank{\bbl@cs{prehc@#1}}}%
3288             }%
3289             {\ifx\bbl@xenoxyph\@undefined
3290                 \let\bbl@xenoxyph\bbl@xenoxyph@d
3291                 \ifx\AtBeginDocument\@notprerr
3292                     \expandafter\@secondoftwo % to execute right now
3293                 \fi
3294                 \AtBeginDocument{%
3295                     \bbl@patchfont{\bbl@xenoxyph}%
3296                     \expandafter\selectlanguage\expandafter{\language}}%
3297             \fi}}%
3298     \fi
3299     \bbl@csarg\bbl@toGLOBAL{lsys@#1}}
3300 \def\bbl@xenoxyph@d{%
3301     \bbl@ifset{bbl@prehc@language}%
3302     {\ifnum\hyphenchar\font=\defaultshyphenchar
3303         \iffontchar\font\bbl@cl{prehc}\relax
3304         \hyphenchar\font\bbl@cl{prehc}\relax
3305     \else\iffontchar\font"200B
3306         \hyphenchar\font"200B
3307     \else

```



```

3357 \def\bbbl@buildifcase#1 {% Returns \bbbl@tempa, requires \toks@={}%
3358 \ifx\\#1% % \\ before, in case #1 is multiletter
3359 \bbbl@exp{%
3360 \def\\bbbl@tempa####1{%
3361 \<ifcase>####1\space\the\toks@\\<else>\\@ctrerr\\<fi>}}%
3362 \else
3363 \toks@\\expandafter{\the\toks@\\or #1}%
3364 \expandafter\bbbl@buildifcase
3365 \fi}

```

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

```

3366 \newcommand\localenumeral[2]{\bbbl@cs{cntr@#1@\language}\{#2}}
3367 \def\bbbl@localecntr#1#2{\localenumeral{#2}{#1}}
3368 \newcommand\localecounter[2]{%
3369 \expandafter\bbbl@localecntr
3370 \expandafter{\number\csname c@#2\endcsname}\{#1}}
3371 \def\bbbl@alphnumeral#1#2{%
3372 \expandafter\bbbl@alphnumeral@i\number#2 76543210@@{#1}}
3373 \def\bbbl@alphnumeral@i#1#2#3#4#5#6#7#8\@@#9{%
3374 \ifcase\@car#8\@nil\or % Currenty <10000, but prepared for bigger
3375 \bbbl@alphnumeral@ii{#9}000000#1\or
3376 \bbbl@alphnumeral@ii{#9}00000#1#2\or
3377 \bbbl@alphnumeral@ii{#9}0000#1#2#3\or
3378 \bbbl@alphnumeral@ii{#9}000#1#2#3#4\else
3379 \bbbl@alphnum@invalid{>9999}%
3380 \fi}
3381 \def\bbbl@alphnumeral@ii#1#2#3#4#5#6#7#8{%
3382 \bbbl@ifunset{bbbl@cntr@#1.F.\number#5#6#7#8@\language}%
3383 {\bbbl@cs{cntr@#1.4@\language}\{#5}}
3384 {\bbbl@cs{cntr@#1.3@\language}\{#6}}
3385 {\bbbl@cs{cntr@#1.2@\language}\{#7}}
3386 {\bbbl@cs{cntr@#1.1@\language}\{#8}}
3387 \ifnum#6#7#8>\z@ % TODO. An ad hoc rule for Greek. Ugly.
3388 \bbbl@ifunset{bbbl@cntr@#1.S.321@\language}\{#9}}
3389 {\bbbl@cs{cntr@#1.S.321@\language}\{#9}}
3390 \fi}%
3391 {\bbbl@cs{cntr@#1.F.\number#5#6#7#8@\language}\{#9}}
3392 \def\bbbl@alphnum@invalid#1{%
3393 \bbbl@error{Alphabetic numeral too large (#1)}%
3394 {Currently this is the limit.}}

```

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

```

3395 \newcommand\localeinfo[1]{%
3396 \bbbl@ifunset{bbbl@csname bbbl@info@#1\endcsname @\language}%
3397 {\bbbl@error{I've found no info for the current locale.\\%
3398 The corresponding ini file has not been loaded\\%
3399 Perhaps it doesn't exist}%
3400 {See the manual for details.}}%
3401 {\bbbl@cs{csname bbbl@info@#1\endcsname @\language}\{#1}}
3402 % \namedef{bbbl@info@name.locale}\{lname}
3403 \namedef{bbbl@info@tag.ini}\{lini}
3404 \namedef{bbbl@info@name.english}\{elname}
3405 \namedef{bbbl@info@name.opentype}\{lname}
3406 \namedef{bbbl@info@tag.bcp47}\{tbcp}

```

```

3407 \@namedef{bbl@info@language.tag.bcp47}{lbcpl}
3408 \@namedef{bbl@info@tag.opentype}{lotf}
3409 \@namedef{bbl@info@script.name}{esname}
3410 \@namedef{bbl@info@script.name.opentype}{sname}
3411 \@namedef{bbl@info@script.tag.bcp47}{sbcpl}
3412 \@namedef{bbl@info@script.tag.opentype}{sotf}
3413 \let\bbl@ensureinfo\@gobble
3414 \newcommand\BabelEnsureInfo{%
3415   \ifx\InputIfFileExists\undefined\else
3416     \def\bbl@ensureinfo##1{%
3417       \bbl@ifunset{bbl@lname@##1}{\bbl@load@info{##1}}{}}%
3418   \fi
3419   \bbl@foreach\bbl@loaded{%
3420     \def\language{##1}%
3421     \bbl@ensureinfo{##1}}}%

```

More general, but non-expandable, is `\getlocaleproperty`. To inspect every possible loaded ini, we define `\LocaleForEach`, where `\bbl@ini@loaded` is a comma-separated list of locales, built by `\bbl@read@ini`.

```

3422 \newcommand\getlocaleproperty{%
3423   \@ifstar\bbl@getproperty@s\bbl@getproperty@x}
3424 \def\bbl@getproperty@s#1#2#3{%
3425   \let#1\relax
3426   \def\bbl@elt##1##2##3{%
3427     \bbl@ifsamestring{##1/##2}{##3}%
3428     {\providecommand#1{##3}%
3429     \def\bbl@elt####1####2####3{}}}%
3430   {}}%
3431   \bbl@cs{inidata@#2}}%
3432 \def\bbl@getproperty@x#1#2#3{%
3433   \bbl@getproperty@s{#1}{#2}{#3}%
3434   \ifx#1\relax
3435     \bbl@error
3436       {Unknown key for locale '#2':\%
3437       #3\%
3438       \string#1 will be set to \relax}%
3439   {Perhaps you misspelled it.}%
3440   \fi}
3441 \let\bbl@ini@loaded\@empty
3442 \newcommand\LocaleForEach{\bbl@foreach\bbl@ini@loaded}

```

9 Adjusting the Babel bahavior

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

```

3443 \newcommand\babeladjust[1]{% TODO. Error handling.
3444   \bbl@forkv{#1}{%
3445     \bbl@ifunset{bbl@ADJ@##1@##2}%
3446     {\bbl@cs{ADJ@##1}{##2}}%
3447     {\bbl@cs{ADJ@##1@##2}}}%
3448 %
3449 \def\bbl@adjust@lua#1#2{%
3450   \ifvmode
3451     \ifnum\currentgrouplevel=\z@
3452       \directlua{ Babel.#2 }%
3453       \expandafter\expandafter\expandafter\@gobble
3454     \fi
3455   \fi
3456   {\bbl@error % The error is gobbled if everything went ok.

```

```

3457     {Currently, #1 related features can be adjusted only\\%
3458     in the main vertical list.}%
3459     {Maybe things change in the future, but this is what it is.}}
3460 \@namedef{bbl@ADJ@bidi.mirroring@on}{%
3461     \bbl@adjust@lua{bidi}{mirroring_enabled=true}}
3462 \@namedef{bbl@ADJ@bidi.mirroring@off}{%
3463     \bbl@adjust@lua{bidi}{mirroring_enabled=false}}
3464 \@namedef{bbl@ADJ@bidi.text@on}{%
3465     \bbl@adjust@lua{bidi}{bidi_enabled=true}}
3466 \@namedef{bbl@ADJ@bidi.text@off}{%
3467     \bbl@adjust@lua{bidi}{bidi_enabled=false}}
3468 \@namedef{bbl@ADJ@bidi.mapdigits@on}{%
3469     \bbl@adjust@lua{bidi}{digits_mapped=true}}
3470 \@namedef{bbl@ADJ@bidi.mapdigits@off}{%
3471     \bbl@adjust@lua{bidi}{digits_mapped=false}}
3472 %
3473 \@namedef{bbl@ADJ@linebreak.sea@on}{%
3474     \bbl@adjust@lua{linebreak}{sea_enabled=true}}
3475 \@namedef{bbl@ADJ@linebreak.sea@off}{%
3476     \bbl@adjust@lua{linebreak}{sea_enabled=false}}
3477 \@namedef{bbl@ADJ@linebreak.cjk@on}{%
3478     \bbl@adjust@lua{linebreak}{cjk_enabled=true}}
3479 \@namedef{bbl@ADJ@linebreak.cjk@off}{%
3480     \bbl@adjust@lua{linebreak}{cjk_enabled=false}}
3481 \@namedef{bbl@ADJ@justify.arabic@on}{%
3482     \bbl@adjust@lua{linebreak}{arabic.justify_enabled=true}}
3483 \@namedef{bbl@ADJ@justify.arabic@off}{%
3484     \bbl@adjust@lua{linebreak}{arabic.justify_enabled=false}}
3485 %
3486 \def\bbl@adjust@layout#1{%
3487     \ifvmode
3488         #1%
3489     \expandafter\@gobble
3490     \fi
3491     {\bbl@error    % The error is gobbled if everything went ok.
3492     {Currently, layout related features can be adjusted only\\%
3493     in vertical mode.}%
3494     {Maybe things change in the future, but this is what it is.}}
3495 \@namedef{bbl@ADJ@layout.tabular@on}{%
3496     \bbl@adjust@layout{\let\@tabular\bbl@NL@tabular}}
3497 \@namedef{bbl@ADJ@layout.tabular@off}{%
3498     \bbl@adjust@layout{\let\@tabular\bbl@OL@tabular}}
3499 \@namedef{bbl@ADJ@layout.lists@on}{%
3500     \bbl@adjust@layout{\let\list\bbl@NL@list}}
3501 \@namedef{bbl@ADJ@layout.lists@off}{%
3502     \bbl@adjust@layout{\let\list\bbl@OL@list}}
3503 \@namedef{bbl@ADJ@hyphenation.extra@on}{%
3504     \bbl@activateposthyphen}
3505 %
3506 \@namedef{bbl@ADJ@autoload.bcp47@on}{%
3507     \bbl@bcpallowedtrue}
3508 \@namedef{bbl@ADJ@autoload.bcp47@off}{%
3509     \bbl@bcpallowedfalse}
3510 \@namedef{bbl@ADJ@autoload.bcp47.prefix}#1{%
3511     \def\bbl@bcp@prefix{#1}}
3512 \def\bbl@bcp@prefix{bcp47-}
3513 \@namedef{bbl@ADJ@autoload.options}#1{%
3514     \def\bbl@autoload@options{#1}}
3515 \let\bbl@autoload@bcptoptions\@empty

```

```

3516 \@namedef{bbl@ADJ@autoload.bcp47.options}#1{%
3517   \def\bbl@autoload@bcptoptions{#1}}
3518 \newif\ifbbl@bcptname
3519 \@namedef{bbl@ADJ@bcp47.toname@on}{%
3520   \bbl@bcptonametrue
3521   \BabelEnsureInfo}
3522 \@namedef{bbl@ADJ@bcp47.toname@off}{%
3523   \bbl@bcptonamefalse}
3524 \@namedef{bbl@ADJ@prehyphenation.disable@nohyphenation}{%
3525   \directlua{ Babel.ignore_pre_char = function(node)
3526     return (node.lang == \the\csname l@nohyphenation\endcsname)
3527   end }}
3528 \@namedef{bbl@ADJ@prehyphenation.disable@off}{%
3529   \directlua{ Babel.ignore_pre_char = function(node)
3530     return false
3531   end }}
3532 \@namedef{bbl@ADJ@select.write@shift}{%
3533   \let\bbl@restorelastskip\relax
3534   \def\bbl@savelastskip{%
3535     \let\bbl@restorelastskip\relax
3536     \ifvmode
3537       \ifdim\lastskip=\z@
3538         \let\bbl@restorelastskip\nobreak
3539       \else
3540         \bbl@exp{%
3541           \def\\bbl@restorelastskip{%
3542             \skip@=\the\lastskip
3543             \\nobreak \vskip-\skip@ \vskip\skip@}}%
3544         \fi
3545       \fi}}
3546 \@namedef{bbl@ADJ@select.write@keep}{%
3547   \let\bbl@restorelastskip\relax
3548   \let\bbl@savelastskip\relax}
3549 \@namedef{bbl@ADJ@select.write@omit}{%
3550   \let\bbl@restorelastskip\relax
3551   \def\bbl@savelastskip##1\bbl@restorelastskip{}}

```

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

```

3552 \ifx\directlua\@undefined\else
3553   \ifx\bbl@luapatterns\@undefined
3554     \input luababel.def
3555   \fi
3556 \fi

```

Continue with \LaTeX .

```

3557 </package | core>
3558 <*package>

```

9.1 Cross referencing macros

The \LaTeX book states:

The *key* argument is any sequence of letters, digits, and punctuation symbols; upper- and lowercase letters are regarded as different.

When the above quote should still be true when a document is typeset in a language that has active characters, special care has to be taken of the category codes of these characters when they appear in an argument of the cross referencing macros.

When a cross referencing command processes its argument, all tokens in this argument should be character tokens with category ‘letter’ or ‘other’.

The following package options control which macros are to be redefined.

```
3559 <<{*More package options}>> ≡
3560 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
3561 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
3562 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
3563 <</More package options>>
```

`\@newl@bel` First we open a new group to keep the changed setting of `\protect` local and then we set the `@safe@actives` switch to true to make sure that any shorthand that appears in any of the arguments immediately expands to its non-active self.

```
3564 \bbl@trace{Cross referencing macros}
3565 \ifx\bbl@opt@safe\@empty\else
3566   \def\@newl@bel#1#2#3{%
3567     {\@safe@activestrue
3568       \bbl@ifunset{#1@#2}%
3569         \relax
3570         {\gdef\@multiplelabels{%
3571           \@latex@warning@no@line{There were multiply-defined labels}}%
3572           \@latex@warning@no@line{Label `#2' multiply defined}}%
3573       \global\@namedef{#1@#2}{#3}}}
```

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

```
3574 \CheckCommand*\@testdef[3]{%
3575   \def\reserved@a{#3}%
3576   \expandafter\ifx\csname#1@#2\endcsname\reserved@a
3577   \else
3578     \@tempswatrue
3579   \fi}
```

Now that we made sure that `\@testdef` still has the same definition we can rewrite it. First we make the shorthands ‘safe’. Then we use `\bbl@tempa` as an ‘alias’ for the macro that contains the label which is being checked. Then we define `\bbl@tempb` just as `\@newl@bel` does it. When the label is defined we replace the definition of `\bbl@tempa` by its meaning. If the label didn’t change, `\bbl@tempa` and `\bbl@tempb` should be identical macros.

```
3580 \def\@testdef#1#2#3{% TODO. With @samestring?
3581   \@safe@activestrue
3582   \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname
3583   \def\bbl@tempb{#3}%
3584   \@safe@activesfalse
3585   \ifx\bbl@tempa\relax
3586   \else
3587     \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
3588   \fi
3589   \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
3590   \ifx\bbl@tempa\bbl@tempb
3591   \else
3592     \@tempswatrue
3593   \fi}
3594 \fi
```

`\ref` `\pageref` The same holds for the macro `\ref` that references a label and `\pageref` to reference a page. We make them robust as well (if they weren’t already) to prevent problems if they should become expanded at the wrong moment.

```
3595 \bbl@xin@{R}\bbl@opt@safe
3596 \ifin@
3597   \bbl@redefineroobust\ref#1{%
3598     \@safe@activestrue\org@ref{#1}\@safe@activesfalse}
```



```

3599 \bbl@redefineroobust\pageref#1{%
3600   \@safe@activetrue\org@pageref{#1}\@safe@activesfalse}
3601 \else
3602   \let\org@ref\ref
3603   \let\org@pageref\pageref
3604 \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.

```

3605 \bbl@xin@{B}\bbl@opt@safe
3606 \ifin@
3607   \bbl@redefine\@citex[#1]#2{%
3608     \@safe@activetrue\edef\@tempa{#2}\@safe@activesfalse
3609     \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.

```

3610 \AtBeginDocument{%
3611   \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.)

```

3612   \def\@citex[#1][#2]#3{%
3613     \@safe@activetrue\edef\@tempa{#3}\@safe@activesfalse
3614     \org@@citex[#1][#2]{\@tempa}}%
3615   }{}

```

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

```

3616 \AtBeginDocument{%
3617   \ifpackageloaded{cite}{%
3618     \def\@citex[#1]#2{%
3619       \@safe@activetrue\org@@citex[#1][#2]\@safe@activesfalse}%
3620     }{}

```

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

```

3621 \bbl@redefine\nocite#1{%
3622   \@safe@activetrue\org@nocite{#1}\@safe@activesfalse}

```

`\bibcite` The macro that is used in the `.aux` file to define citation labels. When packages such as `natbib` or `cite` are not loaded its second argument is used to typeset the citation label. In that case, this second argument can contain active characters but is used in an environment where `\@safe@activetrue` is in effect. This switch needs to be reset inside the `\hbox` which contains the citation label. In order to determine during `.aux` file processing which definition of `\bibcite` is needed we define `\bibcite` in such a way that it redefines itself with the proper definition. We call `\bbl@cite@choice` to select the proper definition for `\bibcite`. This new definition is then activated.

```

3623 \bbl@redefine\bibcite{%
3624   \bbl@cite@choice
3625   \bibcite}

```

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

```

3626 \def\bbl@bibcite#1#2{%
3627   \org@bibcite{#1}{\@safe@activesfalse#2}}

```

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

```
3628 \def\bbl@cite@choice{%
3629   \global\let\bbl@cite\bbl@bibcite
3630   \@ifpackageloaded{natbib}{\global\let\bbl@cite\org@bibcite}{}%
3631   \@ifpackageloaded{cite}{\global\let\bbl@cite\org@bibcite}{}%
3632   \global\let\bbl@cite@choice\relax}
```

When a document is run for the first time, no .aux file is available, and `\bbl@cite` will not yet be properly defined. In this case, this has to happen before the document starts.

```
3633 \AtBeginDocument{\bbl@cite@choice}
```

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

```
3634 \bbl@redefine\@bibitem#1{%
3635   \@safe@activetrue\org@bibitem{#1}\@safe@activesfalse}
3636 \else
3637   \let\org@nocite\nocite
3638   \let\org@@citex\@citex
3639   \let\org@bibcite\bbl@bibcite
3640   \let\org@bibitem\@bibitem
3641 \fi
```

9.2 Marks

`\markright` Because the output routine is asynchronous, we must pass the current language attribute to the head lines. To achieve this we need to adapt the definition of `\markright` and `\markboth` somewhat. However, headlines and footlines can contain text outside marks; for that we must take some actions in the output routine if the 'headfoot' options is used. We need to make some redefinitions to the output routine to avoid an endless loop and to correctly handle the page number in bidi documents.

```
3642 \bbl@trace{Marks}
3643 \IfBabelLayout{sectioning}
3644   {\ifx\bbl@opt@headfoot\@nnil
3645     \g@addto@macro\@resetactivechars{%
3646       \set@typeset@protect
3647       \expandafter\select@language@x\expandafter{\bbl@main@language}%
3648       \let\protect\noexpand
3649       \ifcase\bbl@bidimode\else % Only with bidi. See also above
3650         \edef\thepage{%
3651           \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}%
3652       \fi}%
3653   \fi}
3654 {\ifbbl@single\else
3655   \bbl@ifunset{markright }{\bbl@redefine\bbl@redefineroobust
3656     \markright#1{%
3657       \bbl@ifblank{#1}%
3658       {\org@markright{}}}%
3659     {\toks@{#1}%
3660      \bbl@exp{%
3661        \org@markright{\protect\foreignlanguage{\language}\thepage}%
3662        {\protect\bbl@restore@actives\the\toks@}}}%
3663   }
```

`\markboth` The definition of `\markboth` is equivalent to that of `\markright`, except that we need two token registers. The documentclasses report and book define and set the headings for the page. While doing so they also store a copy of `\markboth` in `\@mkboth`. Therefore we need to check whether `\@mkboth` has already been set. If so we need to do that again with the new definition of `\markboth`. (As of Oct 2019, \TeX stores the definition in an intermediate macro, so it's not necessary anymore, but it's preserved for older versions.)

```

3663 \ifx\@mkboth\markboth
3664 \def\bbl@tempc{\let\@mkboth\markboth}
3665 \else
3666 \def\bbl@tempc{}
3667 \fi
3668 \bbl@ifunset{markboth }\bbl@redefine\bbl@redefineroobust
3669 \markboth#1#2{%
3670 \protected@edef\bbl@tempb##1{%
3671 \protect\foreignlanguage
3672 {\language}\protect\bbl@restore@actives##1}}%
3673 \bbl@ifblank{#1}%
3674 {\toks@{}}%
3675 {\toks@\expandafter{\bbl@tempb{#1}}}%
3676 \bbl@ifblank{#2}%
3677 {\@temptokena{}}%
3678 {\@temptokena\expandafter{\bbl@tempb{#2}}}%
3679 \bbl@exp{\@org@markboth{\the\toks@}{\the\@temptokena}}
3680 \bbl@tempc
3681 \fi} % end ifbbl@single, end \IfBabelLayout

```

9.3 Preventing clashes with other packages

9.3.1 ifthen

`\ifthenelse` Sometimes a document writer wants to create a special effect depending on the page a certain fragment of text appears on. This can be achieved by the following piece of code:

```

\ifthenelse{\isodd{\pageref{some:label}}}{
  {code for odd pages}
}{code for even pages}

```

In order for this to work the argument of `\isodd` needs to be fully expandable. With the above redefinition of `\pageref` it is not in the case of this example. To overcome that, we add some code to the definition of `\ifthenelse` to make things work.

We want to revert the definition of `\pageref` and `\ref` to their original definition for the first argument of `\ifthenelse`, so we first need to store their current meanings.

Then we can set the `\@safe@actives` switch and call the original `\ifthenelse`. In order to be able to use shorthands in the second and third arguments of `\ifthenelse` the resetting of the switch *and* the definition of `\pageref` happens inside those arguments.

```

3682 \bbl@trace{Preventing clashes with other packages}
3683 \bbl@xin@{R}\bbl@opt@safe
3684 \ifin@
3685 \AtBeginDocument{%
3686 \@ifpackageloaded{ifthen}{%
3687 \bbl@redefine@long\ifthenelse#1#2#3{%
3688 \let\bbl@temp@pref\pageref
3689 \let\pageref\org@pageref
3690 \let\bbl@temp@ref\ref
3691 \let\ref\org@ref
3692 \@safe@activestrue
3693 \org@ifthenelse{#1}%
3694 {\let\pageref\bbl@temp@pref
3695 \let\ref\bbl@temp@ref
3696 \@safe@activesfalse
3697 #2}%
3698 {\let\pageref\bbl@temp@pref
3699 \let\ref\bbl@temp@ref
3700 \@safe@activesfalse

```

```

3701         #3}%
3702     }%
3703 }{}%
3704 }

```

9.3.2 varioref

`\@@vpageref` When the package `varioref` is in use we need to modify its internal command `\@@vpageref` in order to prevent problems when an active character ends up in the argument of `\vref`. The same needs to happen for `\vrefpagenum`.

```

3705 \AtBeginDocument{%
3706   \ifpackageloaded{varioref}{%
3707     \bbl@redefine\@@vpageref#1[#2]#3{%
3708       \@safe@activetrue
3709       \org@@vpageref{#1}[#2]{#3}%
3710       \@safe@activesfalse}%
3711     \bbl@redefine\vrefpagenum#1#2{%
3712       \@safe@activetrue
3713       \org\vrefpagenum{#1}{#2}%
3714       \@safe@activesfalse}%

```

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

```

3715   \expandafter\def\csname Ref\endcsname#1{%
3716     \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
3717   }{}%
3718 }
3719 \fi

```

9.3.3 hhline

`\hhline` Delaying the activation of the shorthand characters has introduced a problem with the `hhline` package. The reason is that it uses the ‘:’ character which is made active by the french support in `babel`. Therefore we need to *reload* the package when the ‘:’ is an active character. Note that this happens *after* the category code of the @-sign has been changed to other, so we need to temporarily change it to letter again.

```

3720 \AtEndOfPackage{%
3721   \AtBeginDocument{%
3722     \ifpackageloaded{hhline}%
3723     {\expandafter\ifx\csname normal@char\string\endcsname\relax
3724       \else
3725         \makeatletter
3726         \def\@currname{hhline}\input{hhline.sty}\makeatother
3727         \fi}%
3728     {}}}

```

`\substitutefontfamily` Deprecated. Use the tools provided by \LaTeX . 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.

```

3729 \def\substitutefontfamily#1#2#3{%
3730   \lowercase{\immediate\openout15=#1#2.fd\relax}%
3731   \immediate\write15{%
3732     \string\ProvidesFile{#1#2.fd}%
3733     [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
3734     \space generated font description file]^^J

```

```

3735 \string\DeclareFontFamily{#1}{#2}{}}^^J
3736 \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{}}^^J
3737 \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{}}^^J
3738 \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{}}^^J
3739 \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{}}^^J
3740 \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{}}^^J
3741 \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{}}^^J
3742 \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{}}^^J
3743 \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{}}^^J
3744 }%
3745 \closeout15
3746 }
3747 \@onlypreamble\substitutefontfamily

```

9.4 Encoding and fonts

Because documents may use non-ASCII font encodings, we make sure that the logos of \TeX and \LaTeX always come out in the right encoding. There is a list of non-ASCII encodings. Requested encodings are currently stored in `\fontenc@load@list`. If a non-ASCII has been loaded, we define versions of `\TeX` and `\LaTeX` for them using `\ensureascii`. The default ASCII encoding is set, too (in reverse order): the “main” encoding (when the document begins), the last loaded, or OT1.

`\ensureascii`

```

3748 \bbl@trace{Encoding and fonts}
3749 \newcommand\BabelNonASCII{LGR,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU}
3750 \newcommand\BabelNonText{TS1,T3,TS3}
3751 \let\org@TeX\TeX
3752 \let\org@LaTeX\LaTeX
3753 \let\ensureascii@firstofone
3754 \AtBeginDocument{%
3755   \def\elt#1{,#1,}%
3756   \edef\bbl@tempa{\expandafter\@gobbletwo\fontenc@load@list}%
3757   \let\elt\relax
3758   \let\bbl@tempb\@empty
3759   \def\bbl@tempc{OT1}%
3760   \bbl@foreach\BabelNonASCII{% LGR loaded in a non-standard way
3761     \bbl@ifunset{T@#1}{\def\bbl@tempb{#1}}}%
3762   \bbl@foreach\bbl@tempa{%
3763     \bbl@xin@{#1}{\BabelNonASCII}%
3764     \ifin@
3765       \def\bbl@tempb{#1}% Store last non-ascii
3766     \else\bbl@xin@{#1}{\BabelNonText}% Pass
3767       \ifin@
3768         \def\bbl@tempc{#1}% Store last ascii
3769       \fi
3770     \fi}%
3771   \ifx\bbl@tempb\@empty\else
3772     \bbl@xin@{\cf@encoding,}{\BabelNonASCII,\BabelNonText,}%
3773     \ifin@
3774       \def\bbl@tempc{\cf@encoding}% The default if ascii wins
3775     \fi
3776     \edef\ensureascii#1{%
3777       {\noexpand\fontencoding{\bbl@tempc}\noexpand\selectfont#1}}%
3778     \DeclareTextCommandDefault{\TeX}{\ensureascii{\org@TeX}}%
3779     \DeclareTextCommandDefault{\LaTeX}{\ensureascii{\org@LaTeX}}%
3780   \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.

```
3781 \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.

```
3782 \AtBeginDocument{%
3783   \@ifpackageloaded{fontspec}%
3784     {\xdef\latinencoding{%
3785       \ifx\UTFencname\undefined
3786         EU\ifcase\bbl@engine\or2\or1\fi
3787       \else
3788         \UTFencname
3789       \fi}}%
3790   {\gdef\latinencoding{OT1}%
3791     \ifx\cf@encoding\bbl@t@one
3792       \xdef\latinencoding{\bbl@t@one}%
3793     \else
3794       \def\@elt#1{,#1,}%
3795       \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
3796       \let\@elt\relax
3797       \bbl@xin@{,T1,}\bbl@tempa
3798       \ifin@
3799         \xdef\latinencoding{\bbl@t@one}%
3800       \fi
3801     \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.

```
3802 \DeclareRobustCommand{\latintext}{%
3803   \fontencoding{\latinencoding}\selectfont
3804   \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.

```
3805 \ifx\@undefined\DeclareTextFontCommand
3806   \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}
3807 \else
3808   \DeclareTextFontCommand{\textlatin}{\latintext}
3809 \fi
```

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

```
3810 \bbl@ifformatlater{2021-06-01}%
3811   {\def\bbl@patchfont#1{\AddToHook{selectfont}{#1}}}
3812   {\def\bbl@patchfont#1{%
3813     \expandafter\bbl@add\csname selectfont \endcsname{#1}%
3814     \expandafter\bbl@tglobal\csname selectfont \endcsname}}
```

9.5 Basic bidi support

Work in progress. This code is currently placed here for practical reasons. It will be moved to the correct place soon, I hope.

It is loosely based on `rlbabel.def`, but most of it has been developed from scratch. This `babel` module (by Johannes Braams and Boris Lavva) has served the purpose of typesetting R documents for two decades, and despite its flaws I think it is still a good starting point (some parts have been copied here almost verbatim), partly thanks to its simplicity. I've also looked at `ARABI` (by Youssef Jabri), which is compatible with `babel`.

There are two ways of modifying macros to make them “bidi”, namely, by patching the internal low-level macros (which is what I have done with lists, columns, counters, tocs, much like `rlbabel` did), and by introducing a “middle layer” just below the user interface (sectioning, footnotes).

- `pdfTeX` provides a minimal support for bidi text, and it must be done by hand. Vertical typesetting is not possible.
- `xetex` is somewhat better, thanks to its font engine (even if not always reliable) and a few additional tools. However, very little is done at the paragraph level. Another challenging problem is text direction does not honour \TeX grouping.
- `luatex` can provide the most complete solution, as we can manipulate almost freely the node list, the generated lines, and so on, but bidi text does not work out of the box and some development is necessary. It also provides tools to properly set left-to-right and right-to-left page layouts. As `Lua \TeX -ja` shows, vertical typesetting is possible, too.

```

3815 \bbl@trace{Loading basic (internal) bidi support}
3816 \ifodd\bbl@engine
3817 \else % TODO. Move to txtbabel
3818   \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
3819     \bbl@error
3820     {The bidi method 'basic' is available only in\\%
3821      luatex. I'll continue with 'bidi=default', so\\%
3822      expect wrong results}%
3823     {See the manual for further details.}%
3824   \let\bbl@beforeforeign\leavevmode
3825   \AtEndOfPackage{%
3826     \EnableBabelHook{babel-bidi}%
3827     \bbl@xebidipar}
3828 \fi\fi
3829 \def\bbl@loadxebidi#1{%
3830   \ifx\RTLfootnotetext\@undefined
3831     \AtEndOfPackage{%
3832       \EnableBabelHook{babel-bidi}%
3833       \ifx\fontspec\@undefined
3834         \bbl@loadfontspec % bidi needs fontspec
3835       \fi
3836       \usepackage#1{bidi}}%
3837   \fi}
3838 \ifnum\bbl@bidimode>200
3839   \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
3840     \bbl@tentative{bidi=bidi}
3841     \bbl@loadxebidi{}
3842   \or
3843     \bbl@loadxebidi{[rldocument]}
3844   \or
3845     \bbl@loadxebidi{}
3846   \fi
3847 \fi
3848 \fi
3849 % TODO? Separate:
3850 \ifnum\bbl@bidimode=\@ne
3851   \let\bbl@beforeforeign\leavevmode
3852   \ifodd\bbl@engine
3853     \newattribute\bbl@attr@dir
3854     \directlua{ Babel.attr_dir = luatexbase.registernumber'bbl@attr@dir' }

```

```

3855 \bbl@exp{\output{\bodydir\pagedir\the\output}}
3856 \fi
3857 \AtEndOfPackage{%
3858 \EnableBabelHook{babel-bidi}%
3859 \ifodd\bbl@engine\else
3860 \bbl@xebidipar
3861 \fi}
3862 \fi

```

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

```

3863 \bbl@trace{Macros to switch the text direction}
3864 \def\bbl@alscripts{,Arabic,Syriac,Thaana,}
3865 \def\bbl@rscripts{% TODO. Base on codes ??
3866 ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
3867 Old Hungarian,Old Hungarian,Lydian,Mandaean,Manichaeen,%
3868 Manichaeen,Meroitic Cursive,Meroitic,Old North Arabian,%
3869 Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
3870 Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%
3871 Old South Arabian,}%
3872 \def\bbl@provide@dirs#1{%
3873 \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts\bbl@rscripts}%
3874 \ifin@
3875 \global\bbl@csarg\chardef{wdir@#1}\@ne
3876 \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts}%
3877 \ifin@
3878 \global\bbl@csarg\chardef{wdir@#1}\tw@ % useless in xetex
3879 \fi
3880 \else
3881 \global\bbl@csarg\chardef{wdir@#1}\z@
3882 \fi
3883 \ifodd\bbl@engine
3884 \bbl@csarg\ifcase{wdir@#1}%
3885 \directlua{ Babel.locale_props[\the\localeid].texmdir = 'l' }%
3886 \or
3887 \directlua{ Babel.locale_props[\the\localeid].texmdir = 'r' }%
3888 \or
3889 \directlua{ Babel.locale_props[\the\localeid].texmdir = 'al' }%
3890 \fi
3891 \fi}
3892 \def\bbl@switchdir{%
3893 \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
3894 \bbl@ifunset{bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{}%
3895 \bbl@exp{\bbl@setdirs\bbl@cl{wdir}}%
3896 \def\bbl@setdirs#1{% TODO - math
3897 \ifcase\bbl@select@type % TODO - strictly, not the right test
3898 \bbl@bodydir{#1}%
3899 \bbl@pdir{#1}%
3900 \fi
3901 \bbl@texmdir{#1}}
3902 % TODO. Only if \bbl@bidimode > 0?:
3903 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
3904 \DisableBabelHook{babel-bidi}

```

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

```

3905 \ifodd\bbl@engine % luatex=1
3906 \else % pdftex=0, xetex=2
3907 \newcount\bbl@dirlevel
3908 \chardef\bbl@thetextdir\z@

```



```

3909 \chardef\bbl@thepardir\z@
3910 \def\bbl@textdir#1{%
3911   \ifcase#1\relax
3912     \chardef\bbl@thetextdir\z@
3913     \bbl@textdir@i\beginL\endL
3914   \else
3915     \chardef\bbl@thetextdir\@ne
3916     \bbl@textdir@i\beginR\endR
3917   \fi}
3918 \def\bbl@textdir@i#1#2{%
3919   \ifhmode
3920     \ifnum\currentgrouplevel>\z@
3921       \ifnum\currentgrouplevel=\bbl@dirlevel
3922         \bbl@error{Multiple bidi settings inside a group}%
3923         {I'll insert a new group, but expect wrong results.}%
3924         \bgroup\aftergroup#2\aftergroup\egroup
3925       \else
3926         \ifcase\currentgrouptype\or % 0 bottom
3927           \aftergroup#2% 1 simple {}
3928         \or
3929           \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
3930         \or
3931           \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
3932         \or\or\or % vbox vtop align
3933         \or
3934           \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
3935         \or\or\or\or\or\or % output math disc insert vcent mathchoice
3936         \or
3937           \aftergroup#2% 14 \begingroup
3938         \else
3939           \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
3940         \fi
3941       \fi
3942       \bbl@dirlevel\currentgrouplevel
3943     \fi
3944     #1%
3945   \fi}
3946 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
3947 \let\bbl@bodydir\@gobble
3948 \let\bbl@pagedir\@gobble
3949 \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).

```

3950 \def\bbl@xebidipar{%
3951   \let\bbl@xebidipar\relax
3952   \TeXeTstate\@ne
3953   \def\bbl@xeeverypar{%
3954     \ifcase\bbl@thepardir
3955       \ifcase\bbl@thetextdir\else\beginR\fi
3956     \else
3957       {\setbox\z@\lastbox\beginR\box\z@}%
3958     \fi}%
3959   \let\bbl@severypar\everypar
3960   \newtoks\everypar
3961   \everypar=\bbl@severypar
3962   \bbl@severypar{\bbl@xeeverypar\the\everypar}}
3963 \ifnum\bbl@bidimode>200

```

```

3964 \let\bbl@textdir@i@gobbletwo
3965 \let\bbl@xebidipar@empty
3966 \AddBabelHook{bidi}{foreign}{%
3967   \def\bbl@tempa{\def\BabelText####1}%
3968   \ifcase\bbl@thetextdir
3969     \expandafter\bbl@tempa\expandafter{\BabelText\LR{##1}}}%
3970   \else
3971     \expandafter\bbl@tempa\expandafter{\BabelText\RL{##1}}}%
3972   \fi}
3973 \def\bbl@pardir#1{\ifcase#1\relax\setLR\else\setRL\fi}
3974 \fi
3975 \fi

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

3976 \DeclareRobustCommand\babelsublr[1]{\leavevmode\bbl@textdir\z@#1}}
3977 \AtBeginDocument{%
3978   \ifx\pdfstringdefDisableCommands\undefined\else
3979     \ifx\pdfstringdefDisableCommands\relax\else
3980       \pdfstringdefDisableCommands{\let\babelsublr\@firstofone}%
3981     \fi
3982   \fi}

```

9.6 Local Language Configuration

`\loadlocalcfg` At some sites it may be necessary to add site-specific actions to a language definition file. This can be done by creating a file with the same name as the language definition file, but with the extension `.cfg`. For instance the file `norsk.cfg` will be loaded when the language definition file `norsk.ldf` is loaded.

For plain-based formats we don't want to override the definition of `\loadlocalcfg` from `plain.def`.

```

3983 \bbl@trace{Local Language Configuration}
3984 \ifx\loadlocalcfg\undefined
3985   \@ifpackagewith{babel}{noconfigs}%
3986   {\let\loadlocalcfg@gobble}%
3987   {\def\loadlocalcfg#1{%
3988     \InputIfFileExists{#1.cfg}%
3989     {\typeout{*****^J
3990               * Local config file #1.cfg used^^J
3991               *}}}%
3992   \@empty}}
3993 \fi

```

9.7 Language options

Languages are loaded when processing the corresponding option *except* if a main language has been set. In such a case, it is not loaded until all options has been processed. The following macro inputs the `ldf` file and does some additional checks (`\input` works, too, but possible errors are not caught).

```

3994 \bbl@trace{Language options}
3995 \let\bbl@afterlang\relax
3996 \let\BabelModifiers\relax
3997 \let\bbl@loaded@empty
3998 \def\bbl@load@language#1{%
3999   \InputIfFileExists{#1.ldf}%
4000   {\edef\bbl@loaded{\CurrentOption
4001     \ifx\bbl@loaded@empty\else,\bbl@loaded\fi}%
4002     \expandafter\let\expandafter\bbl@afterlang
4003       \csname\CurrentOption.ldf-h@k\endcsname
4004     \expandafter\let\expandafter\BabelModifiers
4005       \csname bbl@mod@\CurrentOption\endcsname}%

```

```

4006 {\bbl@error{%
4007     Unknown option '\CurrentOption'. Either you misspelled it\\%
4008     or the language definition file \CurrentOption.ldf was not found}%}
4009     Valid options are, among others: shorthands=, KeepShorthandsActive,\\%
4010     activeacute, activegrave, noconfigs, safe=, main=, math=\\%
4011     headfoot=, strings=, config=, hyphenmap=, or a language name.}}

```

Now, we set a few language options whose names are different from ldf files. These declarations are preserved for backwards compatibility, but they must be eventually removed. Use proxy files instead.

```

4012 \def\bbl@try@load@lang#1#2#3{%
4013     \IfFileExists{\CurrentOption.ldf}%
4014     {\bbl@load@language{\CurrentOption}}}%
4015     {#1\bbl@load@language{#2}#3}}
4016 %
4017 \DeclareOption{hebrew}{%
4018     \input{rlbabel.def}%
4019     \bbl@load@language{hebrew}}
4020 \DeclareOption{hungarian}{\bbl@try@load@lang{}{magyar}{}}
4021 \DeclareOption{lowersorbian}{\bbl@try@load@lang{}{lsorbian}{}}
4022 \DeclareOption{nynorsk}{\bbl@try@load@lang{}{norsk}{}}
4023 \DeclareOption{polutonikogreek}{%
4024     \bbl@try@load@lang{}{greek}{\languageattribute{greek}{polutoniko}}}
4025 \DeclareOption{russian}{\bbl@try@load@lang{}{russianb}{}}
4026 \DeclareOption{ukrainian}{\bbl@try@load@lang{}{ukraineb}{}}
4027 \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.

```

4028 \ifx\bbl@opt@config\@nnil
4029     \@ifpackagewith{babel}{noconfigs}{}%
4030     {\InputIfFileExists{bblopts.cfg}%
4031         {\typeout{*****^J%
4032             * Local config file bblopts.cfg used^^J%
4033             *}}}%
4034     }{}%
4035 \else
4036     \InputIfFileExists{\bbl@opt@config.cfg}%
4037     {\typeout{*****^J%
4038         * Local config file \bbl@opt@config.cfg used^^J%
4039         *}}}%
4040     {\bbl@error{%
4041         Local config file '\bbl@opt@config.cfg' not found}%}
4042     {Perhaps you misspelled it.}}%
4043 \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 names of the option and the file are the same. We first pre-process the class and package options to determine the main language, which is processed in the third ‘main’ pass, *except* if all files are ldf *and* there is no main key. In the latter case, the traditional way to set the main language is kept — the last loaded is the main language (\bbl@opt@main is \@nnil.

```

4044 \ifx\bbl@opt@main\@nnil
4045     \ifnum\bbl@iniflag>\z@ % if all ldf's: set implicitly, no main pass
4046         \let\bbl@tempb\@empty

```

```

4047 \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}%
4048 \bbl@foreach\bbl@tempa{\edef\bbl@tempb{#1,\bbl@tempb}}%
4049 \bbl@foreach\bbl@tempb{% \bbl@tempb is a reversed list
4050 \ifx\bbl@opt@main\@nnil % ie, if not yet assigned
4051 \ifodd\bbl@iniflag % = *=
4052 \IfFileExists{babel-#1.tex}{\def\bbl@opt@main{#1}}{}%
4053 \else % n +=
4054 \IfFileExists{#1.ldf}{\def\bbl@opt@main{#1}}{}%
4055 \fi
4056 \fi}%
4057 \fi
4058 \fi

```

A few languages are still defined explicitly. They are stored in case they are needed in the ‘main’ pass (the value can be \relax).

```

4059 \ifx\bbl@opt@main\@nnil\else
4060 \bbl@csarg\let{loadmain\expandafter}\csname ds@\bbl@opt@main\endcsname
4061 \expandafter\let\csname ds@\bbl@opt@main\endcsname\relax
4062 \fi

```

Now define the corresponding loaders. With package options, assume the language exists. With class options, check if the option is a language.

```

4063 \bbl@foreach\bbl@language@opts{%
4064 \bbl@ifunset{ds@#1}%
4065 {\ifnum\bbl@iniflag<\tw@ % 0 0 (other = ldf)
4066 \DeclareOption{#1}{\bbl@load@language{#1}}%
4067 \else % + * (other = ini)
4068 \DeclareOption{#1}{%
4069 \bbl@ldfinit
4070 \babelprovide[import]{#1}%
4071 \bbl@afterldf{}}%
4072 \fi}%
4073 {}%
4074 \bbl@foreach\@classoptionslist{%
4075 \bbl@ifunset{ds@#1}%
4076 {\ifnum\bbl@iniflag<\tw@ % 0 0 (other = ldf)
4077 \IfFileExists{#1.ldf}%
4078 {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4079 {}%
4080 \else % + * (other = ini)
4081 \IfFileExists{babel-#1.tex}%
4082 {\DeclareOption{#1}{%
4083 \bbl@ldfinit
4084 \babelprovide[import]{#1}%
4085 \bbl@afterldf{}}}%
4086 {}%
4087 \fi}%
4088 {}%

```

If a main language has been set, disable it here and delay it to the ‘main’ pass.

```

4089 \ifx\bbl@opt@main\@nnil\else
4090 \DeclareOption{\bbl@opt@main}{}
4091 \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, class options, which \LaTeX processes before):

```

4092 \def\AfterBabelLanguage#1{%

```

```

4093 \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang}{}}
4094 \DeclareOption*{}
4095 \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.

```

4096 \bbl@trace{Option 'main'}
4097 \ifx\bbl@opt@main\@nnil
4098 \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
4099 \let\bbl@tempc\@empty
4100 \bbl@for\bbl@tempb\bbl@tempa{%
4101   \bbl@xin@{,\bbl@tempb,}{,\bbl@loaded,}%
4102   \ifin@\edef\bbl@tempc{\bbl@tempb}\fi}
4103 \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
4104 \expandafter\bbl@tempa\bbl@loaded,\@nnil
4105 \ifx\bbl@tempb\bbl@tempc\else
4106   \bbl@warning{%
4107     Last declared language option is '\bbl@tempc',\%
4108     but the last processed one was '\bbl@tempb'.\%
4109     The main language can't be set as both a global\%
4110     and a package option. Use 'main=\bbl@tempc' as\%
4111     option. Reported}%
4112   \fi
4113 \else
4114   \ifodd\bbl@iniflag % case 1,3
4115     \bbl@ldfinit
4116     \let\CurrentOption\bbl@opt@main
4117     \ifx\bbl@opt@provide\@nnil
4118       \bbl@exp{\@babelprovide[import,main]{\bbl@opt@main}}%
4119     \else
4120       \bbl@exp{\@bbl@forkv{\@nameuse{@raw@opt@babel.sty}}}{%
4121         \bbl@xin@{,provide,}{,#1,}%
4122         \ifin@
4123           \def\bbl@opt@provide{#2}%
4124           \bbl@replace\bbl@opt@provide{;}{,}%
4125         \fi}%
4126       \bbl@exp{%
4127         \@babelprovide[\bbl@opt@provide,import,main]{\bbl@opt@main}}%
4128       \fi
4129       \bbl@afterldf{}%
4130   \else % case 0,2
4131     \ifx\bbl@loadmain\relax
4132       \DeclareOption{\bbl@opt@main}{\bbl@load@language{\bbl@opt@main}}
4133     \else
4134       \DeclareOption{\bbl@opt@main}{\bbl@loadmain}
4135     \fi
4136     \ExecuteOptions{\bbl@opt@main}
4137     \DeclareOption*{}%
4138     \ProcessOptions*
4139   \fi
4140 \fi
4141 \def\AfterBabelLanguage{%
4142   \bbl@error
4143   {Too late for \string\AfterBabelLanguage}%
4144   {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.
4145 \ifx\bbl@main@language\@undefined
4146   \bbl@info{%
4147     You haven't specified a language. I'll use 'nil'\%
4148     as the main language. Reported}
4149   \bbl@load@language{nil}
4150 \fi
4151 \</package>

```

10 The kernel of Babel (babel.def, common)

The kernel of the babel system is currently stored in babel.def. The file babel.def contains most of the code. The file hyphen.cfg is a file that can be loaded into the format, which is necessary when you want to be able to switch hyphenation patterns.

Because plain T_EX users might want to use some of the features of the babel system too, care has to be taken that plain T_EX can process the files. For this reason the current format will have to be checked in a number of places. Some of the code below is common to plain T_EX and L^AT_EX, some of it is for the L^AT_EX case only.

Plain formats based on etex (etex, xetex, luatex) don't load hyphen.cfg but etex.src, which follows a different naming convention, so we need to define the babel names. It presumes language.def exists and it is the same file used when formats were created.

A proxy file for switch.def

```

4152 \<*kernel>
4153 \let\bbl@onlyswitch\@empty
4154 \input babel.def
4155 \let\bbl@onlyswitch\@undefined
4156 \</kernel>
4157 \<*patterns>

```

11 Loading hyphenation patterns

The following code is meant to be read by iniT_EX because it should instruct T_EX to read hyphenation patterns. To this end the docstrip option patterns is used to include this code in the file hyphen.cfg. Code is written with lower level macros.

```

4158 \<<Make sure ProvidesFile is defined>>
4159 \ProvidesFile{hyphen.cfg}[\<<date>>] \<<version>> Babel hyphens]
4160 \xdef\bbl@format{\jobname}
4161 \def\bbl@version{\<<version>>}
4162 \def\bbl@date{\<<date>>}
4163 \ifx\AtBeginDocument\@undefined
4164   \def\@empty{}
4165 \fi
4166 \<<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.

```

4167 \def\process@line#1#2 #3 #4 {%
4168   \ifx=#1%
4169     \process@synonym{#2}%
4170   \else
4171     \process@language{#1#2}{#3}{#4}%
4172   \fi
4173   \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.

```
4174 \toks@{}
4175 \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.

```
4176 \def\process@synonym#1{%
4177   \ifnum\last@language=\m@ne
4178     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
4179   \else
4180     \expandafter\chardef\csname l@#1\endcsname\last@language
4181     \wlog{\string\l@#1=\string\language\the\last@language}%
4182     \expandafter\let\csname #1hyphenmins\expandafter\endcsname
4183       \csname\language\hyphenmins\endcsname
4184     \let\bbl@elt\relax
4185     \edef\bbl@languages{\bbl@languages\bbl@elt{#1}{\the\last@language}{}}}%
4186   \fi}
```

`\process@language` The macro `\process@language` is used to process a non-empty line from the ‘configuration file’. It has three arguments, each delimited by white space. The first argument is the ‘name’ of a language; the second is the name of the file that contains the patterns. The optional third argument is the name of a file containing hyphenation exceptions.

The first thing to do is call `\addlanguage` to allocate a pattern register and to make that register ‘active’. Then the pattern file is read.

For some hyphenation patterns it is needed to load them with a specific font encoding selected. This can be specified in the file `language.dat` by adding for instance ‘:T1’ to the name of the language. The macro `\bbl@get@enc` extracts the font encoding from the language name and stores it in `\bbl@hyph@enc`. The latter can be used in hyphenation files if you need to set a behavior depending on the given encoding (it is set to empty if no encoding is given).

Pattern files may contain assignments to `\lefthyphenmin` and `\righthyphenmin`. T_EX 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` or `\uccode` arrays. Such changes should remain local to the language; therefore we process the pattern file in a group; the `\patterns` command acts globally so its effect will be remembered.

Then we globally store the settings of `\lefthyphenmin` and `\righthyphenmin` and close the group. When the hyphenation patterns have been processed we need to see if a file with hyphenation exceptions needs to be read. This is the case when the third argument is not empty and when it does not contain a space token. (Note however there is no need to save hyphenation exceptions into the format.)

`\bbl@languages` saves a snapshot of the loaded languages in the form

`\bbl@elt{<language-name>}{<number>}{<patterns-file>}{<exceptions-file>}`. Note the last 2 arguments are empty in ‘dialects’ defined in `language.dat` with `=`. Note also the language name can have encoding info.

Finally, if the counter `\language` is equal to zero we execute the synonyms stored.

```
4187 \def\process@language#1#2#3{%
4188   \expandafter\addlanguage\csname l@#1\endcsname
4189   \expandafter\language\csname l@#1\endcsname
4190   \edef\language{#1}%
4191   \bbl@hook@everylanguage{#1}%
4192   % > luatex
4193   \bbl@get@enc#1::\@@@
4194   \begingroup
4195     \lefthyphenmin\m@ne
```

```

4196 \bbl@hook@loadpatterns{#2}%
4197 % > luatex
4198 \ifnum\lefthyphenmin=\m@ne
4199 \else
4200 \expandafter\xdef\csname #1hyphenmins\endcsname{%
4201 \the\lefthyphenmin\the\righthyphenmin}%
4202 \fi
4203 \endgroup
4204 \def\bbl@tempa{#3}%
4205 \ifx\bbl@tempa\@empty\else
4206 \bbl@hook@loadexceptions{#3}%
4207 % > luatex
4208 \fi
4209 \let\bbl@elt\relax
4210 \edef\bbl@languages{%
4211 \bbl@languages\bbl@elt{#1}{\the\language}{#2}{\bbl@tempa}}%
4212 \ifnum\the\language=\z@
4213 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
4214 \set@hyphenmins\tw@\thr@@\relax
4215 \else
4216 \expandafter\expandafter\expandafter\set@hyphenmins
4217 \csname #1hyphenmins\endcsname
4218 \fi
4219 \the\toks@
4220 \toks@{}%
4221 \fi}

```

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

```

4222 \def\bbl@get@enc#1:#2:#3@@@{\def\bbl@hyph@enc{#2}}

```

Now, hooks are defined. For efficiency reasons, they are dealt here in a special way. Besides luatex, format-specific configuration files are taken into account. loadkernel currently loads nothing, but define some basic macros instead.

```

4223 \def\bbl@hook@everylanguage#1{}
4224 \def\bbl@hook@loadpatterns#1{\input #1\relax}
4225 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
4226 \def\bbl@hook@loadkernel#1{%
4227 \def\addlanguage{\csname newlanguage\endcsname}%
4228 \def\adddialect##1##2{%
4229 \global\chardef##1##2\relax
4230 \wlog{\string##1 = a dialect from \string\language##2}}%
4231 \def\iflanguage#1{%
4232 \expandafter\ifx\csname l@##1\endcsname\relax
4233 \@nolanerr{##1}%
4234 \else
4235 \ifnum\csname l@##1\endcsname=\language
4236 \expandafter\expandafter\expandafter\@firstoftwo
4237 \else
4238 \expandafter\expandafter\expandafter\@secondoftwo
4239 \fi
4240 \fi}%
4241 \def\providehyphenmins##1##2{%
4242 \expandafter\ifx\csname ##1hyphenmins\endcsname\relax
4243 \@namedef{##1hyphenmins}{##2}%
4244 \fi}%
4245 \def\set@hyphenmins##1##2{%
4246 \lefthyphenmin##1\relax

```



```

4247 \righthyphenmin##2\relax}%
4248 \def\selectlanguage{%
4249 \errhelp{Selecting a language requires a package supporting it}%
4250 \errmessage{Not loaded}}%
4251 \let\foreignlanguage\selectlanguage
4252 \let\otherlanguage\selectlanguage
4253 \expandafter\let\csname otherlanguage*\endcsname\selectlanguage
4254 \def\bbl@usehooks##1##2{% TODO. Temporary!!
4255 \def\setlocale{%
4256 \errhelp{Find an armchair, sit down and wait}%
4257 \errmessage{Not yet available}}%
4258 \let\uselocale\setlocale
4259 \let\locale\setlocale
4260 \let\selectlocale\setlocale
4261 \let\localename\setlocale
4262 \let\textlocale\setlocale
4263 \let\textlanguage\setlocale
4264 \let\languagegettext\setlocale}
4265 \begingroup
4266 \def\AddBabelHook#1#2{%
4267 \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
4268 \def\next{\toks1}%
4269 \else
4270 \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname####1}%
4271 \fi
4272 \next}
4273 \ifx\directlua@undefined
4274 \ifx\XeTeXinputencoding@undefined\else
4275 \input xebabel.def
4276 \fi
4277 \else
4278 \input luababel.def
4279 \fi
4280 \openin1 = babel-\bbl@format.cfg
4281 \ifeof1
4282 \else
4283 \input babel-\bbl@format.cfg\relax
4284 \fi
4285 \closein1
4286 \endgroup
4287 \bbl@hook@loadkernel{switch.def}

```

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

```

4288 \openin1 = language.dat

```

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

```

4289 \def\language{english}%
4290 \ifeof1
4291 \message{I couldn't find the file language.dat,\space
4292 I will try the file hyphen.tex}
4293 \input hyphen.tex\relax
4294 \chardef\l@english\z@
4295 \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.

```

4296 \last@language\m@ne

```

We now read lines from the file until the end is found. While reading from the input, it is useful to switch off recognition of the end-of-line character. This saves us stripping off spaces from the contents of the control sequence.

```
4297 \loop
4298   \endlinechar\m@ne
4299   \read1 to \bbl@line
4300   \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.

```
4301   \if T\ifeof1F\fi T\relax
4302   \ifx\bbl@line\@empty\else
4303     \edef\bbl@line{\bbl@line\space\space\space}%
4304     \expandafter\process@line\bbl@line\relax
4305   \fi
4306 \repeat
```

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

```
4307 \begingroup
4308   \def\bbl@elt#1#2#3#4{%
4309     \global\language=#2\relax
4310     \gdef\language#1}%
4311   \def\bbl@elt##1##2##3##4{}}%
4312   \bbl@languages
4313 \endgroup
4314 \fi
4315 \closein1
```

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

```
4316 \if/\the\toks@/\else
4317   \errhelp{language.dat loads no language, only synonyms}
4318   \errmessage{Orphan language synonym}
4319 \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.

```
4320 \let\bbl@line\@undefined
4321 \let\process@line\@undefined
4322 \let\process@synonym\@undefined
4323 \let\process@language\@undefined
4324 \let\bbl@get@enc\@undefined
4325 \let\bbl@hyph@enc\@undefined
4326 \let\bbl@tempa\@undefined
4327 \let\bbl@hook@loadkernel\@undefined
4328 \let\bbl@hook@everylanguage\@undefined
4329 \let\bbl@hook@loadpatterns\@undefined
4330 \let\bbl@hook@loadexceptions\@undefined
4331 </patterns>
```

Here the code for iniTeX ends.

12 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].

```

4332 <<*More package options>> ≡
4333 \chardef\bbl@bidimode\z@
4334 \DeclareOption{bidi=default}{\chardef\bbl@bidimode=\@ne}
4335 \DeclareOption{bidi=basic}{\chardef\bbl@bidimode=101 }
4336 \DeclareOption{bidi=basic-r}{\chardef\bbl@bidimode=102 }
4337 \DeclareOption{bidi=bidi}{\chardef\bbl@bidimode=201 }
4338 \DeclareOption{bidi=bidi-r}{\chardef\bbl@bidimode=202 }
4339 \DeclareOption{bidi=bidi-l}{\chardef\bbl@bidimode=203 }
4340 <</More package options>>

```

With explicit languages, we could define the font at once, but we don't. Just wait and see if the language is actually activated. `bbl@font` replaces hardcoded font names inside `\. . family` by the corresponding macro `\. . default`.

At the time of this writing, `fontspec` shows a warning about there are languages not available, which some people think refers to `babel`, even if there is nothing wrong. Here is hack to patch `fontspec` to avoid the misleading message, which is replaced by a more explanatory one.

```

4341 <<*Font selection>> ≡
4342 \bbl@trace{Font handling with fontspec}
4343 \ifx\ExplSyntaxOn\@undefined\else
4344   \ExplSyntaxOn
4345   \catcode`\ =10
4346   \def\bbl@loadfontspec{%
4347     \usepackage{fontspec}% TODO. Apply patch always
4348     \expandafter
4349     \def\csname msg~text~>~fontspec/language-not-exist\endcsname##1##2##3##4{%
4350       Font '\l_fontspec_fontname_tl' is using the\\%
4351       default features for language '##1'.\\%
4352       That's usually fine, because many languages\\%
4353       require no specific features, but if the output is\\%
4354       not as expected, consider selecting another font.}
4355     \expandafter
4356     \def\csname msg~text~>~fontspec/no-script\endcsname##1##2##3##4{%
4357       Font '\l_fontspec_fontname_tl' is using the\\%
4358       default features for script '##2'.\\%
4359       That's not always wrong, but if the output is\\%
4360       not as expected, consider selecting another font.}}
4361   \ExplSyntaxOff
4362 \fi
4363 \@onlypreamble\babelfont
4364 \newcommand\babelfont[2][{}]{% 1=langs/scripts 2=fam
4365   \bbl@foreach{#1}{%
4366     \expandafter\ifx\csname date##1\endcsname\relax
4367       \IfFileExists{babel-##1.tex}%
4368         {\babelprovide{##1}}%
4369         {}%
4370     \fi}%
4371   \edef\bbl@tempa{#1}%
4372   \def\bbl@tempb{#2}% Used by \bbl@bblfont
4373   \ifx\fontspec\@undefined
4374     \bbl@loadfontspec
4375   \fi
4376   \EnableBabelHook{babel-fontspec}% Just calls \bbl@switchfont
4377   \bbl@bblfont}
4378 \newcommand\bbl@bblfont[2][{}]{% 1=features 2=fontname, @font=rm|sf|tt
4379   \bbl@ifunset{\bbl@tempb family}%
4380     {\bbl@providedefam{\bbl@tempb}}%
4381     {}%
4382   % For the default font, just in case:
4383   \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}}%

```

```

4384 \expandafter\bb1@ifblank\expandafter{\bb1@tempa}%
4385 {\bb1@csarg\edef{\bb1@tempb dflt@}{<{#1}{#2}}% save bbl@rmdflt@
4386 \bbl@exp{%
4387 \let<\bbl@tempb dflt@\language\bb1@tempb dflt@>%
4388 \bb1@font@set<\bbl@tempb dflt@\language>%
4389 \<\bbl@tempb default>\<\bbl@tempb family>}}%
4390 {\bbl@foreach\bbl@tempa{% ie bbl@rmdflt@lang / *srt
4391 \bbl@csarg\def{\bb1@tempb dflt@##1}{<{#1}{#2}}}}%

```

If the family in the previous command does not exist, it must be defined. Here is how:

```

4392 \def\bbl@providfam#1{%
4393 \bbl@exp{%
4394 \\\newcommand\<#1default>{}% Just define it
4395 \\\bbl@add@list\\bbl@font@fams{#1}%
4396 \\\DeclareRobustCommand\<#1family>{%
4397 \\\not@math@alphabet\<#1family>\relax
4398 % \\\prepare@family@series@update{#1}\<#1default>% TODO. Fails
4399 \\\fontfamily\<#1default>%
4400 \<ifx>\\\UseHooks\\@undefined\<else>\\\UseHook{#1family}\<fi>%
4401 \\\selectfont}%
4402 \\\DeclareTextFontCommand{\<text#1>}{\<#1family>}}

```

The following macro is activated when the hook babel-fontspec is enabled. But before, we define a macro for a warning, which sets a flag to avoid duplicate them.

```

4403 \def\bbl@nostdfont#1{%
4404 \bbl@ifunset{\bbl@WFF@f@family}%
4405 {\bbl@csarg\gdef{\bbl@WFF@f@family}{}}% Flag, to avoid dupl warns
4406 \bbl@infowarn{The current font is not a babel standard family:\%
4407 #1%
4408 \fontname\font\\%
4409 There is nothing intrinsically wrong with this warning, and\\%
4410 you can ignore it altogether if you do not need these\\%
4411 families. But if they are used in the document, you should be\\%
4412 aware 'babel' will no set Script and Language for them, so\\%
4413 you may consider defining a new family with \string\babelfont.\\%
4414 See the manual for further details about \string\babelfont.\\%
4415 Reported}}
4416 {}}%
4417 \gdef\bbl@switchfont{%
4418 \bbl@ifunset{\bbl@lsys@\language}{\bbl@provide@lsys{\language}}}%
4419 \bbl@exp{% eg Arabic -> arabic
4420 \lowercase{\edef\\bbl@tempa{\bbl@cl{sname}}}}%
4421 \bbl@foreach\bbl@font@fams{%
4422 \bbl@ifunset{\bbl@##1dflt@\language}% (1) language?
4423 {\bbl@ifunset{\bbl@##1dflt@*\bbl@tempa}% (2) from script?
4424 {\bbl@ifunset{\bbl@##1dflt@}% 2=F - (3) from generic?
4425 {}% 123=F - nothing!
4426 {\bbl@exp{% 3=T - from generic
4427 \global\let<\bbl@##1dflt@\language>%
4428 \<\bbl@##1dflt@>}}}%
4429 {\bbl@exp{% 2=T - from script
4430 \global\let<\bbl@##1dflt@\language>%
4431 \<\bbl@##1dflt@*\bbl@tempa>}}}%
4432 {}% 1=T - language, already defined
4433 \def\bbl@tempa{\bbl@nostdfont}}}%
4434 \bbl@foreach\bbl@font@fams{% don't gather with prev for
4435 \bbl@ifunset{\bbl@##1dflt@\language}%
4436 {\bbl@cs{famrst@##1}%
4437 \global\bbl@csarg\let{famrst@##1}\relax}%

```

```

4438      {\bbl@exp{% order is relevant. TODO: but sometimes wrong!
4439      \\bbl@add\\originalTeX{%
4440      \\bbl@font@rst{\bbl@cl{##1dflt}}}%
4441      \<##1default>\<##1family>{##1}}}%
4442      \\bbl@font@set\<bbl@##1dflt@language>% the main part!
4443      \<##1default>\<##1family>}}}%
4444      \bbl@ifrestoring{}\bbl@tempa}}%

```

The following is executed at the beginning of the aux file or the document to warn about fonts not defined with \babelfont.

```

4445 \ifx\fbfamily\undefined\else      % if latex
4446 \ifcase\bbl@engine                  % if pdftex
4447 \let\bbl@cckcstdfonts\relax
4448 \else
4449 \def\bbl@cckcstdfonts{%
4450   \begingroup
4451   \global\let\bbl@cckcstdfonts\relax
4452   \let\bbl@tempa\@empty
4453   \bbl@foreach\bbl@font@fams{%
4454     \bbl@ifunset{bbl@##1dflt@}%
4455     {\nameuse{##1family}%
4456     \bbl@csarg\gdef{WFF@fbfamily}}}% Flag
4457     \bbl@exp{\\bbl@add\\bbl@tempa{* \<##1family>= fbfamily\\}%
4458     \space\space\fontname\font\\}%
4459     \bbl@csarg\xdef{##1dflt@}{fbfamily}%
4460     \expandafter\xdef\csname ##1default\endcsname{fbfamily}}}%
4461     {}}%
4462   \ifx\bbl@tempa\@empty\else
4463     \bbl@infowarn{The following font families will use the default\\%
4464     settings for all or some languages:\\%
4465     \bbl@tempa
4466     There is nothing intrinsically wrong with it, but\\%
4467     'babel' will no set Script and Language, which could\\%
4468     be relevant in some languages. If your document uses\\%
4469     these families, consider redefining them with \string\babelfont.\\%
4470     Reported}%
4471   \fi
4472 \endgroup}
4473 \fi
4474 \fi

```

Now the macros defining the font with fontspec.

When there are repeated keys in fontspec, the last value wins. So, we just place the ini settings at the beginning, and user settings will take precedence. We must deactivate temporarily \bbl@mapselect because \selectfont is called internally when a font is defined.

```

4475 \def\bbl@font@set#1#2#3{% eg \bbl@rmdflt@lang \rmdefault \rmfamily
4476 \bbl@xin@{<>}{#1}%
4477 \ifin@
4478 \bbl@exp{\\bbl@fontspec@set\\#1\expandafter@gobbletwo#1\\#3}%
4479 \fi
4480 \bbl@exp{%
4481   \def\\#2{#1}% eg, \rmdefault{\bbl@rmdflt@lang}
4482   \\bbl@ifsamestring{#2}{fbfamily}%
4483   {\#3%
4484     \\bbl@ifsamestring{fbseries}{bfdefault}{\bfseries}}}%
4485   \let\\bbl@tempa\relax}%
4486   {}}}
4487 % TODO - next should be global?, but even local does its job. I'm
4488 % still not sure -- must investigate:

```

```

4489 \def\bbl@fontspec@set#1#2#3#4{% eg \bbl@rmdflt@lang fnt-opt fnt-nme \xxfamily
4490 \let\bbl@tempe\bbl@mapselect
4491 \let\bbl@mapselect\relax
4492 \let\bbl@temp@fam#4% eg, '\rmfamily', to be restored below
4493 \let#4\empty % Make sure \renewfontfamily is valid
4494 \bbl@exp{%
4495 \let\\bbl@temp@pfam\<\bbl@stripslash#4\space>% eg, '\rmfamily '
4496 \<keys_if_exist:nnF>{fontspec-opentype}{Script/\bbl@cl{sname}}}%
4497 {\newfontscript{\bbl@cl{sname}}{\bbl@cl{sotf}}}%
4498 \<keys_if_exist:nnF>{fontspec-opentype}{Language/\bbl@cl{lname}}}%
4499 {\newfontlanguage{\bbl@cl{lname}}{\bbl@cl{lotf}}}%
4500 \\renewfontfamily\\#4%
4501 [\bbl@cl{lsys},#2]{#3}% ie \bbl@exp{.}{#3}
4502 \begingroup
4503 #4%
4504 \xdef#1{\f@family}% eg, \bbl@rmdflt@lang{FreeSerif(0)}
4505 \endgroup
4506 \let#4\bbl@temp@fam
4507 \bbl@exp{\let\<\bbl@stripslash#4\space>}\bbl@temp@pfam
4508 \let\bbl@mapselect\bbl@tempe}%

```

font@rst and famrst are only used when there is no global settings, to save and restore de previous families. Not really necessary, but done for optimization.

```

4509 \def\bbl@font@rst#1#2#3#4{%
4510 \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.

```

4511 \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 :-).

```

4512 \newcommand\babelFSstore[2][{%
4513 \bbl@ifblank{#1}%
4514 {\bbl@csarg\def{sname#2}{Latin}}}%
4515 {\bbl@csarg\def{sname#2}{#1}}}%
4516 \bbl@provide@dirs{#2}%
4517 \bbl@csarg\ifnum{wdir#2}>\z@
4518 \let\bbl@beforeforeign\leavevmode
4519 \EnableBabelHook{babel-bidi}%
4520 \fi
4521 \bbl@foreach{#2}{%
4522 \bbl@FSstore{##1}{rm}\rmdefault\bbl@save@rmdefault
4523 \bbl@FSstore{##1}{sf}\sfdefault\bbl@save@sfdefault
4524 \bbl@FSstore{##1}{tt}\ttdefault\bbl@save@ttdefault}}
4525 \def\bbl@FSstore#1#2#3#4{%
4526 \bbl@csarg\edef{#2default#1}{#3}%
4527 \expandafter\addto\csname extras#1\endcsname{%
4528 \let#4#3%
4529 \ifx#3\f@family
4530 \edef#3{\csname bbl@#2default#1\endcsname}%
4531 \fontfamily{#3}\selectfont
4532 \else
4533 \edef#3{\csname bbl@#2default#1\endcsname}%
4534 \fi}%
4535 \expandafter\addto\csname noextras#1\endcsname{%
4536 \ifx#3\f@family
4537 \fontfamily{#4}\selectfont
4538 \fi

```

```

4539 \let#3#4}}
4540 \let\bbbl@langfeatures\@empty
4541 \def\babelFSfeatures{% make sure \fontspec is redefined once
4542 \let\bbbl@ori@fontspec\fontspec
4543 \renewcommand\fontspec[1][{}]{%
4544 \bbbl@ori@fontspec[\bbbl@langfeatures##1]}
4545 \let\babelFSfeatures\bbbl@FSfeatures
4546 \babelFSfeatures}
4547 \def\bbbl@FSfeatures#1#2{%
4548 \expandafter\addto\csname extras#1\endcsname{%
4549 \babel@save\bbbl@langfeatures
4550 \edef\bbbl@langfeatures{#2,}}}%
4551 <</Font selection>>

```

13 Hooks for XeTeX and LuaTeX

13.1 XeTeX

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

```

4552 <<{*Footnote changes}>> ≡
4553 \bbbl@trace{Bidi footnotes}
4554 \ifnum\bbbl@bidimode>\z@
4555 \def\bbbl@footnote#1#2#3{%
4556 \ifnextchar[%
4557 {\bbbl@footnote@o{#1}{#2}{#3}}%
4558 {\bbbl@footnote@x{#1}{#2}{#3}}}
4559 \long\def\bbbl@footnote@x#1#2#3#4{%
4560 \bgroup
4561 \select@language@x{\bbbl@main@language}%
4562 \bbbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
4563 \egroup}
4564 \long\def\bbbl@footnote@o#1#2#3[#4]#5{%
4565 \bgroup
4566 \select@language@x{\bbbl@main@language}%
4567 \bbbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
4568 \egroup}
4569 \def\bbbl@footnotetext#1#2#3{%
4570 \ifnextchar[%
4571 {\bbbl@footnotetext@o{#1}{#2}{#3}}%
4572 {\bbbl@footnotetext@x{#1}{#2}{#3}}}
4573 \long\def\bbbl@footnotetext@x#1#2#3#4{%
4574 \bgroup
4575 \select@language@x{\bbbl@main@language}%
4576 \bbbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
4577 \egroup}
4578 \long\def\bbbl@footnotetext@o#1#2#3[#4]#5{%
4579 \bgroup
4580 \select@language@x{\bbbl@main@language}%
4581 \bbbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
4582 \egroup}
4583 \def\BabelFootnote#1#2#3#4{%
4584 \ifx\bbbl@fn@footnote\@undefined
4585 \let\bbbl@fn@footnote\footnote
4586 \fi
4587 \ifx\bbbl@fn@footnotetext\@undefined
4588 \let\bbbl@fn@footnotetext\footnotetext
4589 \fi

```

```

4590 \bbl@ifblank{#2}%
4591 {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
4592 \namedef{\bbl@stripslash#1text}%
4593 {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
4594 {\def#1{\bbl@exp{\bbl@footnote{\bbl@foreignlanguage{#2}}{#3}{#4}}}%
4595 \namedef{\bbl@stripslash#1text}%
4596 {\bbl@exp{\bbl@footnotetext{\bbl@foreignlanguage{#2}}{#3}{#4}}}}
4597 \fi
4598 <</Footnote changes>>

```

Now, the code.

```

4599 (*xetex)
4600 \def\BabelStringsDefault{unicode}
4601 \let\xebbl@stop\relax
4602 \AddBabelHook{xetex}{encodedcommands}{%
4603 \def\bbl@tempa{#1}%
4604 \ifx\bbl@tempa\empty
4605 \XeTeXinputencoding"bytes"%
4606 \else
4607 \XeTeXinputencoding"#1"%
4608 \fi
4609 \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
4610 \AddBabelHook{xetex}{stopcommands}{%
4611 \xebbl@stop
4612 \let\xebbl@stop\relax}
4613 \def\bbl@intraspace#1 #2 #3\@@{%
4614 \bbl@csarg\gdef{\xeisp@{language}}%
4615 {\XeTeXlinebreakskip #1em plus #2em minus #3em\relax}}
4616 \def\bbl@intrapenalty#1\@@{%
4617 \bbl@csarg\gdef{\xeipn@{language}}%
4618 {\XeTeXlinebreakpenalty #1\relax}}
4619 \def\bbl@provide@intraspace{%
4620 \bbl@xin@{/s}{/\bbl@cl{lnbrk}}}%
4621 \ifin@ \else \bbl@xin@{/c}{/\bbl@cl{lnbrk}} \fi
4622 \ifin@
4623 \bbl@ifunset{\bbl@intsp@{language}}{%
4624 {\expandafter\ifx\csname \bbl@intsp@{language}\endcsname\empty\else
4625 \ifx\bbl@KVP@intraspace\@nil
4626 \bbl@exp{%
4627 \bbl@intraspace\bbl@cl{intsp}\bbl@cl{intsp}}\bbl@cl{intsp}}%
4628 \fi
4629 \ifx\bbl@KVP@intrapenalty\@nil
4630 \bbl@intrapenalty0\@@
4631 \fi
4632 \fi
4633 \ifx\bbl@KVP@intraspace\@nil\else % We may override the ini
4634 \expandafter\bbl@intraspace\bbl@KVP@intraspace\@@
4635 \fi
4636 \ifx\bbl@KVP@intrapenalty\@nil\else
4637 \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
4638 \fi
4639 \bbl@exp{%
4640 % TODO. Execute only once (but redundant):
4641 \bbl@add\<extras\language>{%
4642 \XeTeXlinebreaklocale "\bbl@cl{tbcpr}"%
4643 \<bbl@xeisp@{language}>%
4644 \<bbl@xeipn@{language}>%
4645 \bbl@tglobal\<extras\language>%
4646 \bbl@add\<noextras\language>{%

```



```

4647 \XeTeXlinebreaklocale "en"%
4648 \\bbl@tglobal\<noextras\language>}%
4649 \ifx\bbl@ispace\undefined
4650 \gdef\bbl@ispace{\bbl@cl{xisp}}%
4651 \ifx\AtBeginDocument\@notprerr
4652 \expandafter\@secondoftwo % to execute right now
4653 \fi
4654 \AtBeginDocument{\bbl@patchfont{\bbl@ispace}}%
4655 \fi}%
4656 \fi}
4657 \ifx\DisableBabelHook\@undefined\endinput\fi
4658 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
4659 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@ckeckstdfonts}
4660 \DisableBabelHook{babel-fontspec}
4661 <<Font selection>>
4662 \input txtbabel.def
4663 </xetex>

```

13.2 Layout

In progress.

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

\bbl@startskip and \bbl@endskip are available to package authors. Thanks to the T_EX 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 pdf_{TEX} and xet_{EX}.

```

4664 (*texxet)
4665 \providecommand\bbl@provide@intraspace{}
4666 \bbl@trace{Redefinitions for bidi layout}
4667 \def\bbl@sspre@caption{%
4668 \bbl@exp{\everyhbox{\bbl@textdir\bbl@cs{wdir@\bbl@main@language}}}}
4669 \ifx\bbl@opt@layout\@nnil\endinput\fi % No layout
4670 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
4671 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}
4672 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
4673 \def\@hangfrom#1{%
4674 \setbox\@tempboxa\hbox{#1}}%
4675 \hangindent\ifcase\bbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
4676 \noindent\box\@tempboxa}
4677 \def\raggedright{%
4678 \let\@centercr
4679 \bbl@startskip\z@skip
4680 \@rightskip\@flushglue
4681 \bbl@endskip\@rightskip
4682 \parindent\z@
4683 \parfillskip\bbl@startskip}
4684 \def\raggedleft{%
4685 \let\@centercr
4686 \bbl@startskip\@flushglue
4687 \bbl@endskip\z@skip
4688 \parindent\z@
4689 \parfillskip\bbl@endskip}
4690 \fi
4691 \IfBabelLayout{lists}
4692 {\bbl@sreplace\list
4693 {\@totalleftmargin\leftmargin}{\@totalleftmargin\bbl@listleftmargin}%
4694 \def\bbl@listleftmargin{%

```

```

4695 \ifcase\bb@thepardir\leftmargin\else\rightmargin\fi}%
4696 \ifcase\bb@engine
4697 \def\labelenumii{}\theenumii{}\pdfTeX doesn't reverse ()
4698 \def\p@enumiii{\p@enumii}\theenumii{}\p@enumii{}%
4699 \fi
4700 \bb@sreplace\@verbatim
4701 {\leftskip\@totalleftmargin}%
4702 {\bb@startskip\textwidth
4703 \advance\bb@startskip-\linewidth}}%
4704 \bb@sreplace\@verbatim
4705 {\rightskip\z@skip}%
4706 {\bb@endskip\z@skip}}%
4707 {}
4708 \IfBabelLayout{contents}
4709 {\bb@sreplace\@dottedtocline{\leftskip}{\bb@startskip}%
4710 \bb@sreplace\@dottedtocline{\rightskip}{\bb@endskip}}
4711 {}
4712 \IfBabelLayout{columns}
4713 {\bb@sreplace\@outputdblcol{\hb@xt\textwidth}{\bb@outputbox}%
4714 \def\bb@outputbox#1{%
4715 \hb@xt\textwidth{%
4716 \hskip\columnwidth
4717 \hfil
4718 {\normalcolor\vrule \@width\columnseprule}%
4719 \hfil
4720 \hb@xt\columnwidth{\box\leftcolumn \hss}%
4721 \hskip-\textwidth
4722 \hb@xt\columnwidth{\box\outputbox \hss}%
4723 \hskip\columnsep
4724 \hskip\columnwidth}}}%
4725 {}
4726 <<Footnote changes>>
4727 \IfBabelLayout{footnotes}%
4728 {\BabelFootnote\footnote\language\{}}%
4729 \BabelFootnote\localfootnote\language\{}}%
4730 \BabelFootnote\mainfootnote\{}}{}
4731 {}

```

Implicitly reverses sectioning labels in `bidi=basic`, because the full stop is not in contact with L numbers any more. I think there must be a better way.

```

4732 \IfBabelLayout{counters}%
4733 {\let\bb@latinarabic=\@arabic
4734 \def\@arabic#1{\babelsublr{\bb@latinarabic#1}}%
4735 \let\bb@asciroman=\@roman
4736 \def\@roman#1{\babelsublr{\ensureascii{\bb@asciroman#1}}}%
4737 \let\bb@asciiRoman=\@Roman
4738 \def\@Roman#1{\babelsublr{\ensureascii{\bb@asciiRoman#1}}}}{}
4739 </texxet>

```

13.3 LuaTeX

The loader for `luatex` is based solely on `language.dat`, which is read on the fly. The code shouldn't be executed when the format is build, so we check if `\AddBabelHook` is defined. Then comes a modified version of the loader in `hyphen.cfg` (without the `hyphenmins` stuff, which is under the direct control of `babel`).

The names `\l@<language>` are defined and take some value from the beginning because all `ldf` files assume this for the corresponding language to be considered valid, but patterns are not loaded (except the first one). This is done later, when the language is first selected (which usually means

when the ldf finishes). If a language has been loaded, \bbl@hyphendata@<num> exists (with the names of the files read).

The default setup preloads the first language into the format. This is intended mainly for ‘english’, so that it’s available without further intervention from the user. To avoid duplicating it, the following rule applies: if the “0th” language and the first language in language.dat have the same name then just ignore the latter. If there are new synonyms, they are added, but note if the language patterns have not been preloaded they won’t at run time.

Other preloaded languages could be read twice, if they have been preloaded into the format. This is not optimal, but it shouldn’t happen very often – with luatex patterns are best loaded when the document is typeset, and the “0th” language is preloaded just for backwards compatibility.

As of 1.1b, lua(e)tex is taken into account. Formerly, loading of patterns on the fly didn’t work in this format, but with the new loader it does. Unfortunately, the format is not based on babel, and data could be duplicated, because languages are reassigned above those in the format (nothing serious, anyway). Note even with this format language.dat is used (under the principle of a single source), instead of language.def.

Of course, there is room for improvements, like tools to read and reassign languages, which would require modifying the language list, and better error handling.

We need catcode tables, but no format (targeted by babel) provide a command to allocate them (although there are packages like ctablestack). FIX - This isn’t true anymore. For the moment, a dangerous approach is used - just allocate a high random number and cross the fingers. To complicate things, etex.sty changes the way languages are allocated.

This files is read at three places: (1) when plain.def, babel.sty starts, to read the list of available languages from language.dat (for the base option); (2) at hyphen.cfg, to modify some macros; (3) in the middle of plain.def and babel.sty, by babel.def, with the commands and other definitions for luatex (eg, \babelpatterns).

```

4740 (*luatex)
4741 \ifx\AddBabelHook\undefined % When plain.def, babel.sty starts
4742 \bbl@trace{Read language.dat}
4743 \ifx\bbl@readstream\undefined
4744   \csname newread\endcsname\bbl@readstream
4745 \fi
4746 \begingroup
4747   \toks@{}
4748   \count@ \z@ % 0=start, 1=0th, 2=normal
4749   \def\bbl@process@line#1#2 #3 #4 {%
4750     \ifx=#1%
4751       \bbl@process@synonym{#2}%
4752     \else
4753       \bbl@process@language{#1#2}{#3}{#4}%
4754     \fi
4755     \ignorespaces}
4756   \def\bbl@manylang{%
4757     \ifnum\bbl@last>\@ne
4758       \bbl@info{Non-standard hyphenation setup}%
4759     \fi
4760     \let\bbl@manylang\relax}
4761   \def\bbl@process@language#1#2#3{%
4762     \ifcase\count@
4763       \@ifundefined{zth#1}{\count@\tw@}{\count@\@ne}%
4764     \or
4765       \count@\tw@
4766     \fi
4767     \ifnum\count@=\tw@
4768       \expandafter\addlanguage\csname l@#1\endcsname
4769       \language\allocationnumber
4770     \chardef\bbl@last\allocationnumber
4771     \bbl@manylang
4772     \let\bbl@elt\relax

```

```

4773 \xdef\bbl@languages{%
4774 \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
4775 \fi
4776 \the\toks@
4777 \toks@{}}
4778 \def\bbl@process@synonym@aux#1#2{%
4779 \global\expandafter\chardef\csname l@#1\endcsname#2\relax
4780 \let\bbl@elt\relax
4781 \xdef\bbl@languages{%
4782 \bbl@languages\bbl@elt{#1}{#2}{}}}%
4783 \def\bbl@process@synonym#1{%
4784 \ifcase\count@
4785 \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
4786 \or
4787 \ifundefined{zth@#1}{\bbl@process@synonym@aux{#1}{0}}}%
4788 \else
4789 \bbl@process@synonym@aux{#1}{\the\bbl@last}%
4790 \fi}
4791 \ifx\bbl@languages@\undefined % Just a (sensible?) guess
4792 \chardef\l@english\z@
4793 \chardef\l@USenglish\z@
4794 \chardef\bbl@last\z@
4795 \global\@namedef{bbl@hyphendata@0}{\hyphen.tex}}
4796 \gdef\bbl@languages{%
4797 \bbl@elt{english}{0}{\hyphen.tex}}%
4798 \bbl@elt{USenglish}{0}{}}
4799 \else
4800 \global\let\bbl@languages@format\bbl@languages
4801 \def\bbl@elt#1#2#3#4{% Remove all except language 0
4802 \ifnum#2>\z@\else
4803 \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
4804 \fi}%
4805 \xdef\bbl@languages{\bbl@languages}%
4806 \fi
4807 \def\bbl@elt#1#2#3#4{\@namedef{zth@#1}} % Define flags
4808 \bbl@languages
4809 \openin\bbl@readstream=language.dat
4810 \ifeof\bbl@readstream
4811 \bbl@warning{I couldn't find language.dat. No additional\\%
4812 patterns loaded. Reported}%
4813 \else
4814 \loop
4815 \endlinechar\m@ne
4816 \read\bbl@readstream to \bbl@line
4817 \endlinechar\^^M
4818 \if T\ifeof\bbl@readstream F\fi T\relax
4819 \ifx\bbl@line\empty\else
4820 \edef\bbl@line{\bbl@line\space\space\space}%
4821 \expandafter\bbl@process@line\bbl@line\relax
4822 \fi
4823 \repeat
4824 \fi
4825 \endgroup
4826 \bbl@trace{Macros for reading patterns files}
4827 \def\bbl@get@enc#1:#2:#3\@@{\def\bbl@hyph@enc{#2}}
4828 \ifx\babelcatcodetablenum\undefined
4829 \ifx\newcatcodetable\undefined
4830 \def\babelcatcodetablenum{5211}
4831 \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}

```

```

4832 \else
4833 \newcatcodetable\babelcatcodetablenum
4834 \newcatcodetable\bbl@pattcodes
4835 \fi
4836 \else
4837 \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4838 \fi
4839 \def\bbl@luapatterns#1#2{%
4840 \bbl@get@enc#1::\@@@
4841 \setbox\z@\hbox\bgroup
4842 \begingroup
4843 \savecatcodetable\babelcatcodetablenum\relax
4844 \initcatcodetable\bbl@pattcodes\relax
4845 \catcodetable\bbl@pattcodes\relax
4846 \catcode`\#=6 \catcode`\$=3 \catcode`\&=4 \catcode`\^=7
4847 \catcode`\_ =8 \catcode`\{=1 \catcode`\}=2 \catcode`\~ =13
4848 \catcode`\@=11 \catcode`\^^I=10 \catcode`\^^J=12
4849 \catcode`\<=12 \catcode`\>=12 \catcode`\*=12 \catcode`\.=12
4850 \catcode`\-=12 \catcode`\/=12 \catcode`\[=12 \catcode`\]=12
4851 \catcode`\`=12 \catcode`\'=12 \catcode`\`=12
4852 \input #1\relax
4853 \catcodetable\babelcatcodetablenum\relax
4854 \endgroup
4855 \def\bbl@tempa{#2}%
4856 \ifx\bbl@tempa\empty\else
4857 \input #2\relax
4858 \fi
4859 \egroup}%
4860 \def\bbl@patterns@lua#1{%
4861 \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
4862 \csname l@#1\endcsname
4863 \edef\bbl@tempa{#1}%
4864 \else
4865 \csname l@#1:\f@encoding\endcsname
4866 \edef\bbl@tempa{#1:\f@encoding}%
4867 \fi\relax
4868 \@namedef{luatexhyphen@loaded@the\language}{}% Temp
4869 \@ifundefined{bbl@hyphendata@the\language}%
4870 {\def\bbl@elt##1##2##3##4{%
4871 \ifnum##2=\csname l@bbl@tempa\endcsname % #2=spanish, dutch:OT1...
4872 \def\bbl@tempb{##3}%
4873 \ifx\bbl@tempb\empty\else % if not a synonymous
4874 \def\bbl@tempc{##3}{##4}%
4875 \fi
4876 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
4877 \fi}%
4878 \bbl@languages
4879 \@ifundefined{bbl@hyphendata@the\language}%
4880 {\bbl@info{No hyphenation patterns were set for\%
4881 language '\bbl@tempa'. Reported}}%
4882 {\expandafter\expandafter\expandafter\bbl@luapatterns
4883 \csname bbl@hyphendata@the\language\endcsname}}}%
4884 \endinput\fi
4885 % Here ends \ifx\AddBabelHook\@undefined
4886 % A few lines are only read by hyphen.cfg
4887 \ifx\DisableBabelHook\@undefined
4888 \AddBabelHook{luatex}{everylanguage}{%
4889 \def\process@language##1##2##3{%
4890 \def\process@line####1####2 ####3 ####4 {}}}

```

```

4891 \AddBabelHook{luatex}{loadpatterns}{%
4892   \input #1\relax
4893   \expandafter\gdef\csname bbl@hyphendata@the\language\endcsname
4894     {{#1}}}}
4895 \AddBabelHook{luatex}{loadexceptions}{%
4896   \input #1\relax
4897   \def\bbl@tempb##1##2{{##1}{##2}}%
4898   \expandafter\xdef\csname bbl@hyphendata@the\language\endcsname
4899     {\expandafter\expandafter\expandafter\bbl@tempb
4900       \csname bbl@hyphendata@the\language\endcsname}}
4901 \endinput\fi
4902 % Here stops reading code for hyphen.cfg
4903 % The following is read the 2nd time it's loaded
4904 \begingroup % TODO - to a lua file
4905 \catcode`\%=12
4906 \catcode`\'=12
4907 \catcode`\=12
4908 \catcode`\:=12
4909 \directlua{
4910   Babel = Babel or {}
4911   function Babel.bytes(line)
4912     return line:gsub(".",
4913       function (chr) return unicode.utf8.char(string.byte(chr)) end)
4914   end
4915   function Babel.begin_process_input()
4916     if luatexbase and luatexbase.add_to_callback then
4917       luatexbase.add_to_callback('process_input_buffer',
4918         Babel.bytes, 'Babel.bytes')
4919     else
4920       Babel.callback = callback.find('process_input_buffer')
4921       callback.register('process_input_buffer', Babel.bytes)
4922     end
4923   end
4924   function Babel.end_process_input ()
4925     if luatexbase and luatexbase.remove_from_callback then
4926       luatexbase.remove_from_callback('process_input_buffer', 'Babel.bytes')
4927     else
4928       callback.register('process_input_buffer', Babel.callback)
4929     end
4930   end
4931   function Babel.addpatterns(pp, lg)
4932     local lg = lang.new(lg)
4933     local pats = lang.patterns(lg) or ''
4934     lang.clear_patterns(lg)
4935     for p in pp:gmatch('[^%s]+') do
4936       ss = ''
4937       for i in string.utfcharacters(p:gsub('%d', '')) do
4938         ss = ss .. '%d?' .. i
4939       end
4940       ss = ss:gsub('^%%d%?%', '%%.') .. '%d?'
4941       ss = ss:gsub('%.%%d%?$', '%%.')
4942       pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
4943       if n == 0 then
4944         tex.sprint(
4945           [[\string\csname\space bbl@info\endcsname{New pattern: }
4946             .. p .. [{}]])
4947         pats = pats .. ' ' .. p
4948       else
4949         tex.sprint(

```

```

4950         [[\string\csname\space bbl@info\endcsname{Renew pattern: }]
4951         .. p .. [{}]])
4952     end
4953 end
4954 lang.patterns(lg, pats)
4955 end
4956 }
4957 \endgroup
4958 \ifx\newattribute\undefined\else
4959   \newattribute\bbl@attr@locale
4960   \directlua{ Babel.attr_locale = luatexbase.registernumber'bbl@attr@locale' }
4961   \AddBabelHook{luatex}{beforeextras}{%
4962     \setattribute\bbl@attr@locale\localeid}
4963 \fi
4964 \def\BabelStringsDefault{unicode}
4965 \let\luabbl@stop\relax
4966 \AddBabelHook{luatex}{encodedcommands}{%
4967   \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
4968   \ifx\bbl@tempa\bbl@tempb\else
4969     \directlua{Babel.begin_process_input()}%
4970     \def\luabbl@stop{%
4971       \directlua{Babel.end_process_input()}}%
4972   \fi}%
4973 \AddBabelHook{luatex}{stopcommands}{%
4974   \luabbl@stop
4975   \let\luabbl@stop\relax}
4976 \AddBabelHook{luatex}{patterns}{%
4977   \@ifundefined{bbl@hyphendata@the\language}%
4978   {\def\bbl@elt##1##2##3##4{%
4979     \ifnum##2=\csname l@##2\endcsname % #2=spanish, dutch:OT1...
4980     \def\bbl@tempb{##3}%
4981     \ifx\bbl@tempb\@empty\else % if not a synonymous
4982       \def\bbl@tempc{##3}{##4}}%
4983     \fi
4984     \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
4985     \fi}%
4986   \bbl@languages
4987   \@ifundefined{bbl@hyphendata@the\language}%
4988   {\bbl@info{No hyphenation patterns were set for\%
4989     language '#2'. Reported}}%
4990   {\expandafter\expandafter\expandafter\bbl@luapatterns
4991     \csname bbl@hyphendata@the\language\endcsname}}}%
4992 \@ifundefined{bbl@patterns@}{}%
4993 \begingroup
4994   \bbl@xin@{, \number\language,}{, \bbl@pttnlist}%
4995   \ifin@else
4996     \ifx\bbl@patterns@\@empty\else
4997       \directlua{ Babel.addpatterns(
4998         [[\bbl@patterns@]], \number\language) }%
4999     \fi
5000     \@ifundefined{bbl@patterns@#1}%
5001     \@empty
5002     {\directlua{ Babel.addpatterns(
5003       [[\space\csname bbl@patterns@#1\endcsname]],
5004       \number\language) }}%
5005     \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
5006   \fi
5007 \endgroup}%
5008 \bbl@exp{%

```

```

5009 \bbl@ifunset{\bbl@prehc@language\name}{}%
5010 {\bbl@ifblank{\bbl@cs{prehc@language}}{}}%
5011 {\prehyphenchar=\bbl@c1{prehc}\relax}}

```

`\babelpatterns` This macro adds patterns. Two macros are used to store them: `\bbl@patterns@` for the global ones and `\bbl@patterns@<lang>` for language ones. We make sure there is a space between words when multiple commands are used.

```

5012 \@onlypreamble\babelpatterns
5013 \AtEndOfPackage{%
5014 \newcommand\babelpatterns[2][\@empty]{%
5015 \ifx\bbl@patterns@relax
5016 \let\bbl@patterns@empty
5017 \fi
5018 \ifx\bbl@pttnlistemptyelse
5019 \bbl@warning{%
5020 You must not intermingle \string\selectlanguage\space and\%
5021 \string\babelpatterns\space or some patterns will not\%
5022 be taken into account. Reported}%
5023 \fi
5024 \ifx\@empty#1%
5025 \protected@edef\bbl@patterns@{\bbl@patterns@space#2}%
5026 \else
5027 \edef\bbl@tempb{\zap@space#1 \@empty}%
5028 \bbl@for\bbl@tempa\bbl@tempb{%
5029 \bbl@fixname\bbl@tempa
5030 \bbl@iflanguage\bbl@tempa{%
5031 \bbl@csarg\protected@edef{patterns@\bbl@tempa}{%
5032 \ifundefined\bbl@patterns@\bbl@tempa}%
5033 \@empty
5034 {\csname bbl@patterns@\bbl@tempa\endcsname\space}%
5035 #2}}}%
5036 \fi}}

```

13.4 Southeast Asian scripts

First, some general code for line breaking, used by `\babelposthyphenation`. Replace regular (ie, implicit) discretionaries by spaceskips, based on the previous glyph (which I think makes sense, because the hyphen and the previous char go always together). Other discretionaries are not touched. See Unicode UAX 14.

```

5037% TODO - to a lua file
5038 \directlua{
5039 Babel = Babel or {}
5040 Babel.linebreaking = Babel.linebreaking or {}
5041 Babel.linebreaking.before = {}
5042 Babel.linebreaking.after = {}
5043 Babel.locale = {} % Free to use, indexed by \localeid
5044 function Babel.linebreaking.add_before(func)
5045 tex.print([[noexpand\csname bbl@luahyphenate\endcsname]])
5046 table.insert(Babel.linebreaking.before, func)
5047 end
5048 function Babel.linebreaking.add_after(func)
5049 tex.print([[noexpand\csname bbl@luahyphenate\endcsname]])
5050 table.insert(Babel.linebreaking.after, func)
5051 end
5052 }
5053 \def\bbl@intraspace#1 #2 #3\@{
5054 \directlua{
5055 Babel = Babel or {}

```



```

5056 Babel.intraspaces = Babel.intraspaces or {}
5057 Babel.intraspaces['\csname bbl@sbcpr@language\endcsname'] = %
5058 {b = #1, p = #2, m = #3}
5059 Babel.locale_props[\the\localeid].intraspace = %
5060 {b = #1, p = #2, m = #3}
5061 }}
5062 \def\bbl@intrapenalty#1\@@{%
5063 \directlua{
5064 Babel = Babel or {}
5065 Babel.intrapenalties = Babel.intrapenalties or {}
5066 Babel.intrapenalties['\csname bbl@sbcpr@language\endcsname'] = #1
5067 Babel.locale_props[\the\localeid].intrapenalty = #1
5068 }}
5069 \begingroup
5070 \catcode`\%=12
5071 \catcode`\^=14
5072 \catcode`\'=12
5073 \catcode`\~=12
5074 \gdef\bbl@seaintraspace{^
5075 \let\bbl@seaintraspace\relax
5076 \directlua{
5077 Babel = Babel or {}
5078 Babel.sea_enabled = true
5079 Babel.sea_ranges = Babel.sea_ranges or {}
5080 function Babel.set_chranges (script, chrng)
5081 local c = 0
5082 for s, e in string.gmatch(chrng..' ', '(.-%.%.(-)%s') do
5083 Babel.sea_ranges[script..c]={tonumber(s,16), tonumber(e,16)}
5084 c = c + 1
5085 end
5086 end
5087 function Babel.sea_disc_to_space (head)
5088 local sea_ranges = Babel.sea_ranges
5089 local last_char = nil
5090 local quad = 655360 ^% 10 pt = 655360 = 10 * 65536
5091 for item in node.traverse(head) do
5092 local i = item.id
5093 if i == node.id'glyph' then
5094 last_char = item
5095 elseif i == 7 and item.subtype == 3 and last_char
5096 and last_char.char > 0x0C99 then
5097 quad = font.getfont(last_char.font).size
5098 for lg, rg in pairs(sea_ranges) do
5099 if last_char.char > rg[1] and last_char.char < rg[2] then
5100 lg = lg:sub(1, 4) ^% Remove trailing number of, eg, Cyr11
5101 local intraspace = Babel.intraspaces[lg]
5102 local intrapenalty = Babel.intrapenalties[lg]
5103 local n
5104 if intrapenalty ~= 0 then
5105 n = node.new(14, 0) ^% penalty
5106 n.penalty = intrapenalty
5107 node.insert_before(head, item, n)
5108 end
5109 n = node.new(12, 13) ^% (glue, spaceskip)
5110 node.setglue(n, intraspace.b * quad,
5111 intraspace.p * quad,
5112 intraspace.m * quad)
5113 node.insert_before(head, item, n)
5114 node.remove(head, item)

```

```

5115         end
5116     end
5117 end
5118 end
5119 end
5120 }^^
5121 \bbl@luahyphenate}

```

13.5 CJK line breaking

Minimal line breaking for CJK scripts, mainly intended for simple documents and short texts as a secondary language. Only line breaking, with a little stretching for justification, without any attempt to adjust the spacing. It is based on (but does not strictly follow) the Unicode algorithm.

We first need a little table with the corresponding line breaking properties. A few characters have an additional key for the width (fullwidth vs. halfwidth), not yet used. There is a separate file, defined below.

```

5122 \catcode`\%=14
5123 \gdef\bbl@cjkintraspacespace{%
5124   \let\bbl@cjkintraspacespace\relax
5125   \directlua{
5126     Babel = Babel or {}
5127     require('babel-data-cjk.lua')
5128     Babel.cjk_enabled = true
5129     function Babel.cjk_linebreak(head)
5130       local GLYPH = node.id'glyph'
5131       local last_char = nil
5132       local quad = 655360      % 10 pt = 655360 = 10 * 65536
5133       local last_class = nil
5134       local last_lang = nil
5135
5136       for item in node.traverse(head) do
5137         if item.id == GLYPH then
5138
5139           local lang = item.lang
5140
5141           local LOCALE = node.get_attribute(item,
5142             Babel.attr_locale)
5143           local props = Babel.locale_props[LOCALE]
5144
5145           local class = Babel.cjk_class[item.char].c
5146
5147           if props.cjk_quotes and props.cjk_quotes[item.char] then
5148             class = props.cjk_quotes[item.char]
5149           end
5150
5151           if class == 'cp' then class = 'cl' end % ]) as CL
5152           if class == 'id' then class = 'I' end
5153
5154           local br = 0
5155           if class and last_class and Babel.cjk_breaks[last_class][class] then
5156             br = Babel.cjk_breaks[last_class][class]
5157           end
5158
5159           if br == 1 and props.linebreak == 'c' and
5160             lang ~= \the\l@nohyphenation\space and
5161             last_lang ~= \the\l@nohyphenation then
5162             local intrapenalty = props.intrapenalty
5163             if intrapenalty ~= 0 then

```

```

5164         local n = node.new(14, 0)      % penalty
5165         n.penalty = intrapenalty
5166         node.insert_before(head, item, n)
5167     end
5168     local intraspace = props.intraspace
5169     local n = node.new(12, 13)          % (glue, spaceskip)
5170     node.setglue(n, intraspace.b * quad,
5171                 intraspace.p * quad,
5172                 intraspace.m * quad)
5173     node.insert_before(head, item, n)
5174 end
5175
5176 if font.getfont(item.font) then
5177     quad = font.getfont(item.font).size
5178 end
5179 last_class = class
5180 last_lang = lang
5181 else % if penalty, glue or anything else
5182     last_class = nil
5183 end
5184 end
5185 lang.hyphenate(head)
5186 end
5187 }%
5188 \bbl@luahyphenate}
5189 \gdef\bbl@luahyphenate{%
5190 \let\bbl@luahyphenate\relax
5191 \directlua{
5192     luatexbase.add_to_callback('hyphenate',
5193     function (head, tail)
5194         if Babel.linebreaking.before then
5195             for k, func in ipairs(Babel.linebreaking.before) do
5196                 func(head)
5197             end
5198         end
5199         if Babel.cjk_enabled then
5200             Babel.cjk_linebreak(head)
5201         end
5202         lang.hyphenate(head)
5203         if Babel.linebreaking.after then
5204             for k, func in ipairs(Babel.linebreaking.after) do
5205                 func(head)
5206             end
5207         end
5208         if Babel.sea_enabled then
5209             Babel.sea_disc_to_space(head)
5210         end
5211     end,
5212     'Babel.hyphenate')
5213 }
5214 }
5215 \endgroup
5216 \def\bbl@provide@intraspace{%
5217 \bbl@ifunset{bbl@intsp@language}{}%
5218 {\expandafter\ifx\csname bbl@intsp@language\endcsname\@empty\else
5219 \bbl@xin{/c}{/\bbl@cl{lnbrk}}}%
5220 \ifin@           % cjk
5221 \bbl@cjk_intraspace
5222 \directlua{

```

```

5223         Babel = Babel or {}
5224         Babel.locale_props = Babel.locale_props or {}
5225         Babel.locale_props[\the\localeid].linebreak = 'c'
5226     }%
5227     \bbl@exp{\bbbl@intraspace\bbl@cl{intsp}\@}%
5228     \ifx\bbbl@KVP@intrapenalty\@nil
5229         \bbl@intrapenalty0\@@
5230     \fi
5231 \else           % sea
5232     \bbl@seaintraspace
5233     \bbl@exp{\bbbl@intraspace\bbl@cl{intsp}\@}%
5234     \directlua{
5235         Babel = Babel or {}
5236         Babel.sea_ranges = Babel.sea_ranges or {}
5237         Babel.set_chranges('\bbl@cl{sbc}',
5238                             '\bbl@cl{chrng}')
5239     }%
5240     \ifx\bbbl@KVP@intrapenalty\@nil
5241         \bbl@intrapenalty0\@@
5242     \fi
5243 \fi
5244 \fi
5245 \ifx\bbbl@KVP@intrapenalty\@nil\else
5246     \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
5247 \fi}}

```

13.6 Arabic justification

```

5248 \ifnum\bbbl@bidimode>100 \ifnum\bbbl@bidimode<200
5249 \def\bbblar@chars{%
5250   0628,0629,062A,062B,062C,062D,062E,062F,0630,0631,0632,0633,%
5251   0634,0635,0636,0637,0638,0639,063A,063B,063C,063D,063E,063F,%
5252   0640,0641,0642,0643,0644,0645,0646,0647,0649}
5253 \def\bbblar@elongated{%
5254   0626,0628,062A,062B,0633,0634,0635,0636,063B,%
5255   063C,063D,063E,063F,0641,0642,0643,0644,0646,%
5256   0649,064A}
5257 \begingroup
5258   \catcode\_ =11 \catcode\`:=11
5259   \gdef\bbblar@nofswarn{\gdef\msg_warning:nx##1##2##3{}}
5260 \endgroup
5261 \gdef\bbbl@arabicjust{%
5262   \let\bbbl@arabicjust\relax
5263   \newattribute\bbblar@kashida
5264   \directlua{ Babel.attr_kashida = luatexbase.registernumber'bbblar@kashida' }%
5265   \bbblar@kashida=\z@
5266   \bbl@patchfont{\bbbl@parsejalt}}%
5267 \directlua{
5268   Babel.arabic.elong_map = Babel.arabic.elong_map or {}
5269   Babel.arabic.elong_map[\the\localeid] = {}
5270   luatexbase.add_to_callback('post_linebreak_filter',
5271     Babel.arabic.justify, 'Babel.arabic.justify')
5272   luatexbase.add_to_callback('hpack_filter',
5273     Babel.arabic.justify_hbox, 'Babel.arabic.justify_hbox')
5274 }}%
5275 % Save both node lists to make replacement. TODO. Save also widths to
5276 % make computations
5277 \def\bbblar@fetchjalt#1#2#3#4{%
5278   \bbl@exp{\bbbl@foreach{#1}}}%

```

```

5279 \bbl@ifunset{bblar@JE@##1}%
5280 {\setbox\z@\hbox{^^^^200d\char"##1#2}}%
5281 {\setbox\z@\hbox{^^^^200d\char"@nameuse{bblar@JE@##1}#2}}%
5282 \directlua{%
5283     local last = nil
5284     for item in node.traverse(tex.box[0].head) do
5285         if item.id == node.id'glyph' and item.char > 0x600 and
5286             not (item.char == 0x200D) then
5287             last = item
5288         end
5289     end
5290     Babel.arabic.#3['##1#4'] = last.char
5291 }}}}
5292 % Brute force. No rules at all, yet. The ideal: look at jalt table. And
5293 % perhaps other tables (falt?, cswb?). What about kaf? And diacritic
5294 % positioning?
5295 \gdef\bbl@parsejalt{%
5296     \ifx\addfontfeature\@undefined\else
5297         \bbl@xin@{/e}{/\bbl@c{l}{lnbrk}}}%
5298     \ifin@
5299         \directlua{%
5300             if Babel.arabic.elong_map[\the\localeid][\fontid\font] == nil then
5301                 Babel.arabic.elong_map[\the\localeid][\fontid\font] = {}
5302                 tex.print([[string\csname\space bbl@parsejalti\endcsname]])
5303             end
5304         }%
5305     \fi
5306 \fi}
5307 \gdef\bbl@parsejalti{%
5308     \beginingroup
5309         \let\bbl@parsejalt\relax % To avoid infinite loop
5310         \edef\bbl@tempb{\fontid\font}%
5311         \bblar@nofswarn
5312         \bblar@fetchjalt\bblar@elongated{}{from}{}%
5313         \bblar@fetchjalt\bblar@chars{^^^^064a}{from}{a}% Alef maksura
5314         \bblar@fetchjalt\bblar@chars{^^^^0649}{from}{y}% Yeh
5315         \addfontfeature{RawFeature+=jalt}%
5316         % \namedef{bblar@JE@0643}{06AA}% todo: catch medial kaf
5317         \bblar@fetchjalt\bblar@elongated{}{dest}{}%
5318         \bblar@fetchjalt\bblar@chars{^^^^064a}{dest}{a}%
5319         \bblar@fetchjalt\bblar@chars{^^^^0649}{dest}{y}%
5320         \directlua{%
5321             for k, v in pairs(Babel.arabic.from) do
5322                 if Babel.arabic.dest[k] and
5323                     not (Babel.arabic.from[k] == Babel.arabic.dest[k]) then
5324                     Babel.arabic.elong_map[\the\localeid][\bbl@tempb]
5325                         [Babel.arabic.from[k]] = Babel.arabic.dest[k]
5326                 end
5327             end
5328         }%
5329     \endgroup}
5330 %
5331 \beginingroup
5332 \catcode`#=11
5333 \catcode`~ =11
5334 \directlua{
5335
5336 Babel.arabic = Babel.arabic or {}
5337 Babel.arabic.from = {}

```

```

5338 Babel.arabic.dest = {}
5339 Babel.arabic.justify_factor = 0.95
5340 Babel.arabic.justify_enabled = true
5341
5342 function Babel.arabic.justify(head)
5343   if not Babel.arabic.justify_enabled then return head end
5344   for line in node.traverse_id(node.id'hlist', head) do
5345     Babel.arabic.justify_hlist(head, line)
5346   end
5347   return head
5348 end
5349
5350 function Babel.arabic.justify_hbox(head, gc, size, pack)
5351   local has_inf = false
5352   if Babel.arabic.justify_enabled and pack == 'exactly' then
5353     for n in node.traverse_id(12, head) do
5354       if n.stretch_order > 0 then has_inf = true end
5355     end
5356     if not has_inf then
5357       Babel.arabic.justify_hlist(head, nil, gc, size, pack)
5358     end
5359   end
5360   return head
5361 end
5362
5363 function Babel.arabic.justify_hlist(head, line, gc, size, pack)
5364   local d, new
5365   local k_list, k_item, pos_inline
5366   local width, width_new, full, k_curr, wt_pos, goal, shift
5367   local subst_done = false
5368   local elong_map = Babel.arabic.elong_map
5369   local last_line
5370   local GLYPH = node.id'glyph'
5371   local KASHIDA = Babel.attr_kashida
5372   local LOCALE = Babel.attr_locale
5373
5374   if line == nil then
5375     line = {}
5376     line.glue_sign = 1
5377     line.glue_order = 0
5378     line.head = head
5379     line.shift = 0
5380     line.width = size
5381   end
5382
5383   % Exclude last line. todo. But-- it discards one-word lines, too!
5384   % ? Look for glue = 12:15
5385   if (line.glue_sign == 1 and line.glue_order == 0) then
5386     elongs = {} % Stores elongated candidates of each line
5387     k_list = {} % And all letters with kashida
5388     pos_inline = 0 % Not yet used
5389
5390     for n in node.traverse_id(GLYPH, line.head) do
5391       pos_inline = pos_inline + 1 % To find where it is. Not used.
5392
5393       % Elongated glyphs
5394       if elong_map then
5395         local locale = node.get_attribute(n, LOCALE)
5396         if elong_map[locale] and elong_map[locale][n.font] and

```

```

5397         elong_map[locale][n.font][n.char] then
5398         table.insert(elongs, {node = n, locale = locale} )
5399         node.set_attribute(n.prev, KASHIDA, 0)
5400     end
5401 end
5402
5403 % Tatwil
5404 if Babel.kashida_wts then
5405     local k_wt = node.get_attribute(n, KASHIDA)
5406     if k_wt > 0 then % todo. parameter for multi inserts
5407         table.insert(k_list, {node = n, weight = k_wt, pos = pos_inline})
5408     end
5409 end
5410
5411 end % of node.traverse_id
5412
5413 if #elongs == 0 and #k_list == 0 then goto next_line end
5414 full = line.width
5415 shift = line.shift
5416 goal = full * Babel.arabic.justify_factor % A bit crude
5417 width = node.dimensions(line.head) % The 'natural' width
5418
5419 % == Elongated ==
5420 % Original idea taken from 'chickenize'
5421 while (#elongs > 0 and width < goal) do
5422     subst_done = true
5423     local x = #elongs
5424     local curr = elongs[x].node
5425     local oldchar = curr.char
5426     curr.char = elong_map[elongs[x].locale][curr.font][curr.char]
5427     width = node.dimensions(line.head) % Check if the line is too wide
5428     % Substitute back if the line would be too wide and break:
5429     if width > goal then
5430         curr.char = oldchar
5431         break
5432     end
5433     % If continue, pop the just substituted node from the list:
5434     table.remove(elongs, x)
5435 end
5436
5437 % == Tatwil ==
5438 if #k_list == 0 then goto next_line end
5439
5440 width = node.dimensions(line.head) % The 'natural' width
5441 k_curr = #k_list
5442 wt_pos = 1
5443
5444 while width < goal do
5445     subst_done = true
5446     k_item = k_list[k_curr].node
5447     if k_list[k_curr].weight == Babel.kashida_wts[wt_pos] then
5448         d = node.copy(k_item)
5449         d.char = 0x0640
5450         line.head, new = node.insert_after(line.head, k_item, d)
5451         width_new = node.dimensions(line.head)
5452         if width > goal or width == width_new then
5453             node.remove(line.head, new) % Better compute before
5454             break
5455         end

```

```

5456         width = width_new
5457     end
5458     if k_curr == 1 then
5459         k_curr = #k_list
5460         wt_pos = (wt_pos >= table.getn(Babel.kashida_wts)) and 1 or wt_pos+1
5461     else
5462         k_curr = k_curr - 1
5463     end
5464 end
5465
5466 ::next_line::
5467
5468 % Must take into account marks and ins, see luatex manual.
5469 % Have to be executed only if there are changes. Investigate
5470 % what's going on exactly.
5471 if subst_done and not gc then
5472     d = node.hpack(line.head, full, 'exactly')
5473     d.shift = shift
5474     node.insert_before(head, line, d)
5475     node.remove(head, line)
5476 end
5477 end % if process line
5478 end
5479 }
5480 \endgroup
5481 \fi\fi % Arabic just block

```

13.7 Common stuff

```

5482 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
5483 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@cckstdfonts}
5484 \DisableBabelHook{babel-fontspec}
5485 <<Font selection>>

```

13.8 Automatic fonts and ids switching

After defining the blocks for a number of scripts (must be extended and very likely fine tuned), we define a short function which just traverse the node list to carry out the replacements. The table `loc_to_scr` gets the locale from a script range (note the locale is the key, and that there is an intermediate table built on the fly for optimization). This locale is then used to get the `\language` and the `\localeid` as stored in `locale_props`, as well as the font (as requested). In the latter table a key starting with `/` maps the font from the global one (the key) to the local one (the value). Maths are skipped and discretionaries are handled in a special way.

```

5486 % TODO - to a lua file
5487 \directlua{
5488 Babel.script_blocks = {
5489   ['dflt'] = {},
5490   ['Arab'] = {{0x0600, 0x06FF}, {0x08A0, 0x08FF}, {0x0750, 0x077F},
5491              {0xFE70, 0xFEFF}, {0xFB50, 0xFDFF}, {0x1EE00, 0x1EEFF}},
5492   ['Armn'] = {{0x0530, 0x058F}},
5493   ['Beng'] = {{0x0980, 0x09FF}},
5494   ['Cher'] = {{0x13A0, 0x13FF}, {0xAB70, 0xABBF}},
5495   ['Copt'] = {{0x03E2, 0x03EF}, {0x2C80, 0x2CFF}, {0x102E0, 0x102FF}},
5496   ['Cyr1'] = {{0x0400, 0x04FF}, {0x0500, 0x052F}, {0x1C80, 0x1C8F},
5497              {0x2DE0, 0x2DFF}, {0xA640, 0xA69F}},
5498   ['Deva'] = {{0x0900, 0x097F}, {0xA8E0, 0xA8FF}},
5499   ['Ethi'] = {{0x1200, 0x137F}, {0x1380, 0x139F}, {0x2D80, 0x2DDF},
5500              {0xAB00, 0xAB2F}},
5501   ['Geor'] = {{0x10A0, 0x10FF}, {0x2D00, 0x2D2F}},
5502   % Don't follow strictly Unicode, which places some Coptic letters in

```



```

5503 % the 'Greek and Coptic' block
5504 ['Grek'] = {{0x0370, 0x03E1}, {0x03F0, 0x03FF}, {0x1F00, 0x1FFF}},
5505 ['Hans'] = {{0x2E80, 0x2EFF}, {0x3000, 0x303F}, {0x31C0, 0x31EF},
5506             {0x3300, 0x33FF}, {0x3400, 0x4DBF}, {0x4E00, 0x9FFF},
5507             {0xF900, 0xFAFF}, {0xFE30, 0xFE4F}, {0xFF00, 0xFFEF},
5508             {0x20000, 0x2A6DF}, {0x2A700, 0x2B73F},
5509             {0x2B740, 0x2B81F}, {0x2B820, 0x2CEAF},
5510             {0x2CEB0, 0x2EBEF}, {0x2F800, 0x2FA1F}},
5511 ['Hebr'] = {{0x0590, 0x05FF}},
5512 ['Jpan'] = {{0x3000, 0x303F}, {0x3040, 0x309F}, {0x30A0, 0x30FF},
5513             {0x4E00, 0x9FAF}, {0xFF00, 0xFFEF}},
5514 ['Khmr'] = {{0x1780, 0x17FF}, {0x19E0, 0x19FF}},
5515 ['Knda'] = {{0x0C80, 0x0CFF}},
5516 ['Kore'] = {{0x1100, 0x11FF}, {0x3000, 0x303F}, {0x3130, 0x318F},
5517             {0x4E00, 0x9FAF}, {0xA960, 0xA97F}, {0xAC00, 0xD7AF},
5518             {0xD7B0, 0xD7FF}, {0xFF00, 0xFFEF}},
5519 ['Lao'] = {{0x0E80, 0x0EFF}},
5520 ['Latn'] = {{0x0000, 0x007F}, {0x0080, 0x00FF}, {0x0100, 0x017F},
5521             {0x0180, 0x024F}, {0x1E00, 0x1EFF}, {0x2C60, 0x2C7F},
5522             {0xA720, 0xA7FF}, {0xAB30, 0xAB6F}},
5523 ['Mahj'] = {{0x11150, 0x1117F}},
5524 ['Mlym'] = {{0x0D00, 0x0D7F}},
5525 ['Mymr'] = {{0x1000, 0x109F}, {0xAA60, 0xAA7F}, {0xA9E0, 0xA9FF}},
5526 ['Orya'] = {{0x0B00, 0x0B7F}},
5527 ['Sinh'] = {{0x0D80, 0x0DFF}, {0x111E0, 0x111FF}},
5528 ['Syrc'] = {{0x0700, 0x074F}, {0x0860, 0x086F}},
5529 ['Taml'] = {{0x0B80, 0x0BFF}},
5530 ['Telu'] = {{0x0C00, 0x0C7F}},
5531 ['Tfng'] = {{0x2D30, 0x2D7F}},
5532 ['Thai'] = {{0x0E00, 0x0E7F}},
5533 ['Tibt'] = {{0x0F00, 0x0FFF}},
5534 ['Vaii'] = {{0xA500, 0xA63F}},
5535 ['Yiii'] = {{0xA000, 0xA48F}, {0xA490, 0xA4CF}}
5536 }
5537
5538 Babel.script_blocks.Cyrs = Babel.script_blocks.Cyrl
5539 Babel.script_blocks.Hant = Babel.script_blocks.Hans
5540 Babel.script_blocks.Kana = Babel.script_blocks.Jpan
5541
5542 function Babel.locale_map(head)
5543   if not Babel.locale_mapped then return head end
5544
5545   local LOCALE = Babel.attr_locale
5546   local GLYPH = node.id('glyph')
5547   local inmath = false
5548   local toloc_save
5549   for item in node.traverse(head) do
5550     local toloc
5551     if not inmath and item.id == GLYPH then
5552       % Optimization: build a table with the chars found
5553       if Babel.chr_to_loc[item.char] then
5554         toloc = Babel.chr_to_loc[item.char]
5555       else
5556         for lc, maps in pairs(Babel.loc_to_scr) do
5557           for _, rg in pairs(maps) do
5558             if item.char >= rg[1] and item.char <= rg[2] then
5559               Babel.chr_to_loc[item.char] = lc
5560               toloc = lc
5561             break

```

```

5562         end
5563     end
5564 end
5565 end
5566 % Now, take action, but treat composite chars in a different
5567 % fashion, because they 'inherit' the previous locale. Not yet
5568 % optimized.
5569 if not toloc and
5570     (item.char >= 0x0300 and item.char <= 0x036F) or
5571     (item.char >= 0x1AB0 and item.char <= 0x1AFF) or
5572     (item.char >= 0x1DC0 and item.char <= 0x1DFF) then
5573     toloc = toloc_save
5574 end
5575 if toloc and toloc > -1 then
5576     if Babel.locale_props[toloc].lg then
5577         item.lang = Babel.locale_props[toloc].lg
5578         node.set_attribute(item, LOCALE, toloc)
5579     end
5580     if Babel.locale_props[toloc]['/'..item.font] then
5581         item.font = Babel.locale_props[toloc]['/'..item.font]
5582     end
5583     toloc_save = toloc
5584 end
5585 elseif not inmath and item.id == 7 then
5586     item.replace = item.replace and Babel.locale_map(item.replace)
5587     item.pre      = item.pre and Babel.locale_map(item.pre)
5588     item.post     = item.post and Babel.locale_map(item.post)
5589 elseif item.id == node.id'math' then
5590     inmath = (item.subtype == 0)
5591 end
5592 end
5593 return head
5594 end
5595 }

```

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

```

5596 \newcommand\babelcharproperty[1]{%
5597   \count@=#1\relax
5598   \ifvmode
5599     \expandafter\bbl@chprop
5600   \else
5601     \bbl@error{\string\babelcharproperty\space can be used only in\\%
5602               vertical mode (preamble or between paragraphs)}%
5603     {See the manual for futher info}%
5604   \fi}
5605 \newcommand\bbl@chprop[3][\the\count@]{%
5606   \@tempcnta=#1\relax
5607   \bbl@ifunset{\bbl@chprop@#2}%
5608   {\bbl@error{No property named '#2'. Allowed values are\\%
5609             direction (bc), mirror (bmg), and linebreak (lb)}%
5610    {See the manual for futher info}}%
5611   }%
5612   \loop
5613     \bbl@cs{chprop@#2}{#3}%
5614     \ifnum\count@<\@tempcnta
5615       \advance\count@\@ne
5616     \repeat}
5617 \def\bbl@chprop@direction#1{%

```

```

5618 \directlua{
5619   Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
5620   Babel.characters[\the\count@]['d'] = '#1'
5621 }}
5622 \let\bbl@chprop@bc\bbl@chprop@direction
5623 \def\bbl@chprop@mirror#1{%
5624   \directlua{
5625     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
5626     Babel.characters[\the\count@]['m'] = '\number#1'
5627   }}
5628 \let\bbl@chprop@bmg\bbl@chprop@mirror
5629 \def\bbl@chprop@linebreak#1{%
5630   \directlua{
5631     Babel.cjk_characters[\the\count@] = Babel.cjk_characters[\the\count@] or {}
5632     Babel.cjk_characters[\the\count@]['c'] = '#1'
5633   }}
5634 \let\bbl@chprop@lb\bbl@chprop@linebreak
5635 \def\bbl@chprop@locale#1{%
5636   \directlua{
5637     Babel.chr_to_loc = Babel.chr_to_loc or {}
5638     Babel.chr_to_loc[\the\count@] =
5639       \bbl@ifblank{#1}{-1000}{\the\bbl@cs{id@#1}}\space
5640   }}

```

Post-handling hyphenation patterns for non-standard rules, like ff to ff-f. There are still some issues with speed (not very slow, but still slow). The Lua code is below.

```

5641 \directlua{
5642   Babel.nohyphenation = \the\l@nohyphenation
5643 }

```

Now the T_EX high level interface, which requires the function defined above for converting strings to functions returning a string. These functions handle the $\{n\}$ syntax. For example, `pre={1}{1}` becomes `function(m) return m[1]..m[1]..'-' end`, where `m` are the matches returned after applying the pattern. With a mapped capture the functions are similar to `function(m) return Babel.capt_map(m[1],1) end`, where the last argument identifies the mapping to be applied to `m[1]`. The way it is carried out is somewhat tricky, but the effect is not dissimilar to `lua load` – save the code as string in a TeX macro, and expand this macro at the appropriate place. As `\directlua` does not take into account the current catcode of `@`, we just avoid this character in macro names (which explains the internal group, too).

```

5644 \begingroup
5645 \catcode`\~ = 12
5646 \catcode`\% = 12
5647 \catcode`\& = 14
5648 \gdef\babelprehyphenation{&%
5649   \@ifnextchar[{\bbl@settransform{0}}{\bbl@settransform{0}}{]]}}
5650 \gdef\babelposthyphenation{&%
5651   \@ifnextchar[{\bbl@settransform{1}}{\bbl@settransform{1}}{]]}}
5652 \gdef\bbl@settransform#1[#2]#3#4#5{&%
5653   \ifcase#1
5654     \bbl@activateprehyphen
5655   \else
5656     \bbl@activateposthyphen
5657   \fi
5658 \begingroup
5659   \def\babeltempa{\bbl@add@list\babeltempb}&%
5660   \let\babeltempb\@empty
5661   \def\bbl@tempa{#5}&%
5662   \bbl@replace\bbl@tempa{,}{ ,}&% TODO. Ugly trick to preserve {}
5663   \expandafter\bbl@foreach\expandafter{\bbl@tempa}{&%

```

```

5664 \bbl@ifsamestring{##1}{remove}&%
5665 {\bbl@add@list\babeltempb{nil}}&%
5666 {\directlua{
5667     local rep = {[##1]=]
5668     rep = rep:gsub('^%s*(remove)%s*$', 'remove = true')
5669     rep = rep:gsub('^%s*(insert)%s*', 'insert = true, ')
5670     rep = rep:gsub('(string)%s*=%s*([^\s,]*)', Babel.capture_func)
5671     if #1 == 0 then
5672         rep = rep:gsub('(space)%s*=%s*([%d%.]+)%s+([%d%.]+)%s+([%d%.]+)',
5673             'space = { ' .. '%2, %3, %4' .. ' }')
5674         rep = rep:gsub('(spacefactor)%s*=%s*([%d%.]+)%s+([%d%.]+)%s+([%d%.]+)',
5675             'spacefactor = { ' .. '%2, %3, %4' .. ' }')
5676         rep = rep:gsub('(kashida)%s*=%s*([^\s,]*)', Babel.capture_kashida)
5677     else
5678         rep = rep:gsub(' (no)%s*=%s*([^\s,]*)', Babel.capture_func)
5679         rep = rep:gsub(' (pre)%s*=%s*([^\s,]*)', Babel.capture_func)
5680         rep = rep:gsub(' (post)%s*=%s*([^\s,]*)', Babel.capture_func)
5681     end
5682     tex.print([[ \string\babeltempa{[]} .. rep .. []]])
5683 }}&%
5684 \let\bbl@kv@attribute\relax
5685 \let\bbl@kv@label\relax
5686 \bbl@forkv{#2}{\bbl@csarg\edef{kv@##1}{##2}}&%
5687 \ifx\bbl@kv@attribute\relax\else
5688     \edef\bbl@kv@attribute{\expandafter\bbl@stripslash\bbl@kv@attribute}&%
5689 \fi
5690 \directlua{
5691     local lbrk = Babel.linebreaking.replacements[#1]
5692     local u = unicode.utf8
5693     local id, attr, label
5694     if #1 == 0 then
5695         id = \the\csname bbl@id@@#3\endcsname\space
5696     else
5697         id = \the\csname l@#3\endcsname\space
5698     end
5699     \ifx\bbl@kv@attribute\relax
5700         attr = -1
5701     \else
5702         attr = luatexbase.registernumber'\bbl@kv@attribute'
5703     \fi
5704     \ifx\bbl@kv@label\relax\else &% Same refs:
5705         label = {[==[\bbl@kv@label]==]}
5706     \fi
5707     &% Convert pattern:
5708     local patt = string.gsub(==[#4]==, '%s', '')
5709     if #1 == 0 then
5710         patt = string.gsub(patt, '|', ' ')
5711     end
5712     if not u.find(patt, '()', nil, true) then
5713         patt = '()' .. patt .. '()'
5714     end
5715     if #1 == 1 then
5716         patt = string.gsub(patt, '%(%)%^\', '^()')
5717         patt = string.gsub(patt, '%$%(%)', '()$')
5718     end
5719     patt = u.gsub(patt, '{(.)}',
5720         function (n)
5721             return '%' .. (tonumber(n) and (tonumber(n)+1) or n)
5722         end)

```

```

5723     patt = u.gsub(patt, '{(%x%x%x%x+)}',
5724     function (n)
5725         return u.gsub(u.char(tonumber(n, 16)), '(%p)', '%%%1')
5726     end)
5727     lbkr[id] = lbkr[id] or {}
5728     table.insert(lbkr[id],
5729     { label=label, attr=attr, pattern=patt, replace={\babeltempb} })
5730 }&%
5731 \endgroup}
5732 \endgroup
5733 \def\bbl@activateposthyphen{%
5734 \let\bbl@activateposthyphen\relax
5735 \directlua{
5736     require('babel-transforms.lua')
5737     Babel.linebreaking.add_after(Babel.post_hyphenate_replace)
5738 }}
5739 \def\bbl@activateprehyphen{%
5740 \let\bbl@activateprehyphen\relax
5741 \directlua{
5742     require('babel-transforms.lua')
5743     Babel.linebreaking.add_before(Babel.pre_hyphenate_replace)
5744 }}

```

13.9 Bidi

As a first step, add a handler for bidi and digits (and potentially other processes) just before luaotfload is applied, which is loaded by default by \LaTeX . Just in case, consider the possibility it has not been loaded.

```

5745 \def\bbl@activate@preotf{%
5746 \let\bbl@activate@preotf\relax % only once
5747 \directlua{
5748     Babel = Babel or {}
5749     %
5750     function Babel.pre_otfload_v(head)
5751         if Babel.numbers and Babel.digits_mapped then
5752             head = Babel.numbers(head)
5753         end
5754         if Babel.bidi_enabled then
5755             head = Babel.bidi(head, false, dir)
5756         end
5757         return head
5758     end
5759     %
5760     function Babel.pre_otfload_h(head, gc, sz, pt, dir)
5761         if Babel.numbers and Babel.digits_mapped then
5762             head = Babel.numbers(head)
5763         end
5764         if Babel.bidi_enabled then
5765             head = Babel.bidi(head, false, dir)
5766         end
5767         return head
5768     end
5769     %
5770     luatexbase.add_to_callback('pre_linebreak_filter',
5771     Babel.pre_otfload_v,
5772     'Babel.pre_otfload_v',
5773     luatexbase.priority_in_callback('pre_linebreak_filter',
5774     'luaotfload.node_processor') or nil)

```

```

5775 %
5776 luatexbase.add_to_callback('hpack_filter',
5777     Babel.pre_otfload_h,
5778     'Babel.pre_otfload_h',
5779     luatexbase.priority_in_callback('hpack_filter',
5780     'luaotfload.node_processor') or nil)
5781 }}

```

The basic setup. The output is modified at a very low level to set the `\bodydir` to the `\pagedir`. Sadly, we have to deal with boxes in math with basic, so the `\bbl@mathboxdir` hack is activated every math with the package option `bidi=`.

```

5782 \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
5783 \let\bbl@beforeforeign\leavevmode
5784 \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
5785 \RequirePackage{luatexbase}
5786 \bbl@activate@preotf
5787 \directlua{
5788     require('babel-data-bidi.lua')
5789     \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
5790         require('babel-bidi-basic.lua')
5791     \or
5792         require('babel-bidi-basic-r.lua')
5793     \fi}
5794 % TODO - to locale_props, not as separate attribute
5795 \newattribute\bbl@attr@dir
5796 \directlua{ Babel.attr_dir = luatexbase.registernumber'bbl@attr@dir' }
5797 % TODO. I don't like it, hackish:
5798 \bbl@exp{\output{\bodydir\pagedir\the\output}}
5799 \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
5800 \fi\fi
5801 \chardef\bbl@thetextdir\z@
5802 \chardef\bbl@thepardir\z@
5803 \def\bbl@getluadir#1{%
5804     \directlua{
5805         if tex.#1dir == 'TLT' then
5806             tex.sprint('0')
5807         elseif tex.#1dir == 'TRT' then
5808             tex.sprint('1')
5809         end}}
5810 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\textdir.. 3=0 lr/1 rl
5811     \ifcase#3\relax
5812         \ifcase\bbl@getluadir{#1}\relax\else
5813             #2 TLT\relax
5814         \fi
5815     \else
5816         \ifcase\bbl@getluadir{#1}\relax
5817             #2 TRT\relax
5818         \fi
5819     \fi}
5820 \def\bbl@textdir#1{%
5821     \bbl@setluadir{text}\textdir{#1}%
5822     \chardef\bbl@thetextdir#1\relax
5823     \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*3+#1}}
5824 \def\bbl@pardir#1{%
5825     \bbl@setluadir{par}\pardir{#1}%
5826     \chardef\bbl@thepardir#1\relax}
5827 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}
5828 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}
5829 \def\bbl@dirparastext{\pardir\the\textdir\relax}% %%%

```

```

5830 %
5831 \ifnum\bb1@bidimode>\z@
5832 \def\bb1@mathboxdir{%
5833 \ifcase\bb1@thetextdir\relax
5834 \everyhbox{\bb1@mathboxdir@aux L}%
5835 \else
5836 \everyhbox{\bb1@mathboxdir@aux R}%
5837 \fi}
5838 \def\bb1@mathboxdir@aux#1{%
5839 \@ifnextchar\egroup{}\@textdir T#1T\relax}}
5840 \frozen@everymath\expandafter{%
5841 \expandafter\bb1@mathboxdir\the\frozen@everymath}
5842 \frozen@everydisplay\expandafter{%
5843 \expandafter\bb1@mathboxdir\the\frozen@everydisplay}
5844 \fi

```

13.10 Layout

Unlike xetex, luatex requires only minimal changes for right-to-left layouts, particularly in monolingual documents (the engine itself reverses boxes – including column order or headings –, margins, etc.) with `bidi=basic`, without having to patch almost any macro where text direction is relevant.

`\@hangfrom` is useful in many contexts and it is redefined always with the layout option.

There are, however, a number of issues when the text direction is not the same as the box direction (as set by `\bodydir`), and when `\parbox` and `\hangindent` are involved. Fortunately, latest releases of luatex simplify a lot the solution with `\shapemode`.

With the issue #15 I realized commands are best patched, instead of redefined. With a few lines, a modification could be applied to several classes and packages. Now, `tabular` seems to work (at least in simple cases) with `array`, `tabularx`, `hhline`, `colortbl`, `longtable`, `booktabs`, etc. However, `dcolumn` still fails.

```

5845 \bb1@trace{Redefinitions for bidi layout}
5846 \ifx\@eqnnum\@undefined\else
5847 \ifx\bb1@attr@dir\@undefined\else
5848 \edef\@eqnnum{%
5849 \unexpanded{\ifcase\bb1@attr@dir\else\bb1@textdir\@ne\fi}}
5850 \unexpanded\expandafter{\@eqnnum}}
5851 \fi
5852 \fi
5853 \ifx\bb1@opt@layout\@nnil\endinput\fi % if no layout
5854 \ifnum\bb1@bidimode>\z@
5855 \def\bb1@nextfake#1{% non-local changes, use always inside a group!
5856 \bb1@exp{%
5857 \mathdir\the\bodydir
5858 #1% Once entered in math, set boxes to restore values
5859 \<ifmmode>%
5860 \everyvbox{%
5861 \the\everyvbox
5862 \bodydir\the\bodydir
5863 \mathdir\the\mathdir
5864 \everyhbox{\the\everyhbox}%
5865 \everyvbox{\the\everyvbox}}%
5866 \everyhbox{%
5867 \the\everyhbox
5868 \bodydir\the\bodydir
5869 \mathdir\the\mathdir
5870 \everyhbox{\the\everyhbox}%
5871 \everyvbox{\the\everyvbox}}%
5872 \<fi>}}%

```

```

5873 \def\@hangfrom#1{%
5874 \setbox\@tempboxa\hbox{#{1}}%
5875 \hangindent\wd\@tempboxa
5876 \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
5877 \shapemode\@ne
5878 \fi
5879 \noindent\box\@tempboxa}
5880 \fi
5881 \IfBabelLayout{tabular}
5882 {\let\bbl@OL@tabular\@tabular
5883 \bbl@replace\@tabular{$}\bbl@nextfake$}%
5884 \let\bbl@NL@tabular\@tabular
5885 \AtBeginDocument{%
5886 \ifx\bbl@NL@tabular\@tabular\else
5887 \bbl@replace\@tabular{$}\bbl@nextfake$}%
5888 \let\bbl@NL@tabular\@tabular
5889 \fi}}
5890 {}
5891 \IfBabelLayout{lists}
5892 {\let\bbl@OL@list\list
5893 \bbl@sreplace\list{\parshape}\bbl@listparshape}%
5894 \let\bbl@NL@list\list
5895 \def\bbl@listparshape#1#2#3{%
5896 \parshape #1 #2 #3 %
5897 \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
5898 \shapemode\tw@
5899 \fi}}
5900 {}
5901 \IfBabelLayout{graphics}
5902 {\let\bbl@pictresetdir\relax
5903 \def\bbl@pictsetdir#1{%
5904 \ifcase\bbl@thetextdir
5905 \let\bbl@pictresetdir\relax
5906 \else
5907 \ifcase#1\bodydir TLT % Remember this sets the inner boxes
5908 \or\textdir TLT
5909 \else\bodydir TLT \textdir TLT
5910 \fi
5911 % \(\text|par)dir required in pgf:
5912 \def\bbl@pictresetdir{\bodydir TRT\pardir TRT\textdir TRT\relax}%
5913 \fi}%
5914 \ifx\AddToHook\@undefined\else
5915 \AddToHook{env/picture/begin}{\bbl@pictsetdir\tw@}%
5916 \directlua{
5917 Babel.get_picture_dir = true
5918 Babel.picture_has_bidi = 0
5919 function Babel.picture_dir (head)
5920 if not Babel.get_picture_dir then return head end
5921 for item in node.traverse(head) do
5922 if item.id == node.id'glyph' then
5923 local itemchar = item.char
5924 % TODO. Copypaste pattern from Babel.bidi (-r)
5925 local chardata = Babel.characters[itemchar]
5926 local dir = chardata and chardata.d or nil
5927 if not dir then
5928 for nn, et in ipairs(Babel.ranges) do
5929 if itemchar < et[1] then
5930 break
5931 elseif itemchar <= et[2] then

```



```

5932         dir = et[3]
5933         break
5934     end
5935 end
5936 end
5937 if dir and (dir == 'al' or dir == 'r') then
5938     Babel.picture_has_bidi = 1
5939 end
5940 end
5941 end
5942 return head
5943 end
5944 luatexbase.add_to_callback("hpack_filter", Babel.picture_dir,
5945     "Babel.picture_dir")
5946 }%
5947 \AtBeginDocument{%
5948     \long\def\put(#1,#2)#3{%
5949         \@killglue
5950         % Try:
5951         \ifx\bbl@pictresetdir\relax
5952             \def\bbl@tempc{0}%
5953         \else
5954             \directlua{
5955                 Babel.get_picture_dir = true
5956                 Babel.picture_has_bidi = 0
5957             }%
5958             \setbox\z@\hb@xt@\z@{%
5959                 \@defaultunitsset\@tempdimc{#1}\unitlength
5960                 \kern\@tempdimc
5961                 #3\hss}%
5962             \edef\bbl@tempc{\directlua{tex.print(Babel.picture_has_bidi)}}%
5963         \fi
5964         % Do:
5965         \@defaultunitsset\@tempdimc{#2}\unitlength
5966         \raise\@tempdimc\hb@xt@\z@{%
5967             \@defaultunitsset\@tempdimc{#1}\unitlength
5968             \kern\@tempdimc
5969             {\ifnum\bbl@tempc>\z@\bbl@pictresetdir\fi#3}\hss}%
5970         \ignorespaces}%
5971         \MakeRobust\put}%
5972 \fi
5973 \AtBeginDocument
5974 {\ifx\pgfpicture\@undefined\else % TODO. Allow deactivate?
5975     \ifx\AddToHook\@undefined
5976         \bbl@sreplace\pgfpicture{\pgfpicturetrue}%
5977         {\bbl@pictsetdir\z@\pgfpicturetrue}%
5978     \else
5979         \AddToHook{env/pgfpicture/begin}{\bbl@pictsetdir\@ne}%
5980     \fi
5981     \bbl@add\pgfinterruptpicture{\bbl@pictresetdir}%
5982     \bbl@add\pgfsys@beginpicture{\bbl@pictsetdir\z@}%
5983 \fi
5984 \ifx\tikzpicture\@undefined\else
5985     \ifx\AddToHook\@undefined\else
5986         \AddToHook{env/tikzpicture/begin}{\bbl@pictsetdir\z@}%
5987     \fi
5988     \bbl@add\tikz@atbegin@node{\bbl@pictresetdir}%
5989     \bbl@sreplace\tikz{\begingroup}{\begingroup\bbl@pictsetdir\tw@}%
5990 \fi

```


base as a model (font, language, etc.); `fetch_word` fetches a series of glyphs and discretionaries, which pattern is matched against (if there is a match, it is called again before trying other patterns, and this is very likely the main bottleneck).

`post_hyphenate_replace` is the callback applied after `lang.hyphenate`. This means the automatic hyphenation points are known. As empty captures return a byte position (as explained in the `luatex` manual), we must convert it to a utf8 position. With `first`, the last byte can be the leading byte in a utf8 sequence, so we just remove it and add 1 to the resulting length. With `last` we must take into account the capture position points to the next character. Here `word_head` points to the starting node of the text to be matched.

```

6038 (*transforms)
6039 Babel.linebreaking.replacements = {}
6040 Babel.linebreaking.replacements[0] = {} -- pre
6041 Babel.linebreaking.replacements[1] = {} -- post
6042
6043 -- Discretionaries contain strings as nodes
6044 function Babel.str_to_nodes(fn, matches, base)
6045   local n, head, last
6046   if fn == nil then return nil end
6047   for s in string.utfvalues(fn(matches)) do
6048     if base.id == 7 then
6049       base = base.replace
6050     end
6051     n = node.copy(base)
6052     n.char = s
6053     if not head then
6054       head = n
6055     else
6056       last.next = n
6057     end
6058     last = n
6059   end
6060   return head
6061 end
6062
6063 Babel.fetch_subtext = {}
6064
6065 Babel.ignore_pre_char = function(node)
6066   return (node.lang == Babel.nohyphenation)
6067 end
6068
6069 -- Merging both functions doesn't seem feasible, because there are too
6070 -- many differences.
6071 Babel.fetch_subtext[0] = function(head)
6072   local word_string = ''
6073   local word_nodes = {}
6074   local lang
6075   local item = head
6076   local inmath = false
6077
6078   while item do
6079
6080     if item.id == 11 then
6081       inmath = (item.subtype == 0)
6082     end
6083
6084     if inmath then
6085       -- pass
6086
```

```

6087     elseif item.id == 29 then
6088         local locale = node.get_attribute(item, Babel.attr_locale)
6089
6090         if lang == locale or lang == nil then
6091             lang = lang or locale
6092             if Babel.ignore_pre_char(item) then
6093                 word_string = word_string .. Babel.us_char
6094             else
6095                 word_string = word_string .. unicode.utf8.char(item.char)
6096             end
6097             word_nodes[#word_nodes+1] = item
6098         else
6099             break
6100         end
6101
6102     elseif item.id == 12 and item.subtype == 13 then
6103         word_string = word_string .. ' '
6104         word_nodes[#word_nodes+1] = item
6105
6106     -- Ignore leading unrecognized nodes, too.
6107     elseif word_string ~= '' then
6108         word_string = word_string .. Babel.us_char
6109         word_nodes[#word_nodes+1] = item -- Will be ignored
6110     end
6111
6112     item = item.next
6113 end
6114
6115 -- Here and above we remove some trailing chars but not the
6116 -- corresponding nodes. But they aren't accessed.
6117 if word_string:sub(-1) == ' ' then
6118     word_string = word_string:sub(1,-2)
6119 end
6120 word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
6121 return word_string, word_nodes, item, lang
6122 end
6123
6124 Babel.fetch_subtext[1] = function(head)
6125     local word_string = ''
6126     local word_nodes = {}
6127     local lang
6128     local item = head
6129     local inmath = false
6130
6131     while item do
6132
6133         if item.id == 11 then
6134             inmath = (item.subtype == 0)
6135         end
6136
6137         if inmath then
6138             -- pass
6139         end
6140
6141         elseif item.id == 29 then
6142             if item.lang == lang or lang == nil then
6143                 if (item.char ~= 124) and (item.char ~= 61) then -- not =, not |
6144                     lang = lang or item.lang
6145                     word_string = word_string .. unicode.utf8.char(item.char)
6146                     word_nodes[#word_nodes+1] = item
6147                 end
6148             end
6149         end
6150     end

```

```

6146         end
6147     else
6148         break
6149     end
6150
6151     elseif item.id == 7 and item.subtype == 2 then
6152         word_string = word_string .. '='
6153         word_nodes[#word_nodes+1] = item
6154
6155     elseif item.id == 7 and item.subtype == 3 then
6156         word_string = word_string .. '|'
6157         word_nodes[#word_nodes+1] = item
6158
6159     -- (1) Go to next word if nothing was found, and (2) implicitly
6160     -- remove leading USs.
6161     elseif word_string == '' then
6162         -- pass
6163
6164     -- This is the responsible for splitting by words.
6165     elseif (item.id == 12 and item.subtype == 13) then
6166         break
6167
6168     else
6169         word_string = word_string .. Babel.us_char
6170         word_nodes[#word_nodes+1] = item -- Will be ignored
6171     end
6172
6173     item = item.next
6174 end
6175
6176 word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
6177 return word_string, word_nodes, item, lang
6178 end
6179
6180 function Babel.pre_hyphenate_replace(head)
6181     Babel.hyphenate_replace(head, 0)
6182 end
6183
6184 function Babel.post_hyphenate_replace(head)
6185     Babel.hyphenate_replace(head, 1)
6186 end
6187
6188 Babel.us_char = string.char(31)
6189
6190 function Babel.hyphenate_replace(head, mode)
6191     local u = unicode.utf8
6192     local lbkr = Babel.linebreaking.replacements[mode]
6193
6194     local word_head = head
6195
6196     while true do -- for each subtext block
6197
6198         local w, w_nodes, nw, lang = Babel.fetch_subtext[mode](word_head)
6199
6200         if Babel.debug then
6201             print()
6202             print((mode == 0) and '@@@<' or '@@@>', w)
6203         end
6204

```

```

6205     if nw == nil and w == '' then break end
6206
6207     if not lang then goto next end
6208     if not lbkr[lang] then goto next end
6209
6210     -- For each saved (pre|post)hyphenation. TODO. Reconsider how
6211     -- loops are nested.
6212     for k=1, #lbkr[lang] do
6213         local p = lbkr[lang][k].pattern
6214         local r = lbkr[lang][k].replace
6215         local attr = lbkr[lang][k].attr or -1
6216
6217         if Babel.debug then
6218             print('*****', p, mode)
6219         end
6220
6221         -- This variable is set in some cases below to the first *byte*
6222         -- after the match, either as found by u.match (faster) or the
6223         -- computed position based on sc if w has changed.
6224         local last_match = 0
6225         local step = 0
6226
6227         -- For every match.
6228         while true do
6229             if Babel.debug then
6230                 print('====')
6231             end
6232             local new -- used when inserting and removing nodes
6233
6234             local matches = { u.match(w, p, last_match) }
6235
6236             if #matches < 2 then break end
6237
6238             -- Get and remove empty captures (with ()'s, which return a
6239             -- number with the position), and keep actual captures
6240             -- (from (...)), if any, in matches.
6241             local first = table.remove(matches, 1)
6242             local last = table.remove(matches, #matches)
6243             -- Non re-fetched substrings may contain \31, which separates
6244             -- subsubstrings.
6245             if string.find(w:sub(first, last-1), Babel.us_char) then break end
6246
6247             local save_last = last -- with A()BC()D, points to D
6248
6249             -- Fix offsets, from bytes to unicode. Explained above.
6250             first = u.len(w:sub(1, first-1)) + 1
6251             last = u.len(w:sub(1, last-1)) -- now last points to C
6252
6253             -- This loop stores in a small table the nodes
6254             -- corresponding to the pattern. Used by 'data' to provide a
6255             -- predictable behavior with 'insert' (w_nodes is modified on
6256             -- the fly), and also access to 'remove'd nodes.
6257             local sc = first-1 -- Used below, too
6258             local data_nodes = {}
6259
6260             local enabled = true
6261             for q = 1, last-first+1 do
6262                 data_nodes[q] = w_nodes[sc+q]
6263                 if enabled

```

```

6264         and attr > -1
6265         and not node.has_attribute(data_nodes[q], attr)
6266     then
6267         enabled = false
6268     end
6269 end
6270
6271 -- This loop traverses the matched substring and takes the
6272 -- corresponding action stored in the replacement list.
6273 -- sc = the position in substr nodes / string
6274 -- rc = the replacement table index
6275 local rc = 0
6276
6277 while rc < last-first+1 do -- for each replacement
6278     if Babel.debug then
6279         print('.....', rc + 1)
6280     end
6281     sc = sc + 1
6282     rc = rc + 1
6283
6284     if Babel.debug then
6285         Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6286         local ss = ''
6287         for itt in node.traverse(head) do
6288             if itt.id == 29 then
6289                 ss = ss .. unicode.utf8.char(itt.char)
6290             else
6291                 ss = ss .. '{' .. itt.id .. '}'
6292             end
6293         end
6294         print('*****', ss)
6295     end
6296
6297     local crep = r[rc]
6298     local item = w_nodes[sc]
6299     local item_base = item
6300     local placeholder = Babel.us_char
6301     local d
6302
6303     if crep and crep.data then
6304         item_base = data_nodes[crep.data]
6305     end
6306
6307     if crep then
6308         step = crep.step or 0
6309     end
6310
6311     if (not enabled) or (crep and next(crep) == nil) then -- = {}
6312         last_match = save_last -- Optimization
6313         goto next
6314     end
6315
6316     elseif crep == nil or crep.remove then
6317         node.remove(head, item)
6318         table.remove(w_nodes, sc)
6319         w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
6320         sc = sc - 1 -- Nothing has been inserted.
6321         last_match = utf8.offset(w, sc+1+step)
6322         goto next

```

```

6323
6324 elseif crep and crep.kashida then -- Experimental
6325     node.set_attribute(item,
6326         Babel.attr_kashida,
6327         crep.kashida)
6328     last_match = utf8.offset(w, sc+1+step)
6329     goto next
6330
6331 elseif crep and crep.string then
6332     local str = crep.string(matches)
6333     if str == '' then -- Gather with nil
6334         node.remove(head, item)
6335         table.remove(w_nodes, sc)
6336         w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
6337         sc = sc - 1 -- Nothing has been inserted.
6338     else
6339         local loop_first = true
6340         for s in string.utfvalues(str) do
6341             d = node.copy(item_base)
6342             d.char = s
6343             if loop_first then
6344                 loop_first = false
6345                 head, new = node.insert_before(head, item, d)
6346                 if sc == 1 then
6347                     word_head = head
6348                 end
6349                 w_nodes[sc] = d
6350                 w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc+1)
6351             else
6352                 sc = sc + 1
6353                 head, new = node.insert_before(head, item, d)
6354                 table.insert(w_nodes, sc, new)
6355                 w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc)
6356             end
6357             if Babel.debug then
6358                 print('.....', 'str')
6359                 Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6360             end
6361         end -- for
6362         node.remove(head, item)
6363     end -- if ''
6364     last_match = utf8.offset(w, sc+1+step)
6365     goto next
6366
6367 elseif mode == 1 and crep and (crep.pre or crep.no or crep.post) then
6368     d = node.new(7, 0) -- (disc, discretionary)
6369     d.pre = Babel.str_to_nodes(crep.pre, matches, item_base)
6370     d.post = Babel.str_to_nodes(crep.post, matches, item_base)
6371     d.replace = Babel.str_to_nodes(crep.no, matches, item_base)
6372     d.attr = item_base.attr
6373     if crep.pre == nil then -- TeXbook p96
6374         d.penalty = crep.penalty or tex.hyphenpenalty
6375     else
6376         d.penalty = crep.penalty or tex.exhyphenpenalty
6377     end
6378     placeholder = '|'
6379     head, new = node.insert_before(head, item, d)
6380
6381 elseif mode == 0 and crep and (crep.pre or crep.no or crep.post) then

```



```

6382         -- ERROR
6383
6384     elseif crep and crep.penalty then
6385         d = node.new(14, 0) -- (penalty, userpenalty)
6386         d.attr = item_base.attr
6387         d.penalty = crep.penalty
6388         head, new = node.insert_before(head, item, d)
6389
6390     elseif crep and crep.space then
6391         -- 655360 = 10 pt = 10 * 65536 sp
6392         d = node.new(12, 13) -- (glue, spaceskip)
6393         local quad = font.getfont(item_base.font).size or 655360
6394         node.setglue(d, crep.space[1] * quad,
6395                       crep.space[2] * quad,
6396                       crep.space[3] * quad)
6397         if mode == 0 then
6398             placeholder = ' '
6399         end
6400         head, new = node.insert_before(head, item, d)
6401
6402     elseif crep and crep.spacefactor then
6403         d = node.new(12, 13) -- (glue, spaceskip)
6404         local base_font = font.getfont(item_base.font)
6405         node.setglue(d,
6406                     crep.spacefactor[1] * base_font.parameters['space'],
6407                     crep.spacefactor[2] * base_font.parameters['space_stretch'],
6408                     crep.spacefactor[3] * base_font.parameters['space_shrink'])
6409         if mode == 0 then
6410             placeholder = ' '
6411         end
6412         head, new = node.insert_before(head, item, d)
6413
6414     elseif mode == 0 and crep and crep.space then
6415         -- ERROR
6416
6417     end -- ie replacement cases
6418
6419     -- Shared by disc, space and penalty.
6420     if sc == 1 then
6421         word_head = head
6422     end
6423     if crep.insert then
6424         w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc)
6425         table.insert(w_nodes, sc, new)
6426         last = last + 1
6427     else
6428         w_nodes[sc] = d
6429         node.remove(head, item)
6430         w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc+1)
6431     end
6432
6433     last_match = utf8.offset(w, sc+1+step)
6434
6435     ::next::
6436
6437 end -- for each replacement
6438
6439 if Babel.debug then
6440     print('.....', '/')

```

```

6441         Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
6442     end
6443
6444     end -- for match
6445
6446     end -- for patterns
6447
6448     ::next::
6449     word_head = nw
6450 end -- for substring
6451 return head
6452 end
6453
6454 -- This table stores capture maps, numbered consecutively
6455 Babel.capture_maps = {}
6456
6457 -- The following functions belong to the next macro
6458 function Babel.capture_func(key, cap)
6459     local ret = "[" .. cap:gsub('{{[0-9]}}', "]..m[%1]..[") .. "]"
6460     local cnt
6461     local u = unicode.utf8
6462     ret, cnt = ret:gsub('{{[0-9]}|([^\]]+)|(.-)}', Babel.capture_func_map)
6463     if cnt == 0 then
6464         ret = u.gsub(ret, '{{(%x%x%x%x+)}',
6465             function (n)
6466                 return u.char(tonumber(n, 16))
6467             end)
6468     end
6469     ret = ret:gsub("%[%[%]]%.%", '')
6470     ret = ret:gsub("%.%.%[%[%]]%", '')
6471     return key .. [[=function(m) return ]] .. ret .. [[ end]]
6472 end
6473
6474 function Babel.capt_map(from, mapno)
6475     return Babel.capture_maps[mapno][from] or from
6476 end
6477
6478 -- Handle the {n|abc|ABC} syntax in captures
6479 function Babel.capture_func_map(capno, from, to)
6480     local u = unicode.utf8
6481     from = u.gsub(from, '{{(%x%x%x%x+)}',
6482         function (n)
6483             return u.char(tonumber(n, 16))
6484         end)
6485     to = u.gsub(to, '{{(%x%x%x%x+)}',
6486         function (n)
6487             return u.char(tonumber(n, 16))
6488         end)
6489     local froms = {}
6490     for s in string.utfcharacters(from) do
6491         table.insert(froms, s)
6492     end
6493     local cnt = 1
6494     table.insert(Babel.capture_maps, {})
6495     local mlen = table.getn(Babel.capture_maps)
6496     for s in string.utfcharacters(to) do
6497         Babel.capture_maps[mlen][froms[cnt]] = s
6498         cnt = cnt + 1
6499     end

```

```

6500 return "]]..Babel.capt_map(m[" .. capno .. "], " ..
6501         (mlen) .. " ).." .. "[["
6502 end
6503
6504 -- Create/Extend reversed sorted list of kashida weights:
6505 function Babel.capture_kashida(key, wt)
6506   wt = tonumber(wt)
6507   if Babel.kashida_wts then
6508     for p, q in ipairs(Babel.kashida_wts) do
6509       if wt == q then
6510         break
6511       elseif wt > q then
6512         table.insert(Babel.kashida_wts, p, wt)
6513         break
6514       elseif table.getn(Babel.kashida_wts) == p then
6515         table.insert(Babel.kashida_wts, wt)
6516       end
6517     end
6518   else
6519     Babel.kashida_wts = { wt }
6520   end
6521   return 'kashida = ' .. wt
6522 end
6523 </transforms>

```

13.12 Lua: Auto bidi with basic and basic-r

The file `babel-data-bidi.lua` currently only contains data. It is a large and boring file and it is not shown here (see the generated file), but here is a sample:

```

[0x25]={d='et'},
[0x26]={d='on'},
[0x27]={d='on'},
[0x28]={d='on', m=0x29},
[0x29]={d='on', m=0x28},
[0x2A]={d='on'},
[0x2B]={d='es'},
[0x2C]={d='cs'},

```

For the meaning of these codes, see the Unicode standard.

Now the `basic-r` bidi mode. One of the aims is to implement a fast and simple bidi algorithm, with a single loop. I managed to do it for R texts, with a second smaller loop for a special case. The code is still somewhat chaotic, but its behavior is essentially correct. I cannot resist copying the following text from Emacs `bidi.c` (which also attempts to implement the bidi algorithm with a single loop):

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.

```

6524 (*basic-r)
6525 Babel = Babel or {}
6526
6527 Babel.bidi_enabled = true
6528
6529 require('babel-data-bidi.lua')
6530
6531 local characters = Babel.characters
6532 local ranges = Babel.ranges
6533
6534 local DIR = node.id("dir")
6535
6536 local function dir_mark(head, from, to, outer)
6537   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
6538   local d = node.new(DIR)
6539   d.dir = '+' .. dir
6540   node.insert_before(head, from, d)
6541   d = node.new(DIR)
6542   d.dir = '-' .. dir
6543   node.insert_after(head, to, d)
6544 end
6545
6546 function Babel.bidi(head, ispar)
6547   local first_n, last_n          -- first and last char with nums
6548   local last_es                  -- an auxiliary 'last' used with nums
6549   local first_d, last_d          -- first and last char in L/R block
6550   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):

```

6551   local strong = ('TRT' == tex.pardir) and 'r' or 'l'
6552   local strong_lr = (strong == 'l') and 'l' or 'r'
6553   local outer = strong
6554
6555   local new_dir = false
6556   local first_dir = false
6557   local inmath = false
6558
6559   local last_lr
6560
6561   local type_n = ''
6562
6563   for item in node.traverse(head) do
6564
6565     -- three cases: glyph, dir, otherwise
6566     if item.id == node.id'glyph'
6567       or (item.id == 7 and item.subtype == 2) then
6568
6569       local itemchar
6570       if item.id == 7 and item.subtype == 2 then
6571         itemchar = item.replace.char
6572       else
6573         itemchar = item.char
6574       end

```

```

6575     local chardata = characters[itemchar]
6576     dir = chardata and chardata.d or nil
6577     if not dir then
6578         for nn, et in ipairs(ranges) do
6579             if itemchar < et[1] then
6580                 break
6581             elseif itemchar <= et[2] then
6582                 dir = et[3]
6583                 break
6584             end
6585         end
6586     end
6587     dir = dir or 'l'
6588     if inmath then dir = ('TRT' == tex.mathdir) and 'r' or 'l' end

```

Next is based on the assumption babel sets the language AND switches the script with its dir. We treat a language block as a separate Unicode sequence. The following piece of code is executed at the first glyph after a 'dir' node. We don't know the current language until then. This is not exactly true, as the math mode may insert explicit dirs in the node list, so, for the moment there is a hack by brute force (just above).

```

6589     if new_dir then
6590         attr_dir = 0
6591         for at in node.traverse(item.attr) do
6592             if at.number == Babel.attr_dir then
6593                 attr_dir = at.value % 3
6594             end
6595         end
6596         if attr_dir == 1 then
6597             strong = 'r'
6598         elseif attr_dir == 2 then
6599             strong = 'al'
6600         else
6601             strong = 'l'
6602         end
6603         strong_lr = (strong == 'l') and 'l' or 'r'
6604         outer = strong_lr
6605         new_dir = false
6606     end
6607
6608     if dir == 'nsm' then dir = strong end -- W1

```

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

```

6609     dir_real = dir -- We need dir_real to set strong below
6610     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:

```

6611     if strong == 'al' then
6612         if dir == 'en' then dir = 'an' end -- W2
6613         if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
6614         strong_lr = 'r' -- W3
6615     end

```

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

```

6616     elseif item.id == node.id'dir' and not inmath then
6617         new_dir = true
6618         dir = nil
6619     elseif item.id == node.id'math' then
6620         inmath = (item.subtype == 0)

```

```

6621     else
6622         dir = nil          -- Not a char
6623     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>.

```

6624     if dir == 'en' or dir == 'an' or dir == 'et' then
6625         if dir ~= 'et' then
6626             type_n = dir
6627         end
6628         first_n = first_n or item
6629         last_n = last_es or item
6630         last_es = nil
6631     elseif dir == 'es' and last_n then -- W3+W6
6632         last_es = item
6633     elseif dir == 'cs' then          -- it's right - do nothing
6634     elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
6635         if strong_lr == 'r' and type_n ~= '' then
6636             dir_mark(head, first_n, last_n, 'r')
6637         elseif strong_lr == 'l' and first_d and type_n == 'an' then
6638             dir_mark(head, first_n, last_n, 'r')
6639             dir_mark(head, first_d, last_d, outer)
6640             first_d, last_d = nil, nil
6641         elseif strong_lr == 'l' and type_n ~= '' then
6642             last_d = last_n
6643         end
6644         type_n = ''
6645         first_n, last_n = nil, nil
6646     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:

```

6647     if dir == 'l' or dir == 'r' then
6648         if dir ~= outer then
6649             first_d = first_d or item
6650             last_d = item
6651         elseif first_d and dir ~= strong_lr then
6652             dir_mark(head, first_d, last_d, outer)
6653             first_d, last_d = nil, nil
6654         end
6655     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.

```

6656     if dir and not last_lr and dir ~= 'l' and outer == 'r' then
6657         item.char = characters[item.char] and
6658             characters[item.char].m or item.char
6659     elseif (dir or new_dir) and last_lr ~= item then
6660         local mir = outer .. strong_lr .. (dir or outer)
6661         if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
6662             for ch in node.traverse(node.next(last_lr)) do

```

```

6663         if ch == item then break end
6664         if ch.id == node.id'glyph' and characters[ch.char] then
6665             ch.char = characters[ch.char].m or ch.char
6666         end
6667     end
6668 end
6669 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).

```

6670     if dir == 'l' or dir == 'r' then
6671         last_lr = item
6672         strong = dir_real          -- Don't search back - best save now
6673         strong_lr = (strong == 'l') and 'l' or 'r'
6674     elseif new_dir then
6675         last_lr = nil
6676     end
6677 end

```

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

```

6678     if last_lr and outer == 'r' then
6679         for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
6680             if characters[ch.char] then
6681                 ch.char = characters[ch.char].m or ch.char
6682             end
6683         end
6684     end
6685     if first_n then
6686         dir_mark(head, first_n, last_n, outer)
6687     end
6688     if first_d then
6689         dir_mark(head, first_d, last_d, outer)
6690     end

```

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

```

6691     return node.prev(head) or head
6692 end
6693 </basic-r>

```

And here the Lua code for bidi=basic:

```

6694 <(*basic)
6695 Babel = Babel or {}
6696
6697 -- eg, Babel.fontmap[1][<prefontid>]=<dirfontid>
6698
6699 Babel.fontmap = Babel.fontmap or {}
6700 Babel.fontmap[0] = {}          -- l
6701 Babel.fontmap[1] = {}          -- r
6702 Babel.fontmap[2] = {}          -- al/an
6703
6704 Babel.bidi_enabled = true
6705 Babel.mirroring_enabled = true
6706
6707 require('babel-data-bidi.lua')
6708
6709 local characters = Babel.characters
6710 local ranges = Babel.ranges
6711

```

```

6712 local DIR = node.id('dir')
6713 local GLYPH = node.id('glyph')
6714
6715 local function insert_implicit(head, state, outer)
6716   local new_state = state
6717   if state.sim and state.eim and state.sim ~= state.eim then
6718     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
6719     local d = node.new(DIR)
6720     d.dir = '+' .. dir
6721     node.insert_before(head, state.sim, d)
6722     local d = node.new(DIR)
6723     d.dir = '-' .. dir
6724     node.insert_after(head, state.eim, d)
6725   end
6726   new_state.sim, new_state.eim = nil, nil
6727   return head, new_state
6728 end
6729
6730 local function insert_numeric(head, state)
6731   local new
6732   local new_state = state
6733   if state.san and state.ean and state.san ~= state.ean then
6734     local d = node.new(DIR)
6735     d.dir = '+TLT'
6736     _, new = node.insert_before(head, state.san, d)
6737     if state.san == state.sim then state.sim = new end
6738     local d = node.new(DIR)
6739     d.dir = '-TLT'
6740     _, new = node.insert_after(head, state.ean, d)
6741     if state.ean == state.eim then state.eim = new end
6742   end
6743   new_state.san, new_state.ean = nil, nil
6744   return head, new_state
6745 end
6746
6747 -- TODO - \hbox with an explicit dir can lead to wrong results
6748 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>. A small attempt
6749 -- was s made to improve the situation, but the problem is the 3-dir
6750 -- model in babel/Unicode and the 2-dir model in LuaTeX don't fit
6751 -- well.
6752
6753 function Babel.bidi(head, ispar, hdir)
6754   local d -- d is used mainly for computations in a loop
6755   local prev_d = ''
6756   local new_d = false
6757
6758   local nodes = {}
6759   local outer_first = nil
6760   local inmath = false
6761
6762   local glue_d = nil
6763   local glue_i = nil
6764
6765   local has_en = false
6766   local first_et = nil
6767
6768   local ATDIR = Babel.attr_dir
6769
6770   local save_outer

```



```

6771 local temp = node.get_attribute(head, ATDIR)
6772 if temp then
6773     temp = temp % 3
6774     save_outer = (temp == 0 and 'l') or
6775                 (temp == 1 and 'r') or
6776                 (temp == 2 and 'al')
6777 elseif ispar then -- Or error? Shouldn't happen
6778     save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
6779 else -- Or error? Shouldn't happen
6780     save_outer = ('TRT' == hdir) and 'r' or 'l'
6781 end
6782 -- when the callback is called, we are just _after_ the box,
6783 -- and the textdir is that of the surrounding text
6784 -- if not ispar and hdir ~= tex.textdir then
6785 --     save_outer = ('TRT' == hdir) and 'r' or 'l'
6786 -- end
6787 local outer = save_outer
6788 local last = outer
6789 -- 'al' is only taken into account in the first, current loop
6790 if save_outer == 'al' then save_outer = 'r' end
6791
6792 local fontmap = Babel.fontmap
6793
6794 for item in node.traverse(head) do
6795
6796     -- In what follows, #node is the last (previous) node, because the
6797     -- current one is not added until we start processing the neutrals.
6798
6799     -- three cases: glyph, dir, otherwise
6800     if item.id == GLYPH
6801         or (item.id == 7 and item.subtype == 2) then
6802
6803         local d_font = nil
6804         local item_r
6805         if item.id == 7 and item.subtype == 2 then
6806             item_r = item.replace -- automatic discs have just 1 glyph
6807         else
6808             item_r = item
6809         end
6810         local chardata = characters[item_r.char]
6811         d = chardata and chardata.d or nil
6812         if not d or d == 'nsm' then
6813             for nn, et in ipairs(ranges) do
6814                 if item_r.char < et[1] then
6815                     break
6816                 elseif item_r.char <= et[2] then
6817                     if not d then d = et[3]
6818                     elseif d == 'nsm' then d_font = et[3]
6819                     end
6820                     break
6821                 end
6822             end
6823         end
6824         d = d or 'l'
6825
6826         -- A short 'pause' in bidi for mapfont
6827         d_font = d_font or d
6828         d_font = (d_font == 'l' and 0) or
6829                 (d_font == 'nsm' and 0) or

```

```

6830             (d_font == 'r' and 1) or
6831             (d_font == 'al' and 2) or
6832             (d_font == 'an' and 2) or nil
6833 if d_font and fontmap and fontmap[d_font][item_r.font] then
6834     item_r.font = fontmap[d_font][item_r.font]
6835 end
6836
6837 if new_d then
6838     table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
6839     if inmath then
6840         attr_d = 0
6841     else
6842         attr_d = node.get_attribute(item, ATDIR)
6843         attr_d = attr_d % 3
6844     end
6845     if attr_d == 1 then
6846         outer_first = 'r'
6847         last = 'r'
6848     elseif attr_d == 2 then
6849         outer_first = 'r'
6850         last = 'al'
6851     else
6852         outer_first = 'l'
6853         last = 'l'
6854     end
6855     outer = last
6856     has_en = false
6857     first_et = nil
6858     new_d = false
6859 end
6860
6861 if glue_d then
6862     if (d == 'l' and 'l' or 'r') ~= glue_d then
6863         table.insert(nodes, {glue_i, 'on', nil})
6864     end
6865     glue_d = nil
6866     glue_i = nil
6867 end
6868
6869 elseif item.id == DIR then
6870     d = nil
6871     new_d = true
6872
6873 elseif item.id == node.id'glue' and item.subtype == 13 then
6874     glue_d = d
6875     glue_i = item
6876     d = nil
6877
6878 elseif item.id == node.id'math' then
6879     inmath = (item.subtype == 0)
6880
6881 else
6882     d = nil
6883 end
6884
6885 -- AL <= EN/ET/ES      -- W2 + W3 + W6
6886 if last == 'al' and d == 'en' then
6887     d = 'an'          -- W3
6888 elseif last == 'al' and (d == 'et' or d == 'es') then

```

```

6889     d = 'on'          -- W6
6890 end
6891
6892 -- EN + CS/ES + EN      -- W4
6893 if d == 'en' and #nodes >= 2 then
6894     if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
6895         and nodes[#nodes-1][2] == 'en' then
6896         nodes[#nodes][2] = 'en'
6897     end
6898 end
6899
6900 -- AN + CS + AN          -- W4 too, because uax9 mixes both cases
6901 if d == 'an' and #nodes >= 2 then
6902     if (nodes[#nodes][2] == 'cs')
6903         and nodes[#nodes-1][2] == 'an' then
6904         nodes[#nodes][2] = 'an'
6905     end
6906 end
6907
6908 -- ET/EN                  -- W5 + W7->l / W6->on
6909 if d == 'et' then
6910     first_et = first_et or (#nodes + 1)
6911 elseif d == 'en' then
6912     has_en = true
6913     first_et = first_et or (#nodes + 1)
6914 elseif first_et then      -- d may be nil here !
6915     if has_en then
6916         if last == 'l' then
6917             temp = 'l'    -- W7
6918         else
6919             temp = 'en'   -- W5
6920         end
6921     else
6922         temp = 'on'      -- W6
6923     end
6924     for e = first_et, #nodes do
6925         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
6926     end
6927     first_et = nil
6928     has_en = false
6929 end
6930
6931 -- Force mathdir in math if ON (currently works as expected only
6932 -- with 'l')
6933 if inmath and d == 'on' then
6934     d = ('TRT' == tex.mathdir) and 'r' or 'l'
6935 end
6936
6937 if d then
6938     if d == 'al' then
6939         d = 'r'
6940         last = 'al'
6941     elseif d == 'l' or d == 'r' then
6942         last = d
6943     end
6944     prev_d = d
6945     table.insert(nodes, {item, d, outer_first})
6946 end
6947

```

```

6948     outer_first = nil
6949
6950 end
6951
6952 -- TODO -- repeated here in case EN/ET is the last node. Find a
6953 -- better way of doing things:
6954 if first_et then      -- dir may be nil here !
6955     if has_en then
6956         if last == 'l' then
6957             temp = 'l'    -- W7
6958         else
6959             temp = 'en'    -- W5
6960         end
6961     else
6962         temp = 'on'        -- W6
6963     end
6964     for e = first_et, #nodes do
6965         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
6966     end
6967 end
6968
6969 -- dummy node, to close things
6970 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
6971
6972 ----- NEUTRAL -----
6973
6974 outer = save_outer
6975 last = outer
6976
6977 local first_on = nil
6978
6979 for q = 1, #nodes do
6980     local item
6981
6982     local outer_first = nodes[q][3]
6983     outer = outer_first or outer
6984     last = outer_first or last
6985
6986     local d = nodes[q][2]
6987     if d == 'an' or d == 'en' then d = 'r' end
6988     if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
6989
6990     if d == 'on' then
6991         first_on = first_on or q
6992     elseif first_on then
6993         if last == d then
6994             temp = d
6995         else
6996             temp = outer
6997         end
6998         for r = first_on, q - 1 do
6999             nodes[r][2] = temp
7000             item = nodes[r][1]    -- MIRRORING
7001             if Babel.mirroring_enabled and item.id == GLYPH
7002                 and temp == 'r' and characters[item.char] then
7003                 local font_mode = font.fonts[item.font].properties.mode
7004                 if font_mode ~= 'harf' and font_mode ~= 'plug' then
7005                     item.char = characters[item.char].m or item.char
7006                 end

```

```

7007         end
7008     end
7009     first_on = nil
7010 end
7011
7012     if d == 'r' or d == 'l' then last = d end
7013 end
7014
7015 ----- IMPLICIT, REORDER -----
7016
7017 outer = save_outer
7018 last = outer
7019
7020 local state = {}
7021 state.has_r = false
7022
7023 for q = 1, #nodes do
7024
7025     local item = nodes[q][1]
7026
7027     outer = nodes[q][3] or outer
7028
7029     local d = nodes[q][2]
7030
7031     if d == 'nsm' then d = last end          -- W1
7032     if d == 'en' then d = 'an' end
7033     local isdir = (d == 'r' or d == 'l')
7034
7035     if outer == 'l' and d == 'an' then
7036         state.san = state.san or item
7037         state.ean = item
7038     elseif state.san then
7039         head, state = insert_numeric(head, state)
7040     end
7041
7042     if outer == 'l' then
7043         if d == 'an' or d == 'r' then      -- im -> implicit
7044             if d == 'r' then state.has_r = true end
7045             state.sim = state.sim or item
7046             state.eim = item
7047         elseif d == 'l' and state.sim and state.has_r then
7048             head, state = insert_implicit(head, state, outer)
7049         elseif d == 'l' then
7050             state.sim, state.eim, state.has_r = nil, nil, false
7051         end
7052     else
7053         if d == 'an' or d == 'l' then
7054             if nodes[q][3] then -- nil except after an explicit dir
7055                 state.sim = item -- so we move sim 'inside' the group
7056             else
7057                 state.sim = state.sim or item
7058             end
7059             state.eim = item
7060         elseif d == 'r' and state.sim then
7061             head, state = insert_implicit(head, state, outer)
7062         elseif d == 'r' then
7063             state.sim, state.eim = nil, nil
7064         end
7065     end
end

```

```

7066
7067   if isdir then
7068       last = d           -- Don't search back - best save now
7069   elseif d == 'on' and state.san then
7070       state.san = state.san or item
7071       state.ean = item
7072   end
7073
7074 end
7075
7076 return node.prev(head) or head
7077 end
7078 </basic>

```

14 Data for CJK

It is a boring file and it is not shown here (see the generated file), but here is a sample:

```

[0x0021]={c='ex'},
[0x0024]={c='pr'},
[0x0025]={c='po'},
[0x0028]={c='op'},
[0x0029]={c='cp'},
[0x002B]={c='pr'},

```

For the meaning of these codes, see the Unicode standard.

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.

```

7079 <*nil>
7080 \ProvidesLanguage{nil}[<<date>>] <<version>> Nil language]
7081 \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.

```

7082 \ifx\l@nil\undefined
7083   \newlanguage\l@nil
7084   \@namedef{bbl@hyphendata@the\l@nil}{}{}{}% Remove warning
7085   \let\bbl@elt\relax
7086   \edef\bbl@languages{% Add it to the list of languages
7087     \bbl@languages\bbl@elt{nil}{the\l@nil}{}{}
7088 \fi

```

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

```

7089 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}

```

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

```

\captionnil
\datenil
7090 \let\captionnil\empty
7091 \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.

```
7092 \ldf@finish{nil}
7093 \</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 `locallyhyphen.tex` or whatever they like, but they mustn’t diddle with `hyphen.tex` (or `plain.tex` except to preload additional fonts).

The files `bplain.tex` and `blplain.tex` can be used as replacement wrappers around `plain.tex` and `lplain.tex` to achieve the desired effect, based on the `babel` package. If you load each of them with `ini \TeX` , 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 `ini \TeX` sees, we need to set some category codes just to be able to change the definition of `\input`.

```
7094 (*bplain | blplain)
7095 \catcode`\{=1 % left brace is begin-group character
7096 \catcode`\}=2 % right brace is end-group character
7097 \catcode`\#=6 % hash mark is macro parameter character
```

If a file called `hyphen.cfg` can be found, we make sure that *it* will be read instead of the file `hyphen.tex`. We do this by first saving the original meaning of `\input` (and I use a one letter control sequence for that so as not to waste multi-letter control sequence on this in the format).

```
7098 \openin 0 hyphen.cfg
7099 \ifeof0
7100 \else
7101 \let\input
```

Then `\input` is defined to forget about its argument and load `hyphen.cfg` instead. Once that’s done the original meaning of `\input` can be restored and the definition of `\a` can be forgotten.

```
7102 \def\input #1 {%
7103 \let\input\input
7104 \a hyphen.cfg
7105 \let\input\undefined
7106 }
7107 \fi
7108 \</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`.

```
7109 \<bplain>\a plain.tex
7110 \<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.

```
7111 \<bplain>\def\fmtname{babel-plain}
7112 \<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 L^AT_EX features

The file `babel.def` expects some definitions made in the L^AT_EX 2_ε style file. So, in Plain we must provide at least some predefined values as well some tools to set them (even if not all options are available). There are no package options, and therefore an alternative mechanism is provided. For the moment, only `\babeloptionstrings` and `\babeloptionmath` are provided, which can be defined before loading `babel`. `\BabelModifiers` can be set too (but not sure it works).

```
7113 <<(*Emulate LaTeX)>> ≡
7114 \def\@empty{}
7115 \def\loadlocalcfg#1{%
7116   \openin0#1.cfg
7117   \ifeof0
7118     \closein0
7119   \else
7120     \closein0
7121     {\immediate\write16{*****}%
7122      \immediate\write16{* Local config file #1.cfg used}%
7123      \immediate\write16{*}%
7124     }
7125     \input #1.cfg\relax
7126   \fi
7127   \@endoflfd}
```

16.3 General tools

A number of L^AT_EX macro's that are needed later on.

```
7128 \long\def\@firstofone#1{#1}
7129 \long\def\@firstoftwo#1#2{#1}
7130 \long\def\@secondoftwo#1#2{#2}
7131 \def\@nnil{\@nil}
7132 \def\@gobbletwo#1#2{}
7133 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
7134 \def\@star@or@long#1{%
7135   \@ifstar
7136   {\let\l@ngrel@x\relax#1}%
7137   {\let\l@ngrel@x\long#1}}
7138 \let\l@ngrel@x\relax
7139 \def\@car#1#2\@nil{#1}
7140 \def\@cdr#1#2\@nil{#2}
7141 \let\@typeset@protect\relax
7142 \let\protected@edef\edef
7143 \long\def\@gobble#1{}
7144 \edef\@backslashchar{\expandafter\@gobble\string\}
7145 \def\strip@prefix#1>{}
7146 \def\g@addto@macro#1#2{%
7147   \toks@\expandafter{#1#2}%
7148   \xdef#1{\the\toks@}}
7149 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
7150 \def\@nameuse#1{\csname #1\endcsname}
7151 \def\@ifundefined#1{%
7152   \expandafter\ifx\csname#1\endcsname\relax
7153     \expandafter\@firstoftwo
7154   \else
7155     \expandafter\@secondoftwo
7156   \fi}
7157 \def\@expandtwoargs#1#2#3{%
7158   \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
7159 \def\zap@space#1 #2{%
```



```

7160 #1%
7161 \ifx#2\@empty\else\expandafter\zap@space\fi
7162 #2}
7163 \let\bbl@trace\@gobble
7164 \def\bbl@error#1#2{%
7165   \begingroup
7166     \newlinechar=`^^J
7167     \def\{^^J(babel) }%
7168     \errhelp{#2}\errmessage{\{#1}%
7169   \endgroup}
7170 \def\bbl@warning#1{%
7171   \begingroup
7172     \newlinechar=`^^J
7173     \def\{^^J(babel) }%
7174     \message{\{#1}%
7175   \endgroup}
7176 \let\bbl@infowarn\bbl@warning
7177 \def\bbl@info#1{%
7178   \begingroup
7179     \newlinechar=`^^J
7180     \def\{^^J}%
7181     \wlog{#1}%
7182   \endgroup}

```

$\text{\LaTeX} 2_{\epsilon}$ has the command `\@onlypreamble` which adds commands to a list of commands that are no longer needed after `\begin{document}`.

```

7183 \ifx\@preamblecmds\@undefined
7184   \def\@preamblecmds{}
7185 \fi
7186 \def\@onlypreamble#1{%
7187   \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
7188     \@preamblecmds\do#1}}
7189 \@onlypreamble\@onlypreamble

```

Mimick \LaTeX 's `\AtBeginDocument`; for this to work the user needs to add `\begindocument` to his file.

```

7190 \def\begindocument{%
7191   \@begindocumenthook
7192   \global\let\@begindocumenthook\@undefined
7193   \def\do##1{\global\let##1\@undefined}%
7194   \@preamblecmds
7195   \global\let\do\noexpand}
7196 \ifx\@begindocumenthook\@undefined
7197   \def\@begindocumenthook{}
7198 \fi
7199 \@onlypreamble\@begindocumenthook
7200 \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`.

```

7201 \def\AtEndOfPackage#1{\g@addto@macro\@endofldf{#1}}
7202 \@onlypreamble\AtEndOfPackage
7203 \def\@endofldf{}
7204 \@onlypreamble\@endofldf
7205 \let\bbl@afterlang\@empty
7206 \chardef\bbl@opt@hyphenmap\zap

```

\LaTeX needs to be able to switch off writing to its auxiliary files; plain doesn't have them by default. There is a trick to hide some conditional commands from the outer `\ifx`. The same trick is applied below.

```

7207 \catcode`\&=\z@
7208 \ifx&\if@files\@undefined
7209   \expandafter\let\csname if@files\expandafter\endcsname
7210     \csname iffalse\endcsname
7211 \fi
7212 \catcode`\&=4

Mimick LATEX's commands to define control sequences.

7213 \def\newcommand{\@star@or@long\new@command}
7214 \def\new@command#1{%
7215   \@testopt{\@newcommand#1}0}
7216 \def\@newcommand#1[#2]{%
7217   \@ifnextchar [{\@xargdef#1[#2]}%
7218                 {\@argdef#1[#2]}}
7219 \long\def\@argdef#1[#2]#3{%
7220   \@yargdef#1\@ne{#2}{#3}}
7221 \long\def\@xargdef#1[#2][#3]#4{%
7222   \expandafter\def\expandafter#1\expandafter{%
7223     \expandafter\@protected@testopt\expandafter #1%
7224     \csname\string#1\expandafter\endcsname{#3}}%
7225   \expandafter\@yargdef \csname\string#1\endcsname
7226   \tw@{#2}{#4}}
7227 \long\def\@yargdef#1#2#3{%
7228   \@tempcnta#3\relax
7229   \advance \@tempcnta \@ne
7230   \let\@hash@\relax
7231   \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
7232   \@tempcntb #2%
7233   \@whilenum\@tempcntb <\@tempcnta
7234   \do{%
7235     \edef\reserved@a{\reserved@a\@hash@\the\@tempcntb}%
7236     \advance\@tempcntb \@ne}%
7237   \let\@hash@###
7238   \l@ngrel@x\expandafter\def\expandafter#1\reserved@a}
7239 \def\providecommand{\@star@or@long\provide@command}
7240 \def\provide@command#1{%
7241   \begingroup
7242     \escapechar\m@ne\xdef\@tempa{\string#1}%
7243   \endgroup
7244   \expandafter\@ifundefined\@tempa
7245     {\def\reserved@a{\new@command#1}}%
7246     {\let\reserved@a\relax
7247      \def\reserved@a{\new@command\reserved@a}}%
7248   \reserved@a}%

7249 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
7250 \def\declare@robustcommand#1{%
7251   \edef\reserved@a{\string#1}%
7252   \def\reserved@b{#1}%
7253   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
7254   \edef#1{%
7255     \ifx\reserved@a\reserved@b
7256       \noexpand\x@protect
7257       \noexpand#1%
7258     \fi
7259     \noexpand\protect
7260     \expandafter\noexpand\csname
7261       \expandafter\@gobble\string#1 \endcsname
7262   }%
7263   \expandafter\new@command\csname

```

```

7264 \expandafter\@gobble\string#1 \endcsname
7265 }
7266 \def\x@protect#1{%
7267 \ifx\protect\@typeset@protect\else
7268 \x@protect#1%
7269 \fi
7270 }
7271 \catcode`\&=\z@ % Trick to hide conditionals
7272 \def\@x@protect#1&fi#2#3{&fi\protect#1}

```

The following little macro `\in@` is taken from `latex.ltx`; it checks whether its first argument is part of its second argument. It uses the boolean `\in@`; allocating a new boolean inside conditionally executed code is not possible, hence the construct with the temporary definition of `\bbl@tempa`.

```

7273 \def\bbl@tempa{\csname newif\endcsname&ifin@}
7274 \catcode`\&=4
7275 \ifx\in@\@undefined
7276 \def\in@#1#2{%
7277 \def\in@@##1#1##2##3\in@@{%
7278 \ifx\in@@##2\in@false\else\in@true\fi}%
7279 \in@@##1\in@\in@@}
7280 \else
7281 \let\bbl@tempa\@empty
7282 \fi
7283 \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).

```

7284 \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.

```

7285 \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 $\text{\LaTeX} 2_{\epsilon}$ versions; just enough to make things work in plain \TeX environments.

```

7286 \ifx\@tempcnta\@undefined
7287 \csname newcount\endcsname\@tempcnta\relax
7288 \fi
7289 \ifx\@tempcntb\@undefined
7290 \csname newcount\endcsname\@tempcntb\relax
7291 \fi

```

To prevent wasting two counters in \LaTeX (because counters with the same name are allocated later by it) we reset the counter that holds the next free counter (`\count10`).

```

7292 \ifx\bye\@undefined
7293 \advance\count10 by -2\relax
7294 \fi
7295 \ifx\@ifnextchar\@undefined
7296 \def\@ifnextchar#1#2#3{%
7297 \let\reserved@d=#1%
7298 \def\reserved@a{#2}\def\reserved@b{#3}%
7299 \futurelet\@let@token\@ifnch}
7300 \def\@ifnch{%
7301 \ifx\@let@token\@sptoken
7302 \let\reserved@c\@ifnch
7303 \else

```

```

7304     \ifx\@let@token\reserved@d
7305         \let\reserved@c\reserved@a
7306     \else
7307         \let\reserved@c\reserved@b
7308     \fi
7309 \fi
7310 \reserved@c}
7311 \def\:{\let\sptoken= } \: % this makes \@sptoken a space token
7312 \def\:{\@xifnch} \expandafter\def\:{\futurelet\@let@token\@ifnch}
7313 \fi
7314 \def\@testopt#1#2{%
7315     \@ifnextchar[{#1}{#1[#2]}}
7316 \def\@protected@testopt#1{%
7317     \ifx\protect\@typeset@protect
7318         \expandafter\@testopt
7319     \else
7320         \@x@protect#1%
7321     \fi}
7322 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
7323     #2\relax}\fi}
7324 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
7325     \else\expandafter\@gobble\fi{#1}}

```

16.4 Encoding related macros

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

```

7326 \def\DeclareTextCommand{%
7327     \@dec@text@cmd\providecommand
7328 }
7329 \def\ProvideTextCommand{%
7330     \@dec@text@cmd\providecommand
7331 }
7332 \def\DeclareTextSymbol#1#2#3{%
7333     \@dec@text@cmd\chardef#1{#2}#3\relax
7334 }
7335 \def\@dec@text@cmd#1#2#3{%
7336     \expandafter\def\expandafter#2%
7337         \expandafter{%
7338             \csname#3-cmd\expandafter\endcsname
7339             \expandafter#2%
7340             \csname#3\string#2\endcsname
7341         }%
7342 %     \let\@ifdefinable\@rc@ifdefinable
7343     \expandafter#1\csname#3\string#2\endcsname
7344 }
7345 \def\@current@cmd#1{%
7346     \ifx\protect\@typeset@protect\else
7347         \noexpand#1\expandafter\@gobble
7348     \fi
7349 }
7350 \def\@changed@cmd#1#2{%
7351     \ifx\protect\@typeset@protect
7352         \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
7353             \expandafter\ifx\csname ?\string#1\endcsname\relax
7354                 \expandafter\def\csname ?\string#1\endcsname{%
7355                     \@changed@x@err{#1}%
7356                 }%
7357     \fi

```

```

7358      \global\expandafter\let
7359      \csname\cf@encoding \string#1\expandafter\endcsname
7360      \csname ?\string#1\endcsname
7361      \fi
7362      \csname\cf@encoding\string#1%
7363      \expandafter\endcsname
7364  \else
7365      \noexpand#1%
7366  \fi
7367 }
7368 \def\@changed@x@err#1{%
7369     \errhelp{Your command will be ignored, type <return> to proceed}%
7370     \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
7371 \def\DeclareTextCommandDefault#1{%
7372     \DeclareTextCommand#1?%
7373 }
7374 \def\ProvideTextCommandDefault#1{%
7375     \ProvideTextCommand#1?%
7376 }
7377 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
7378 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
7379 \def\DeclareTextAccent#1#2#3{%
7380     \DeclareTextCommand#1{#2}[1]{\accent#3 ##1}
7381 }
7382 \def\DeclareTextCompositeCommand#1#2#3#4{%
7383     \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
7384     \edef\reserved@b{\string##1}%
7385     \edef\reserved@c{%
7386         \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
7387     \ifx\reserved@b\reserved@c
7388         \expandafter\expandafter\expandafter\ifx
7389             \expandafter\@car\reserved@a\relax\relax\@nil
7390             \@text@composite
7391     \else
7392         \edef\reserved@b##1{%
7393             \def\expandafter\noexpand
7394                 \csname#2\string#1\endcsname####1{%
7395                 \noexpand\@text@composite
7396                 \expandafter\noexpand\csname#2\string#1\endcsname
7397                 ####1\noexpand\@empty\noexpand\@text@composite
7398                 {##1}%
7399             }%
7400         }%
7401         \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
7402     \fi
7403     \expandafter\def\csname\expandafter\string\csname
7404         #2\endcsname\string#1-\string#3\endcsname{#4}
7405 \else
7406     \errhelp{Your command will be ignored, type <return> to proceed}%
7407     \errmessage{\string\DeclareTextCompositeCommand\space used on
7408         inappropriate command \protect#1}
7409 \fi
7410 }
7411 \def\@text@composite#1#2#3\@text@composite{%
7412     \expandafter\@text@composite@x
7413     \csname\string#1-\string#2\endcsname
7414 }
7415 \def\@text@composite@x#1#2{%
7416     \ifx#1\relax

```

```

7417      #2%
7418      \else
7419      #1%
7420      \fi
7421 }
7422 %
7423 \def\@strip@args#1:#2-#3\@strip@args{#2}
7424 \def\DeclareTextComposite#1#2#3#4{%
7425   \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
7426   \bgroup
7427     \lcode` \@=#4%
7428     \lowercase{%
7429   \egroup
7430   \reserved@a @%
7431   }%
7432 }
7433 %
7434 \def\UseTextSymbol#1#2{#2}
7435 \def\UseTextAccent#1#2#3{}
7436 \def\@use@text@encoding#1{}
7437 \def\DeclareTextSymbolDefault#1#2{%
7438   \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
7439 }
7440 \def\DeclareTextAccentDefault#1#2{%
7441   \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
7442 }
7443 \def\cf@encoding{OT1}

```

Currently we only use the $\LaTeX 2_{\epsilon}$ method for accents for those that are known to be made active in *some* language definition file.

```

7444 \DeclareTextAccent{"}{OT1}{127}
7445 \DeclareTextAccent{'}{OT1}{19}
7446 \DeclareTextAccent{^}{OT1}{94}
7447 \DeclareTextAccent`{OT1}{18}
7448 \DeclareTextAccent{~}{OT1}{126}

```

The following control sequences are used in `babel.def` but are not defined for `PLAIN TEX`.

```

7449 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
7450 \DeclareTextSymbol{\textquotedblright}{OT1}{`"}
7451 \DeclareTextSymbol{\textquoteleft}{OT1}{``}
7452 \DeclareTextSymbol{\textquoteright}{OT1}{''}
7453 \DeclareTextSymbol{\i}{OT1}{16}
7454 \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 sophisticated font mechanism as \LaTeX has, we just `\let` it to `\sevenrm`.

```

7455 \ifx\scriptsize@undefined
7456   \let\scriptsize\sevenrm
7457 \fi

```

And a few more “dummy” definitions.

```

7458 \def\language{english}%
7459 \let\bbl@opt@shorthands@nnil
7460 \def\bbl@ifshorthand#1#2#3{#2}%
7461 \let\bbl@language@opts@empty
7462 \ifx\babeloptionstrings@undefined
7463   \let\bbl@opt@strings@nnil
7464 \else
7465   \let\bbl@opt@strings\babeloptionstrings

```

```

7466 \fi
7467 \def\BabelStringsDefault{generic}
7468 \def\bbl@tempa{normal}
7469 \ifx\babeloptionmath\bbl@tempa
7470   \def\bbl@mathnormal{\noexpand\textormath}
7471 \fi
7472 \def\AfterBabelLanguage#1#2{}
7473 \ifx\BabelModifiers\@undefined\let\BabelModifiers\relax\fi
7474 \let\bbl@afterlang\relax
7475 \def\bbl@opt@safe{BR}
7476 \ifx\@uclclist\@undefined\let\@uclclist\@empty\fi
7477 \ifx\bbl@trace\@undefined\def\bbl@trace#1{}\fi
7478 \expandafter\newif\csname ifbbl@single\endcsname
7479 \chardef\bbl@bidimode\z@
7480 <</Emulate LaTeX>>

A proxy file:
7481 <*plain>
7482 \input babel.def
7483 </plain>

```

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