

Babel

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

PDFTEX

```
\documentclass{article}

\usepackage[T1]{fontenc}
% \usepackage[utf8]{inputenc} % Uncomment if LaTeX < 2018-04-01

\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 \LaTeX 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 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 follows. The main language is french, which is activated when the document begins. The package `inputenc` may be omitted with $\LaTeX \geq 2018-04-01$ if the encoding is UTF-8.

PDFTEX

```
\documentclass{article}  
  
\usepackage[T1]{fontenc}  
\usepackage[utf8]{inputenc}  
  
\usepackage[english,french]{babel}  
  
\begin{document}  
  
Plus ça change, plus c'est la même chose!  
  
\selectlanguage{english}  
  
And an English paragraph, with a short text in  
\foreignlanguage{french}{français}.  
  
\end{document}
```

EXAMPLE With xetex and luatex, 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 1.21 for further details.

1.3 Mostly monolingual documents

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

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

EXAMPLE A trivial document 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 tree-letter word is a valid name for a language (eg, `yi`). See section 1.21 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

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

```
\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

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

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

WARNING Not all languages provide a sty file and some of them are not compatible with Plain.⁴

1.7 Basic language selectors

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

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

`\selectlanguage` {*<language>*}

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

```
\selectlanguage{german}
```

This command can be used as environment, too.

NOTE For “historical reasons”, a macro name is converted to a language name without the leading `\`; in other words, `\selectlanguage{\german}` is equivalent to `\selectlanguage{german}`. Using a macro instead of a “real” name is deprecated.

New 3.43 However, if the macro name does not match any language, it will get expanded as expected.

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.

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

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

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

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}`

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

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

⁴Even in the babel kernel there were some macros not compatible with plain. Hopefully these issues have been fixed.

The environment `other language` 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 `other language*` does not.

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

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

1.9 More on selection

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

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

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

EXAMPLE With

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

you can write

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

and

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

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

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

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

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

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

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

```
\babelensure{polish}
```

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

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

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

1.10 Shorthands

A *shorthand* is a sequence of one or two characters that expands to arbitrary \TeX code. Shorthands can be used for different kinds of things, for example: (1) in some languages shorthands such as "a are defined to be able to hyphenate the word if the encoding is OT1; (2) in some languages shorthands such as ! are used to insert the right amount of white space; (3) several kinds of discretionaries and breaks can be inserted easily with "-", "=", etc.

⁵With it, encoded strings may not work as expected.

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 `\knbccode`, and `luatex` can manipulate the glyph list. Tools for point 3 can be still very useful in general. There are three levels of shorthands: *user*, *language*, and *system* (by order of precedence). Version 3.9 introduces the *language user* level on top of the user level, as described below. In most cases, you will use only shorthands provided by languages.

NOTE Note the following:

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

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.

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

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*{\langle char \rangle}` is provided, which makes sure shorthands are always activated.

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

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

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

User shorthands override language ones, which in turn override system shorthands.

Language-dependent user shorthands (new in 3.9) take precedence over “normal” user shorthands.

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

```
\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 is repeated at the beginning of the next line. You can then set:

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

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

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

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

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

⁶Actually, 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.

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

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

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

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

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

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

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

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

For your records, here is a list of shorthands, but you must double check them, as they may change:⁷

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.⁸

⁷Thanks to Enrico Gregorio

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

\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

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

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

1.11 Package options

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

- KeepShorthandsActive** Tells babel not to deactivate shorthands after loading a language file, so that they are also available in the preamble.
- activeacute** For some languages babel supports this options to set `'` as a shorthand in case it is not done by default.
- activegrave** Same for ```.
- shorthands=** $\langle char \rangle \langle char \rangle \dots \mid \text{off}$
The only language shorthands activated are those given, like, eg:

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

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

safe=	none ref bib
	Some \LaTeX macros are redefined so that using shorthands is safe. With <code>safe=bib</code> only <code>\nocite</code> , <code>\bibcite</code> and <code>\bibitem</code> are redefined. With <code>safe=ref</code> only <code>\newlabel</code> , <code>\ref</code> and <code>\pageref</code> are redefined (as well as a few macros from <code>varioref</code> and <code>ifthen</code>). With <code>safe=none</code> 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 <code>normal</code> they are deactivated in math mode (default is <code>active</code>) and things like <code>#{a'}</code> (a closing brace after a shorthand) are not a source of trouble anymore.
config=	$\langle file \rangle$
	Load $\langle file \rangle$.cfg instead of the default config file <code>bblopts.cfg</code> (the file is loaded even with <code>noconfigs</code>).
main=	$\langle language \rangle$
	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=	$\langle language \rangle$
	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 <code>\SetCase</code>) are ignored. Use only if there are incompatibilities with other packages.
silent	New 3.9l No warnings and no <i>infos</i> are written to the log file. ⁹
strings=	generic unicode encoded $\langle label \rangle$ $\langle font encoding \rangle$
	Selects the encoding of strings in languages supporting this feature. Predefined labels are <code>generic</code> (for traditional \TeX , LICR and ASCII strings), <code>unicode</code> (for engines like <code>xetex</code> and <code>luatex</code>) and <code>encoded</code> (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 <code>\MakeUpper</code> case and the like (this feature misuses some internal \LaTeX tools, so use it only as a last resort).
hyphenmap=	off first select other other*

⁹You can use alternatively the package `silence`.

New 3.9g Sets the behavior of case mapping for hyphenation, provided the language defines it.¹⁰ It can take the following values:

off deactivates this feature and no case mapping is applied;
first sets it at the first switching commands in the current or parent scope (typically, when the aux file is first read and at `\begin{document}`), but also the first `\selectlanguage` in the preamble), and it's the default if a single language option has been stated;¹¹
select sets it only at `\selectlanguage`;
other also sets it at `otherlanguage`;
other* also sets it at `otherlanguage*` as well as in heads and foots (if the option `headfoot` is used) and in auxiliary files (ie, at `\select@language`), and it's the default if several language options have been stated. The option `first` can be regarded as an optimized version of `other*` for monolingual documents.¹²

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

New 3.14 Selects the bidi algorithm to be used in `luatex` and `xetex`. See sec. 1.23.

layout=

New 3.16 Selects which layout elements are adapted in bidi documents. See sec. 1.23.

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:

¹⁰Turned off in plain.

¹¹Duplicated options count as several ones.

¹²Providing `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.

```

\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 T_EX and other systems, they are identified with the BCP 47 codes as preferred by the Unicode Common Language Data Repository, which was used as source for most of the data provided by these files, too (the main exception being the `\ldf` name strings).

Most of them set the date, and many also the captions (Unicode and LICR). They will be evolving with the time to add more features (something to keep in mind if backward compatibility is important). The following section shows how to make use of them by means of `\babelprovide`. In other words, `\babelprovide` is mainly meant for auxiliary tasks, and as alternative when the `ldf`, for some reason, does not work as expected.

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

LUATEX/XETEX

```

\documentclass{book}

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

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

\begin{document}

\tableofcontents

\chapter{სამზარეულო და სუფრის ტრადიციები}

ქართული ტრადიციული სამზარეულო ერთ-ერთი უმდიდრესია მთელ მსოფლიოში.

\end{document}

```

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

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

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

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

Or also:

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

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

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

Arabic Monolingual documents mostly work in luatex, but it must be fine tuned, and a recent version of fontspec/loaotfload is required. In xetex babel resorts to the bidi package, which seems to work.

Hebrew Niqqud marks seem to work in both engines, but cantillation marks are 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 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. Khmer 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]{lᦺ lᦴ lᦵ lᦶ lᦷ lᦸ lᦹ} % Random
```

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

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

Latin, Greek, Cyrillic Combining chars with the default luatex font renderer might be wrong; on the other hand, with the Harfbuzz renderer diacritics are stacked correctly, but many hyphenation points are discarded (this bug 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}	cs	Czech ^{ul}
agq	Aghem	cu	Church Slavic
ak	Akan	cu-Cyrs	Church Slavic
am	Amharic ^{ul}	cu-Glag	Church Slavic
ar	Arabic ^{ul}	cy	Welsh ^{ul}
ar-DZ	Arabic ^{ul}	da	Danish ^{ul}
ar-MA	Arabic ^{ul}	dav	Taita
ar-SY	Arabic ^{ul}	de-AT	German ^{ul}
as	Assamese	de-CH	German ^{ul}
asa	Asu	de	German ^{ul}
ast	Asturian ^{ul}	dje	Zarma
az-Cyrl	Azerbaijani	dsb	Lower Sorbian ^{ul}
az-Latn	Azerbaijani	dua	Duala
az	Azerbaijani ^{ul}	dyo	Jola-Fonyi
bas	Basaa	dz	Dzongkha
be	Belarusian ^{ul}	ebu	Embu
bem	Bemba	ee	Ewe
bez	Bena	el	Greek ^{ul}
bg	Bulgarian ^{ul}	el-polyton	Polytonic Greek ^{ul}
bm	Bambara	en-AU	English ^{ul}
bn	Bangla ^{ul}	en-CA	English ^{ul}
bo	Tibetan ^u	en-GB	English ^{ul}
brx	Bodo	en-NZ	English ^{ul}
bs-Cyrl	Bosnian	en-US	English ^{ul}
bs-Latn	Bosnian ^{ul}	en	English ^{ul}
bs	Bosnian ^{ul}	eo	Esperanto ^{ul}
ca	Catalan ^{ul}	es-MX	Spanish ^{ul}
ce	Chechen	es	Spanish ^{ul}
cgg	Chiga	et	Estonian ^{ul}
chr	Cherokee	eu	Basque ^{ul}
ckb	Central Kurdish	ewo	Ewondo
cop	Coptic	fa	Persian ^{ul}

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
fr-CA	French ^{ul}	lb	Luxembourgish
fr-CH	French ^{ul}	lg	Ganda
fr-LU	French ^{ul}	lkt	Lakota
fur	Friulian ^{ul}	ln	Lingala
fy	Western Frisian	lo	Lao ^{ul}
ga	Irish ^{ul}	lrc	Northern Luri
gd	Scottish Gaelic ^{ul}	lt	Lithuanian ^{ul}
gl	Galician ^{ul}	lu	Luba-Katanga
grc	Ancient Greek ^{ul}	luo	Luo
gsw	Swiss German	luy	Luyia
gu	Gujarati	lv	Latvian ^{ul}
guz	Gusii	mas	Masai
gv	Manx	mer	Meru
ha-GH	Hausa	mfe	Morisyen
ha-NE	Hausa ^l	mg	Malagasy
ha	Hausa	mgh	Makhuwa-Meetto
haw	Hawaiian	mgo	Meta'
he	Hebrew ^{ul}	mk	Macedonian ^{ul}
hi	Hindi ^u	ml	Malayalam ^{ul}
hr	Croatian ^{ul}	mn	Mongolian
hsb	Upper Sorbian ^{ul}	mr	Marathi ^{ul}
hu	Hungarian ^{ul}	ms-BN	Malay ^l
hy	Armenian ^u	ms-SG	Malay ^l
ia	Interlingua ^{ul}	ms	Malay ^{ul}
id	Indonesian ^{ul}	mt	Maltese
ig	Igbo	mua	Mundang
ii	Sichuan Yi	my	Burmese
is	Icelandic ^{ul}	mzn	Mazanderani
it	Italian ^{ul}	naq	Nama
ja	Japanese	nb	Norwegian Bokmål ^{ul}
jgo	Ngomba	nd	North Ndebele
jmc	Machame	ne	Nepali
ka	Georgian ^{ul}	nl	Dutch ^{ul}
kab	Kabyle	nmg	Kwasio
kam	Kamba	nn	Norwegian Nynorsk ^{ul}
kde	Makonde	nnh	Ngiemboon
kea	Kabuverdianu	nus	Nuer
khq	Koyra Chiini	nyn	Nyankole
ki	Kikuyu	om	Oromo
kk	Kazakh	or	Odia
kkj	Kako	os	Ossetic
kl	Kalaallisut	pa-Arab	Punjabi
klj	Kalenjin	pa-Guru	Punjabi
km	Khmer	pa	Punjabi
kn	Kannada ^{ul}	pl	Polish ^{ul}
ko	Korean	pms	Piedmontese ^{ul}
kok	Konkani	ps	Pashto
ks	Kashmiri	pt-BR	Portuguese ^{ul}

pt-PT	Portuguese ^{ul}	sr	Serbian ^{ul}
pt	Portuguese ^{ul}	sv	Swedish ^{ul}
qu	Quechua	sw	Swahili
rm	Romansh ^{ul}	ta	Tamil ^u
rn	Rundi	te	Telugu ^{ul}
ro	Romanian ^{ul}	teo	Teso
rof	Rombo	th	Thai ^{ul}
ru	Russian ^{ul}	ti	Tigrinya
rw	Kinyarwanda	tk	Turkmen ^{ul}
rwk	Rwa	to	Tongan
sa-Beng	Sanskrit	tr	Turkish ^{ul}
sa-Deva	Sanskrit	twq	Tasawaq
sa-Gujr	Sanskrit	tzm	Central Atlas Tamazight
sa-Knda	Sanskrit	ug	Uyghur
sa-Mlym	Sanskrit	uk	Ukrainian ^{ul}
sa-Telu	Sanskrit	ur	Urdu ^{ul}
sa	Sanskrit	uz-Arab	Uzbek
sah	Sakha	uz-Cyrl	Uzbek
saq	Samburu	uz-Latn	Uzbek
sbp	Sangu	uz	Uzbek
se	Northern Sami ^{ul}	vai-Latn	Vai
seh	Sena	vai-Vaii	Vai
ses	Koyraboro Senni	vai	Vai
sg	Sango	vi	Vietnamese ^{ul}
shi-Latn	Tachelhit	vun	Vunjo
shi-Tfng	Tachelhit	wae	Walser
shi	Tachelhit	xog	Soga
si	Sinhala	yav	Yangben
sk	Slovak ^{ul}	yi	Yiddish
sl	Slovenian ^{ul}	yo	Yoruba
smn	Inari Sami	yue	Cantonese
sn	Shona	zgh	Standard Moroccan Tamazight
so	Somali		
sq	Albanian ^{ul}	zh-Hans-HK	Chinese
sr-Cyrl-BA	Serbian ^{ul}	zh-Hans-MO	Chinese
sr-Cyrl-ME	Serbian ^{ul}	zh-Hans-SG	Chinese
sr-Cyrl-XK	Serbian ^{ul}	zh-Hans	Chinese
sr-Cyrl	Serbian ^{ul}	zh-Hant-HK	Chinese
sr-Latn-BA	Serbian ^{ul}	zh-Hant-MO	Chinese
sr-Latn-ME	Serbian ^{ul}	zh-Hant	Chinese
sr-Latn-XK	Serbian ^{ul}	zh	Chinese
sr-Latn	Serbian ^{ul}	zu	Zulu

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

aghem	american
akan	amharic
albanian	ancientgreek

arabic	chinese-simplified-hongkongsarchina
arabic-algeria	chinese-simplified-macausarchina
arabic-DZ	chinese-simplified-singapore
arabic-morocco	chinese-simplified
arabic-MA	chinese-traditional-hongkongsarchina
arabic-syria	chinese-traditional-macausarchina
arabic-SY	chinese-traditional
armenian	chinese
assamese	churchslavic
asturian	churchslavic-cyrs
asu	churchslavic-oldcyrillic ¹³
australian	churchsslavic-glag
austrian	churchsslavic-glagolitic
azerbaijani-cyrillic	cognian
azerbaijani-cyrl	cornish
azerbaijani-latin	croatian
azerbaijani-latn	czech
azerbaijani	danish
bafia	duala
bambara	dutch
basaa	dzongkha
basque	embu
belarusian	english-au
bemba	english-australia
ben	english-ca
bengali	english-canada
bodo	english-gb
bosnian-cyrillic	english-newzealand
bosnian-cyrl	english-nz
bosnian-latin	english-unitedkingdom
bosnian-latn	english-unitedstates
bosnian	english-us
brazilian	english
breton	esperanto
british	estonian
bulgarian	ewe
burmese	ewondo
canadian	faroes
cantonese	filipino
catalan	finnish
centralatlastamazight	french-be
centralkurdish	french-belgium
chechen	french-ca
cherokee	french-canada
chiga	french-ch
chinese-hans-hk	french-lu
chinese-hans-mo	french-luxembourg
chinese-hans-sg	french-switzerland
chinese-hans	french
chinese-hant-hk	friulian
chinese-hant-mo	fulah
chinese-hant	galician

¹³The name in the CLDR is Old Church Slavonic Cyrillic, but it has been shortened for practical reasons.

ganda
georgian
german-at
german-austria
german-ch
german-switzerland
german
greek
gujarati
gusii
hausa-gh
hausa-ghana
hausa-ne
hausa-niger
hausa
hawaiian
hebrew
hindi
hungarian
icelandic
igbo
inarisami
indonesian
interlingua
irish
italian
japanese
jolafonyi
kabuverdianu
kabyle
kako
kalaallisut
kalenjin
kamba
kannada
kashmiri
kazakh
khmer
kikuyu
kinyarwanda
konkani
korean
koyraborosenni
koyrachiini
kwasio
kyrgyz
lakota
langi
lao
latvian
lingala
lithuanian
lowersorbian
lsorbian

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

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

yiddish
yoruba

zarma
zulu afrikaans

Modifying and adding values to ini files

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

1.14 Selecting fonts

New 3.15 Babel provides a high level interface on top of `fontspec` to select fonts. There is no need to load `fontspec` explicitly – babel does it for you with the first `\babelfont`.¹⁴

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

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

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

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

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

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

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

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

LUATEX/XETEX

```
\documentclass{article}

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

\babelprovide[import]{hebrew}

\babelfont{rm}{FreeSerif}

\begin{document}
```

¹⁴See also the package `combofont` for a complementary approach.

```
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 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* and 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* and 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.

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

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

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

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

NOTE There are a few alternative methods:

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

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

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

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

```
\addto\captionseenglish{%  
  \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.

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: \mylangchaptername not set. Please, define it
(babel)                after the language has been loaded (typically
(babel)                in the preamble) with something like:
(babel)                \renewcommand\mylangchaptername{..}
(babel)                Reported on input line 18.

```

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}
\renewcommand\arhinishchaptername{Chapitula}
\renewcommand\arhinishrefname{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= $\langle\textit{language-tag}\rangle$

Loads only the strings. For example:

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

hyphenrules= $\langle\textit{language-list}\rangle$

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).

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}
```

script= $\langle\textit{script-name}\rangle$

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= $\langle\textit{language-name}\rangle$

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).

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

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

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

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, syllable, 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 a ini files 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. Çiley a Pêşîn 2019*, but with variant=iza fa it prints *31'ê Çiley a 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 $\{\langle language \rangle\}\{\langle true \rangle\}\{\langle false \rangle\}$

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 $\{\langle field \rangle\}$

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 $*\{\langle macro \rangle\}\{\langle locale \rangle\}\{\langle property \rangle\}$

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 stored in an internal macro named `\bbl@languages` (see the code for further details), but note several locales may share a single `\language`, so they are separated concepts. In `luatex`, the `\localeid` is saved in each node (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 T_EX are entered as -, and (2) *optional* or *soft hyphens*, which are entered as \-. Strictly, a *soft hyphen* is not a hyphen, but just a breaking opportunity or, in T_EX terms, a “discretionary”; a *hard hyphen* is a hyphen with a breaking opportunity after it. A further type is a *non-breaking hyphen*, a hyphen without a breaking opportunity. In T_EX, - and \- forbid further breaking opportunities in the word. This is the desired behavior very often, but not always, and therefore many languages provide shorthands for these cases. Unfortunately, this has not been done consistently: for example, - in Dutch, Portuguese, Catalan or Danish is a hard hyphen, while in German, Spanish, Norwegian, Slovak or Russian is a soft hyphen. Furthermore, some of them even redefine \-, so that you cannot insert a soft hyphen without breaking opportunities in the rest of the word. Therefore, some macros are provided with a set of basic “hyphens” which can be used by themselves, to define a user shorthand, or even in language files.

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

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

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

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

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

New 3.9m *In luatex only*,¹⁵ adds or replaces patterns for the languages given or, without the optional argument, for *all* languages. If a pattern for a certain combination already exists, it gets replaced by the new one.

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

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

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`).

\babelposthyphenation {<hyphenrules-name>} {<lua-pattern>} {<replacement>}

New 3.37-3.39 *With luatex* it is now 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. No rules are currently provided by default, 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 `([îú])`, the replacement could be `{1|îú|íú}`, which maps `î` to `í`, and `ú` to `ó`, so that the diaeresis is removed.

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

¹⁵With `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.

See the [babel wiki](#) for a more detailed description and some examples. It also describes an additional replacement type with the key `string`.

EXAMPLE 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 dictionaries into account). For example, you can use the `string` replacement to 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
\babelposthyphenation{russian-latin}{([sz])h} % Create rule
{
  { string = {1|sz|šž} },
  remove
}
```

In other words, it is a quite general tool. (A counterpart `\babelprehyphenation` is on the way.)

1.21 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.

1.22 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` $\{\langle text \rangle\}$

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

If non-ASCII encodings are not loaded (or no encoding at all), it is no-op (also `\TeX` and `\LaTeX` are not redefined); otherwise, `\ensureascii` switches to the encoding at the

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.

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

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

1.23 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 (الاجريقي) بـ
    Arabia أو Aravia (بالاغريقية Αραβία), استخدم الرومان ثلاث
    بادئات بـ “Arabia” على ثلاث مناطق من شبه الجزيرة العربية، إلا أنها
    حقيقةً كانت أكبر مما تعرف عليه اليوم.

\end{document}

```

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

```

\documentclass{book}

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

\babelprovide[onchar=ids fonts]{arabic}

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

\begin{document}

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

\end{document}

```

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

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

```

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

```

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

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

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

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

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

With counters, `\arabic` is not only considered L text always (with `\babelsublr`, see below), but also an “isolated” block which does not interact with the surrounding chars. So, while `1.2` in R text is rendered in that order with `bidi=basic` (as a decimal number), in `\arabic{c1}.\arabic{c2}` the visual order is `c2.c1`. Of course, you may always adjust the order by changing the language, if necessary.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 if you want sloped lines (**With recent versions of \LaTeX , this feature has stopped working**). It attempts to do the same for `pgf/tikz`. Somewhat experimental. **New 3.32** .

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

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

EXAMPLE Typically, in an Arabic document you would need:

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

\babelsublr $\{\langle lr\text{-}text\rangle\}$

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 `rl` counterpart. Any `\babelsublr` in *explicit* L mode is ignored. However, with `bidi=basic` and *implicit* L, it first returns to R and then switches to explicit L. To clarify this point, consider, in an R context:

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

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

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

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

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}\{()\}
```

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

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

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

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

1.24 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).

1.25 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 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 $\text{T}_\text{E}\text{X}$ parameters (#1, #2, #3), with the meaning given:

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

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

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

defaultcommands Used (locally) in `\StartBabelCommands`.

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

stopcommands Used to reset the above, if necessary.

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

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

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

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

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

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

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

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

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

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

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

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

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

\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).

1.26 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 uppsorbian
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}

```

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

Then you preprocess it with `devnag <file>`, which creates `<file>.tex`; you can then typeset the latter with \LaTeX .

1.27 Unicode character properties in luatex

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

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

New 3.32 Here, $\{\langle char-code \rangle\}$ is a number (with \TeX syntax). With the optional argument, you can set a range of values. There are three properties (with a short name, taken from Unicode): `direction` (`bc`), `mirror` (`bm`), `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}
```

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

1.29 Tips, workarounds, known issues and notes

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

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

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

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

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

(A recent version of inputenc is required.)

- 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 \usesshorthands to activate ' and \defineshorthand, or redefine \textquoteright (the latter is called by the non-ASCII right quote).
- \bibitem is out of sync with \selectlanguage in the .aux file. The reason is \bibitem uses \immediate (and others, in fact), while \selectlanguage doesn't. There is no known workaround.
- Babel does not take into account \normalsfcodes and (non-)French spacing is not always properly (un)set by languages. However, problems are unlikely to happen and therefore this part remains untouched in version 3.9 (but it is in the 'to do' list).
- Using a character mathematically active (ie, with math code "8000) as a shorthand can make 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.

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

1.30 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.

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).

1.31 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.

\babelprehyphenation

New 3.44 Note it is tentative, but the current behavior for glyphs should be correct. It is similar to \babelposthyphenation, but (as its name implies) applied before hyphenation. There are other differences: (1) the first argument is the locale instead the name of hyphenation patterns; (2) in the search patterns = has no special meaning (| is still reserved, but currently unused); (3) in the replacement, discretionaries are not accepted, only remove, , and string = ...

Currently it handles glyphs, not discretionaries or spaces (in particular, it will not catch the hyphen and you can't insert or remove spaces). Also, you are limited to substitutions as done by lua, although a future implementation may alternatively accept lpeg.

Performance is still somewhat poor.

2 Loading languages with language.dat

T_EX and most engines based on it (pdfT_EX, xetex, ϵ -T_EX, the main exception being luatex) require hyphenation patterns to be preloaded when a format is created (eg, L^AT_EX, XeL^AT_EX, pdfL^AT_EX). 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

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.

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 T_EX 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 L^AT_EX that the hyphenation patterns just processed have to be known under an alternative name. Here is an example:

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

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

You may also set the font encoding the patterns are intended for by following the language name by a colon and the encoding code.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.

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.

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

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

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

The following assumptions are made:

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

Some recommendations:

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

- Do not switch scripts. If you want to make sure a set of glyphs is used, switch either the font encoding (low-level) or the language (high-level, which in turn may switch the font encoding). Usage of things like `\latintext` is deprecated.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, sent it to me. Feel free to ask for help or to make feature requests.

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

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

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

The following page provides a starting point for ldf files:

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

<https://github.com/latex3/babel/wiki/List-of-locale-templates>.

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 T_EX 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

²⁶But not removed, for backward compatibility.

`\<lang>hyphenmins` 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. 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>`.

`\bbl@declare@tribute` This is a command to be used in the language definition files for declaring a language attribute. It takes three arguments: the name of the language, the attribute to be defined, and the code to be executed when the attribute is to be used.

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

`\ProvidesLanguage` The macro `\ProvidesLanguage` should be used to identify the language definition files. Its syntax is similar to the syntax of the \LaTeX command `\ProvidesPackage`.

`\LdfInit` The macro `\LdfInit` performs a couple of standard checks that must be made at the beginning of a language definition file, such as checking the category code of the `@`-sign, preventing the `.ldf` file from being processed twice, etc.

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

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

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

`\substitutefontfamily` (Deprecated.) This command takes three arguments, a font encoding and two font family names. It creates a font description file for the first font in the given encoding. This `.fd` file will instruct \LaTeX to use a font from the second family when a font from the first family in the given encoding seems to be needed.

3.3 Skeleton

Here is the basic structure of an ldf file, with a language, a dialect and an attribute. Strings are best defined using the method explained in 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>

\bb{<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\monthname{<name of first month>}
% More strings

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

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

\EndBabelCommands

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

\ldf@finish{<language>}
```

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

```
\AtEndOfPackage{%
  \RequirePackage{dingbat}%      Delay package
```


<code>\savebox{\myeye}{\eye}%</code>	And direct usage
<code>\newsavebox{\myeye}</code>	
<code>\newcommand\myanchor{\anchor}%</code>	But OK inside command

3.4 Support for active characters

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

<code>\initiate@active@char</code>	The internal macro <code>\initiate@active@char</code> is used in language definition files to instruct \TeX to give a character the category code ‘active’. When a character has been made active it will remain that way until the end of the document. Its definition may vary.
<code>\bbl@activate</code> <code>\bbl@deactivate</code>	The command <code>\bbl@activate</code> is used to change the way an active character expands. <code>\bbl@activate</code> ‘switches on’ the active behavior of the character. <code>\bbl@deactivate</code> lets the active character expand to its former (mostly) non-active self.
<code>\declare@shorthand</code>	The macro <code>\declare@shorthand</code> is used to define the various shorthands. It takes three arguments: the name for the collection of shorthands this definition belongs to; the character (sequence) that makes up the shorthand, i.e. <code>~</code> or <code>"a</code> ; and the code to be executed when the shorthand is encountered. (It does <i>not</i> raise an error if the shorthand character has not been “initiated”.)
<code>\bbl@add@special</code> <code>\bbl@remove@special</code>	The \TeX book states: “Plain \TeX includes a macro called <code>\dospecials</code> that is essentially a set macro, representing the set of all characters that have a special category code.” [4, p. 380] It is used to set text ‘verbatim’. To make this work if more characters get a special category code, you have to add this character to the macro <code>\dospecial</code> . \TeX adds another macro called <code>\@sanitize</code> representing the same character set, but without the curly braces. The macros <code>\bbl@add@special⟨char⟩</code> and <code>\bbl@remove@special⟨char⟩</code> add and remove the character <code>⟨char⟩</code> to these two sets.

3.5 Support for saving macro definitions

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

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

3.6 Support for extending macros

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

²⁷This mechanism was introduced by Bernd Raichle.

3.7 Macros common to a number of languages

<code>\bbl@allowhyphens</code>	In several languages compound words are used. This means that when \TeX has to 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 <code>\bbl@allowhyphens</code> can be used.
<code>\allowhyphens</code>	Same as <code>\bbl@allowhyphens</code> , but does nothing if the encoding is T1. It is intended mainly for characters provided as real glyphs by this encoding but constructed with <code>\accent</code> in OT1. Note the previous command (<code>\bbl@allowhyphens</code>) has different applications (hyphens and discretionary) than this one (composite chars). Note also prior to version 3.7, <code>\allowhyphens</code> had the behavior of <code>\bbl@allowhyphens</code> .
<code>\set@low@box</code>	For some languages, quotes need to be lowered to the baseline. For this purpose the macro <code>\set@low@box</code> is available. It takes one argument and puts that argument in an <code>\hbox</code> , at the baseline. The result is available in <code>\box0</code> for further processing.
<code>\save@sf@q</code>	Sometimes it is necessary to preserve the <code>\spacefactor</code> . For this purpose the macro <code>\save@sf@q</code> is available. It takes one argument, saves the current <code>\spacefactor</code> , executes the argument, and restores the <code>\spacefactor</code> .
<code>\bbl@frenchspacing</code> <code>\bbl@nonfrenchspacing</code>	The commands <code>\bbl@frenchspacing</code> and <code>\bbl@nonfrenchspacing</code> can be used to properly switch French spacing on and off.

3.8 Encoding-dependent strings

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

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

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

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

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

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

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

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

\EndBabelCommands
```

A real example is:

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

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

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

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

\StartBabelCommands{german,austrian}{date}
\SetString\monthiiname{Februar}
\SetString\monthiiiname{M\"a\"rz}
\SetString\monthivname{April}
\SetString\monthvname{Mai}
\SetString\monthviname{Juni}
\SetString\monthviiname{Juli}
\SetString\monthviiiname{August}
\SetString\monthixname{September}
\SetString\monthxname{Oktober}
\SetString\monthxiname{November}
\SetString\monthxiiname{Dezenber}
```

²⁸In future releases further categories may be added.

```

\SetString\today{\number\day.\~%
\csname month\romannumeral\month name\endcsname\space
\number\year}

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

\EndBabelCommands

```

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

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

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

\EndBabelCommands Marks the end of the series of blocks.

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

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

\SetString $\{ \langle macro-name \rangle \} \{ \langle string \rangle \}$

Adds $\langle macro-name \rangle$ to the current category, and defines globally $\langle lang-macro-name \rangle$ to $\langle code \rangle$ (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 $\{ \langle macro-name \rangle \} \{ \langle string-list \rangle \}$

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

```

\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 $[\langle map-list \rangle] \{ \langle toupper-code \rangle \} \{ \langle tolower-code \rangle \}$

Sets globally code to be executed at $\backslash MakeUppercase$ and $\backslash MakeLowercase$. The code would typically be things like $\backslash let \backslash BB \backslash bb$ and $\backslash uccode$ or $\backslash lccode$ (although for the reasons explained above, changes in lc/uc codes may not work). A $\langle map-list \rangle$ is a series of macros using the internal format of $\backslash @uclclist$ (eg, $\backslash bb \backslash BB \backslash cc \backslash CC$). The mandatory

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

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 \LaTeX , 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` $\{ \langle to\text{-}lower\text{-}macros \rangle \}$

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

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

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

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

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

4 Changes

4.1 Changes in babel version 3.9

Most of 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`name. 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 \TeX 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=3.51.2195>>

2 <<date=2020/11/18>>

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

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

```

3 <<(*Basic macros)>> ≡
4 \bbl@trace{Basic macros}
5 \def\bbl@stripslash{\expandafter\@gobble\string}
6 \def\bbl@add#1#2{%
7   \bbl@ifunset{\bbl@stripslash#1}%
8   {\def#1{#2}}%
9   {\expandafter\def\expandafter#1\expandafter{#1#2}}
10 \def\bbl@xin@{\@expandtwoargs\in@}
11 \def\bbl@csarg#1#2{\expandafter#1\csname bbl@#2\endcsname}%
12 \def\bbl@cs#1{\csname bbl@#1\endcsname}
13 \def\bbl@c1#1{\csname bbl@#1@\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,
\bbl@afterfi we take 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   \def\<##1>{\expandafter\>\noexpand\csname##1\endcsname}%
33   \edef\bbl@exp@aux{\endgroup#1}%
34   \bbl@exp@aux}

\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.

35 \def\bbl@tempa#1{%
36   \long\def\bbl@trim##1##2{%

```

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


```

37 \futurelet\bb@trim@a\bb@trim@c##2\@nil\@nil#1\@nil\relax{##1}}%
38 \def\bb@trim@c{%
39 \ifx\bb@trim@a\@sptoken
40 \expandafter\bb@trim@b
41 \else
42 \expandafter\bb@trim@b\expandafter#1%
43 \fi}%
44 \long\def\bb@trim@b#1##1 \@nil{\bb@trim@i##1}}
45 \bb@tempa{ }
46 \long\def\bb@trim@i#1\@nil#2\relax#3{#3{#1}}
47 \long\def\bb@trim@def#1{\bb@trim{\def#1}}

```

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

```

48 \begingroup
49 \gdef\bb@ifunset#1{%
50 \expandafter\ifx\csname#1\endcsname\relax
51 \expandafter\@firstoftwo
52 \else
53 \expandafter\@secondoftwo
54 \fi}
55 \bb@ifunset{ifcsname}%
56 {}%
57 {\gdef\bb@ifunset#1{%
58 \ifcsname#1\endcsname
59 \expandafter\ifx\csname#1\endcsname\relax
60 \bb@afterelse\expandafter\@firstoftwo
61 \else
62 \bb@afterfi\expandafter\@secondoftwo
63 \fi
64 \else
65 \expandafter\@firstoftwo
66 \fi}}
67 \endgroup

```

`\bb@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,

```

68 \def\bb@ifblank#1{%
69 \bb@ifblank@i#1\@nil\@nil\@secondoftwo\@firstoftwo\@nil}
70 \long\def\bb@ifblank@i#1#2\@nil#3#4#5\@nil{#4}
71 \def\bb@ifset#1#2#3{%
72 \bb@ifunset{#1}{#3}{\bb@exp{\bb@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).

```

73 \def\bb@forkv#1#2{%
74 \def\bb@kvcmd##1##2##3{#2}%
75 \bb@kvnext#1,\@nil,}
76 \def\bb@kvnext#1,{%
77 \ifx\@nil#1\relax\else
78 \bb@ifblank{#1}{\bb@forkv@eq#1=\@empty=\@nil{#1}}%
79 \expandafter\bb@kvnext
80 \fi}

```

```

81 \def\bbl@forkv@eq#1=#2=#3\@nil#4{%
82   \bbl@trim@def\bbl@forkv@a{#1}%
83   \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).

```

84 \def\bbl@vforeach#1#2{%
85   \def\bbl@forcmd##1{#2}%
86   \bbl@fornext#1,\@nil,}
87 \def\bbl@fornext#1,{%
88   \ifx\@nil#1\relax\else
89     \bbl@ifblank{#1}{\bbl@trim\bbl@forcmd{#1}}%
90     \expandafter\bbl@fornext
91   \fi}
92 \def\bbl@foreach#1{\expandafter\bbl@vforeach\expandafter{#1}}

```

\bbl@replace

```

93 \def\bbl@replace#1#2#3{% in #1 -> repl #2 by #3
94   \toks@{}%
95   \def\bbl@replace@aux##1#2##2#2{%
96     \ifx\bbl@nil##2%
97       \toks@\expandafter{\the\toks@##1}%
98     \else
99       \toks@\expandafter{\the\toks@##1#3}%
100     \bbl@afterfi
101     \bbl@replace@aux##2#2%
102   \fi}%
103   \expandafter\bbl@replace@aux#1#2\bbl@nil#2%
104   \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).

```

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

```

```

129 \endgroup
130 \bbl@tempc}} % empty or expand to set #1 with changes
131 \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.

```

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

```

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

```

154 \def\bbl@bsphack{%
155 \ifhmode
156 \hskip\z@skip
157 \def\bbl@esphack{\loop\ifdim\lastskip>\z@\unskip\repeat\unskip}%
158 \else
159 \let\bbl@esphack\@empty
160 \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`.

```

161 \def\bbl@cased{%
162 \ifx\oe\OE
163 \expandafter\in@\expandafter
164 {\expandafter\OE\expandafter}\expandafter{\oe}%
165 \ifin@
166 \bbl@afterelse\expandafter\MakeUppercase
167 \else
168 \bbl@afterfi\expandafter\MakeLowercase
169 \fi
170 \else
171 \expandafter\@firstofone
172 \fi}
173 <</Basic macros>>

```

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

```

174 <<*Make sure ProvidesFile is defined>> ≡
175 \ifx\ProvidesFile\@undefined
176   \def\ProvidesFile#1[#2 #3 #4]{%
177     \wlog{File: #1 #4 #3 <#2>}%
178     \let\ProvidesFile\@undefined}
179 \fi
180 <</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.

```

181 <<*Define core switching macros>> ≡
182 \ifx\language\@undefined
183   \csname newcount\endcsname\language
184 \fi
185 <</Define core switching macros>>

```

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

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

```

186 <<*Define core switching macros>> ≡
187 <<*Define core switching macros>> ≡
188 \countdef\last@language=19 % TODO. why? remove?
189 \def\addlanguage{\csname newlanguage\endcsname}
190 <</Define core switching macros>>

```

Now we make sure all required files are loaded. When the command `\AtBeginDocument` doesn't exist we assume that we are dealing with a plain-based format or \LaTeX 2.09. In that case the file `plain.def` is needed (which also defines `\AtBeginDocument`, and therefore it is not loaded twice). We need the first part when the format is created, and `\orig@dump` is used as a flag. Otherwise, we need to use the second part, so `\orig@dump` is not defined (`plain.def` undefines it).

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

7.2 The Package File (\LaTeX , `babel.sty`)

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.

The first two options are for debugging.

```

191 <*package>
192 \NeedsTeXFormat{LaTeX2e}[2005/12/01]
193 \ProvidesPackage{babel}[\<date> \<version>] The Babel package]
194 \@ifpackagewith{babel}{debug}
195   {\providecommand\bb1@trace[1]{\message{^^J[ #1 ]}}%

```

```

196 \let\bbl@debug\@firstofone}
197 {\providecommand\bbl@trace[1]{}%
198 \let\bbl@debug\@gobble}
199 <<Basic macros>>
200 % Temporarily repeat here the code for errors
201 \def\bbl@error#1#2{%
202   \begingroup
203     \def\{\MessageBreak}%
204     \PackageError{babel}{#1}{#2}%
205   \endgroup}
206 \def\bbl@warning#1{%
207   \begingroup
208     \def\{\MessageBreak}%
209     \PackageWarning{babel}{#1}%
210   \endgroup}
211 \def\bbl@infowarn#1{%
212   \begingroup
213     \def\{\MessageBreak}%
214     \GenericWarning
215       {(babel) \@spaces\@spaces\@spaces}%
216       {Package babel Info: #1}%
217   \endgroup}
218 \def\bbl@info#1{%
219   \begingroup
220     \def\{\MessageBreak}%
221     \PackageInfo{babel}{#1}%
222   \endgroup}
223 \def\bbl@nocaption{\protect\bbl@nocaption@i}
224 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
225   \global\@namedef{#2}{\textbf{?#1?}}%
226   \@nameuse{#2}%
227   \bbl@warning{%
228     \@backslashchar#2 not set. Please, define it\\%
229     after the language has been loaded (typically\\%
230     in the preamble) with something like:\\%
231     \string\renewcommand\@backslashchar#2{..}\\%
232     Reported}}
233 \def\bbl@tentative{\protect\bbl@tentative@i}
234 \def\bbl@tentative@i#1{%
235   \bbl@warning{%
236     Some functions for '#1' are tentative.\\%
237     They might not work as expected and their behavior\\%
238     may change in the future.\\%
239     Reported}}
240 \def\@nolanerr#1{%
241   \bbl@error
242     {You haven't defined the language #1\space yet.\\%
243     Perhaps you misspelled it or your installation\\%
244     is not complete}%
245     {Your command will be ignored, type <return> to proceed}}
246 \def\@nopatterns#1{%
247   \bbl@warning
248     {No hyphenation patterns were preloaded for\\%
249     the language '#1' into the format.\\%
250     Please, configure your TeX system to add them and\\%
251     rebuild the format. Now I will use the patterns\\%
252     preloaded for \bbl@nulllanguage\space instead}}
253   % End of errors
254 \@ifpackagewith{babel}{silent}

```

```

255 {\let\bbl@info\@gobble
256 \let\bbl@infowarn\@gobble
257 \let\bbl@warning\@gobble}
258 {}
259 %
260 \def\AfterBabelLanguage#1{%
261 \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.

```

262 \ifx\bbl@languages\@undefined\else
263 \begingroup
264 \catcode`\^^I=12
265 \@ifpackagewith{babel}{showlanguages}{%
266 \begingroup
267 \def\bbl@elt#1#2#3#4{\wlog{#2^^I#1^^I#3^^I#4}}%
268 \wlog{<*languages>}%
269 \bbl@languages
270 \wlog{</languages>}%
271 \endgroup}{%
272 \endgroup
273 \def\bbl@elt#1#2#3#4{%
274 \ifnum#2=\z@
275 \gdef\bbl@nulllanguage{#1}%
276 \def\bbl@elt##1##2##3##4{}}%
277 \fi}%
278 \bbl@languages
279 \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`.

```

280 \bbl@trace{Defining option 'base'}
281 \@ifpackagewith{babel}{base}{%
282 \let\bbl@onlyswitch\@empty
283 \let\bbl@provide@locale\relax
284 \input babel.def
285 \let\bbl@onlyswitch\@undefined
286 \ifx\directlua\@undefined
287 \DeclareOption*{\bbl@patterns{\CurrentOption}}%
288 \else
289 \input luababel.def
290 \DeclareOption*{\bbl@patterns@lua{\CurrentOption}}%
291 \fi
292 \DeclareOption{base}{}%
293 \DeclareOption{showlanguages}{}%
294 \ProcessOptions
295 \global\expandafter\let\csname opt@babel.sty\endcsname\relax
296 \global\expandafter\let\csname ver@babel.sty\endcsname\relax
297 \global\let\@ifl@ter@@\@ifl@ter
298 \def\@ifl@ter#1#2#3#4#5{\global\let\@ifl@ter\@ifl@ter@@}%
299 \endinput}{%
300 % \end{macrocode}

```

```

301%
302% \subsection{\texttt{key=value} options and other general option}
303%
304%     The following macros extract language modifiers, and only real
305%     package options are kept in the option list. Modifiers are saved
306%     and assigned to |\BabelModifiers| at |\bbl@load@language|; when
307%     no modifiers have been given, the former is |\relax|. How
308%     modifiers are handled are left to language styles; they can use
309%     |\in@|, loop them with |\@for| or load |keyval|, for example.
310%
311%     \begin{macrocode}
312 \bbl@trace{key=value and another general options}
313 \bbl@csarg\let\tempa\expandafter\csname opt@babel.sty\endcsname
314 \def\bbl@tempb#1.#2{% Remove trailing dot
315     #1\ifx\@empty#2\else,\bbl@afterfi\bbl@tempb#2\fi}%
316 \def\bbl@tempd#1.#2\@nnil{% TODO. Refactor lists?
317     \ifx\@empty#2%
318         \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
319     \else
320         \in@{,provide,}{, #1,}%
321         \ifin@
322             \edef\bbl@tempc{%
323                 \ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.\bbl@tempb#2}%
324         \else
325             \in@{=}{#1}%
326             \ifin@
327                 \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.#2}%
328             \else
329                 \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
330                 \bbl@csarg\edef{mod#1}{\bbl@tempb#2}%
331             \fi
332         \fi
333     \fi}
334 \let\bbl@tempc\@empty
335 \bbl@foreach\bbl@tempa{\bbl@tempd#1.\@empty\@nnil}
336 \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.

```

337 \DeclareOption{KeepShorthandsActive}{}
338 \DeclareOption{activeacute}{}
339 \DeclareOption{activegrave}{}
340 \DeclareOption{debug}{}
341 \DeclareOption{noconfigs}{}
342 \DeclareOption{showlanguages}{}
343 \DeclareOption{silent}{}
344 \DeclareOption{mono}{}
345 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
346 \chardef\bbl@iniflag\z@
347 \DeclareOption{provide=*}{\chardef\bbl@iniflag\@ne}    % main -> +1
348 \DeclareOption{provide+=*}{\chardef\bbl@iniflag\tw@}    % add = 2
349 \DeclareOption{provide*=*}{\chardef\bbl@iniflag\thr@@} % add + main
350 % A separate option
351 \let\bbl@autoload@options\@empty
352 \DeclareOption{provide=@*}{\def\bbl@autoload@options{import}}
353 % Don't use. Experimental. TODO.
354 \newif\ifbbl@single

```

```

355 \DeclareOption{selectors=off}{\bbl@singletrue}
356 <<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.

```

357 \let\bbl@opt@shorthands\@nnil
358 \let\bbl@opt@config\@nnil
359 \let\bbl@opt@main\@nnil
360 \let\bbl@opt@headfoot\@nnil
361 \let\bbl@opt@layout\@nnil

```

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

```

362 \def\bbl@tempa#1=#2\bbl@tempa{%
363   \bbl@csarg\ifx{opt@#1}\@nnil
364     \bbl@csarg\edef{opt@#1}{#2}%
365   \else
366     \bbl@error
367     {Bad option `#1=#2'. Either you have misspelled the\\%
368      key or there is a previous setting of `#1'. Valid\\%
369      keys are, among others, `shorthands', `main', `bidi',\\%
370      `strings', `config', `headfoot', `safe', `math'.}%
371     {See the manual for further details.}
372   \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.

```

373 \let\bbl@language@opts\@empty
374 \DeclareOption*{%
375   \bbl@xin@{\string=}{\CurrentOption}%
376   \ifin@
377     \expandafter\bbl@tempa\CurrentOption\bbl@tempa
378   \else
379     \bbl@add@list\bbl@language@opts{\CurrentOption}%
380   \fi}

```

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

```

381 \ProcessOptions*

```

7.4 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=...`

```

382 \bbl@trace{Conditional loading of shorthands}
383 \def\bbl@sh@string#1{%
384   \ifx#1\@empty\else
385     \ifx#1t\string~%
386     \else\ifx#1c\string,%
387     \else\string#1%
388   \fi\fi

```



```

389 \expandafter\bb1@sh@string
390 \fi}
391 \ifx\bb1@opt@shorthands\@nnil
392 \def\bb1@ifshorthand#1#2#3{#2}%
393 \else\ifx\bb1@opt@shorthands\@empty
394 \def\bb1@ifshorthand#1#2#3{#3}%
395 \else

```

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

```

396 \def\bb1@ifshorthand#1{%
397 \bb1@xin@{\string#1}{\bb1@opt@shorthands}%
398 \ifin@
399 \expandafter\@firstoftwo
400 \else
401 \expandafter\@secondoftwo
402 \fi}

```

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

```

403 \edef\bb1@opt@shorthands{%
404 \expandafter\bb1@sh@string\bb1@opt@shorthands\@empty}%

```

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

```

405 \bb1@ifshorthand{'}%
406 {\PassOptionsToPackage{activeacute}{babel}}{}
407 \bb1@ifshorthand`}%
408 {\PassOptionsToPackage{activegrave}{babel}}{}
409 \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.

```

410 \ifx\bb1@opt@headfoot\@nnil\else
411 \g@addto@macro\@resetactivechars{%
412 \set@typeset@protect
413 \expandafter\select@language@x\expandafter{\bb1@opt@headfoot}%
414 \let\protect\noexpand}
415 \fi

```

For the option `safe` we use a different approach – `\bb1@opt@safe` says which macros are redefined (B for bibs and R for refs). By default, both are set.

```

416 \ifx\bb1@opt@safe\@undefined
417 \def\bb1@opt@safe{BR}
418 \fi
419 \ifx\bb1@opt@main\@nnil\else
420 \edef\bb1@language@opts{%
421 \ifx\bb1@language@opts\@empty\else\bb1@language@opts,\fi
422 \bb1@opt@main}
423 \fi

```

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

```

424 \bb1@trace{Defining IfBabelLayout}
425 \ifx\bb1@opt@layout\@nnil
426 \newcommand\IfBabelLayout[3]{#3}%
427 \else
428 \newcommand\IfBabelLayout[1]{%

```

```

429 \expandafter\in@{.#1.}{.\bbl@opt@layout.}%
430 \ifin@
431 \expandafter\@firstoftwo
432 \else
433 \expandafter\@secondoftwo
434 \fi}
435 \fi

```

Common definitions. *In progress.* Still based on `babel.def`, but the code should be moved here.

```
436 \input babel.def
```

7.5 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.

```

437 <<(*More package options)>> ≡
438 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
439 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
440 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
441 <</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.

```

442 \bbl@trace{Cross referencing macros}
443 \ifx\bbl@opt@safe\@empty\else
444 \def\@newl@bel#1#2#3{%
445   {\@safe@activetrue
446     \bbl@ifunset{#1@#2}%
447     \relax
448     {\gdef\@multiplelabels{%
449       \@latex@warning@no@line{There were multiply-defined labels}}%
450     \@latex@warning@no@line{Label `#2' multiply defined}}%
451   \global\@namedef{#1@#2}{#3}}

```

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

```

452 \CheckCommand*\@testdef[3]{%
453   \def\reserved@a{#3}%
454   \expandafter\ifx\csname#1@#2\endcsname\reserved@a
455   \else
456     \@tempwattrue
457   \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.

```

458 \def\@testdef#1#2#3{% TODO. With @samestring?
459   \@safe@activetrue
460   \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname
461   \def\bbl@tempb{#3}%
462   \@safe@activesfalse
463   \ifx\bbl@tempa\relax
464   \else
465     \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
466   \fi
467   \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
468   \ifx\bbl@tempa\bbl@tempb
469   \else
470     \@tempswatrue
471   \fi}
472 \fi

```

`\ref` The same holds for the macro `\ref` that references a label and `\pageref` to reference a page. We make them robust as well (if they weren't already) to prevent problems if they should become expanded at the wrong moment.

```

473 \bbl@xin@{R}\bbl@opt@safe
474 \ifin@
475   \bbl@redefineroast\ref#1{%
476     \@safe@activetrue\org@ref{#1}\@safe@activesfalse}
477   \bbl@redefineroast\pageref#1{%
478     \@safe@activetrue\org@pageref{#1}\@safe@activesfalse}
479 \else
480   \let\org@ref\ref
481   \let\org@pageref\pageref
482 \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.

```

483 \bbl@xin@{B}\bbl@opt@safe
484 \ifin@
485   \bbl@redefine\@citex[#1]#2{%
486     \@safe@activetrue\edef\@tempa{#2}\@safe@activesfalse
487     \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.

```

488 \AtBeginDocument{%
489   \@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.)

```

490   \def\@citex[#1][#2]#3{%
491     \@safe@activetrue\edef\@tempa{#3}\@safe@activesfalse
492     \org@@citex[#1][#2]{\@tempa}}%
493   }{}

```

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

```
494 \AtBeginDocument{%
495   \@ifpackageloaded{cite}{%
496     \def\@citex[#1]#2{%
497       \@safe@activetrue\org@citex[#1]{#2}\@safe@activesfalse}%
498     }{}}
```

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

```
499 \bbl@redefine\nocite#1{%
500   \@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.

```
501 \bbl@redefine\bibcite{%
502   \bbl@cite@choice
503   \bibcite}
```

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

```
504 \def\bbl@bibcite#1#2{%
505   \org@bibcite{#1}{\@safe@activesfalse#2}}
```

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

```
506 \def\bbl@cite@choice{%
507   \global\let\bibcite\bbl@bibcite
508   \@ifpackageloaded{natbib}{\global\let\bibcite\org@bibcite}{%
509     \@ifpackageloaded{cite}{\global\let\bibcite\org@bibcite}{%
510       \global\let\bbl@cite@choice\relax}}
```

When a document is run for the first time, no .aux file is available, and \bibcite will not yet be properly defined. In this case, this has to happen before the document starts.

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

\@bibitem One of the two internal L^AT_EX macros called by \bibitem that write the citation label on the .aux file.

```
512 \bbl@redefine\@bibitem#1{%
513   \@safe@activetrue\org@bibitem{#1}\@safe@activesfalse}
514 \else
515   \let\org@nocite\nocite
516   \let\org@citex\citex
517   \let\org@bibcite\bibcite
518   \let\org@bibitem\@bibitem
519 \fi
```

7.6 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.

```

520 \bbl@trace{Marks}
521 \IfBabelLayout{sectioning}
522   {\ifx\bbl@opt@headfoot\@nnil
523     \g@addto@macro\@resetactivechars{%
524       \set@typeset@protect
525       \expandafter\select@language@x\expandafter{\bbl@main@language}%
526       \let\protect\noexpand
527       \ifcase\bbl@bidimode\else % Only with bidi. See also above
528         \edef\thepage{%
529           \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}%
530       \fi}%
531   \fi}
532 {\ifbbl@single\else
533   \bbl@ifunset{markright } \bbl@redefine\bbl@redefineroobust
534   \markright#1{%
535     \bbl@ifblank{#1}%
536     {\org@markright{}}%
537     {\toks@{#1}%
538       \bbl@exp{%
539         \org@markright{\protect\foreignlanguage{\language}%
540           \protect\bbl@restore@actives\the\toks@}}}%

```

`\markboth` The definition of `\markboth` is equivalent to that of `\markright`, except that we need two token registers. The documentclasses report and book define and set the headings for the page. While doing so they also store a copy of `\markboth` in `\@mkboth`. Therefore we need to check whether `\@mkboth` has already been set. If so we need to do that again with the new definition of `\markboth`. (As of Oct 2019, L^AT_EX stores the definition in an intermediate macro, so it's not necessary anymore, but it's preserved for older versions.)

`\@mkboth`

```

541   \ifx\@mkboth\markboth
542     \def\bbl@tempc{\let\@mkboth\markboth}
543   \else
544     \def\bbl@tempc{}
545   \fi
546   \bbl@ifunset{markboth } \bbl@redefine\bbl@redefineroobust
547   \markboth#1#2{%
548     \protected@edef\bbl@tempb##1{%
549       \protect\foreignlanguage
550       {\language}{\protect\bbl@restore@actives##1}}%
551     \bbl@ifblank{#1}%
552     {\toks@{}}%
553     {\toks@\expandafter{\bbl@tempb{#1}}}%
554     \bbl@ifblank{#2}%
555     {\@temptokena{}}%
556     {\@temptokena\expandafter{\bbl@tempb{#2}}}%
557     \bbl@exp{\org@markboth{\the\toks@}{\the\@temptokena}}
558     \bbl@tempc
559   \fi} % end ifbbl@single, end \IfBabelLayout

```

7.7 Preventing clashes with other packages

7.7.1 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.

```
560 \bbl@trace{Preventing clashes with other packages}
561 \bbl@xin@{R}\bbl@opt@safe
562 \ifin@
563 \AtBeginDocument{%
564   \@ifpackageloaded{ifthen}{%
565     \bbl@redefine@long\ifthenelse#1#2#3{%
566       \let\bbl@temp@pref\pageref
567       \let\pageref\org@pageref
568       \let\bbl@temp@ref\ref
569       \let\ref\org@ref
570       \@safe@activestrue
571       \org@ifthenelse{#1}%
572         {\let\pageref\bbl@temp@pref
573          \let\ref\bbl@temp@ref
574          \@safe@activesfalse
575          #2}%
576         {\let\pageref\bbl@temp@pref
577          \let\ref\bbl@temp@ref
578          \@safe@activesfalse
579          #3}%
580     }%
581   }{}%
582 }
```

7.7.2 varioref

`\@@vpageref` When the package `varioref` is in use we need to modify its internal command `\@@vpageref`
`\vrefpagemum` in order to prevent problems when an active character ends up in the argument of `\vref`.
`\Ref` The same needs to happen for `\vrefpagemum`.

```
583 \AtBeginDocument{%
584   \@ifpackageloaded{varioref}{%
585     \bbl@redefine\@@vpageref#1[#2]#3{%
586       \@safe@activestrue
587       \org@@@vpageref{#1}[#2]{#3}%
588       \@safe@activesfalse}%
589     \bbl@redefine\vrefpagemum#1#2{%
590       \@safe@activestrue
591       \org\vrefpagemum{#1}{#2}%
592     }%
593   }%
594 }
```

```
592 \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.

```
593 \expandafter\def\csname Ref \endcsname#1{%
594   \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
595   }{}%
596 }
597 \fi
```

7.7.3 `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.

```
598 \AtEndOfPackage{%
599   \AtBeginDocument{%
600     \ifpackageloaded{hhline}%
601       {\expandafter\ifx\csname normal@char\string\endcsname\relax
602         \else
603           \makeatletter
604           \def\@currname{hhline}\input{hhline.sty}\makeatother
605           \fi}%
606     {}}}
```

7.7.4 `hyperref`

`\pdfstringdefDisableCommands` A number of interworking problems between `babel` and `hyperref` are tackled by `hyperref` itself. The following code was introduced to prevent some annoying warnings but it broke bookmarks. This was quickly fixed in `hyperref`, which essentially made it no-op. However, it will not be removed for the moment because `hyperref` is expecting it. TODO. Still true? Commented out in 2020/07/27.

```
607 % \AtBeginDocument{%
608 %   \ifx\pdfstringdefDisableCommands\@undefined\else
609 %     \pdfstringdefDisableCommands{\languageshorthands{system}}%
610 %   \fi}
```

7.7.5 `fancyhdr`

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

```
611 \DeclareRobustCommand{\FOREIGNLANGUAGE}[1]{%
612   \lowercase{\foreignlanguage{#1}}}
```

`\substitutefontfamily` The command `\substitutefontfamily` creates an `.fd` file on the fly. The first argument is an encoding mnemonic, the second and third arguments are font family names. This command is deprecated. Use the tools provided by \TeX .

```
613 \def\substitutefontfamily#1#2#3{%
```

```

614 \lowercase{\immediate\openout15=#1#2.fd\relax}%
615 \immediate\write15{%
616   \string\ProvidesFile{#1#2.fd}%
617   [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
618   \space generated font description file]^J
619   \string\DeclareFontFamily{#1}{#2}{^^J
620   \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{^^J
621   \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{^^J
622   \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{^^J
623   \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{^^J
624   \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{^^J
625   \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{^^J
626   \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{^^J
627   \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{^^J
628   }%
629   \closeout15
630 }
631 \@onlypreamble\substitutefontfamily

```

7.8 Encoding and fonts

Because documents may use non-ASCII font encodings, we make sure that the logos of \TeX and \LaTeX always come out in the right encoding. There is a list of non-ASCII encodings. Unfortunately, fontenc deletes its package options, so we must guess which encodings has been loaded by traversing `\@filelist` to search for `<enc>enc.def`. If a non-ASCII has been loaded, we define versions of `\TeX` and `\LaTeX` for them using `\ensureascii`. The default ASCII encoding is set, too (in reverse order): the “main” encoding (when the document begins), the last loaded, or OT1.

`\ensureascii`

```

632 \bbl@trace{Encoding and fonts}
633 \newcommand\BabelNonASCII{LGR,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU,PU,PD1}
634 \newcommand\BabelNonText{TS1,T3,TS3}
635 \let\org@TeX\TeX
636 \let\org@LaTeX\LaTeX
637 \let\ensureascii\@firstofone
638 \AtBeginDocument{%
639   \in@false
640   \bbl@foreach\BabelNonASCII{% is there a text non-ascii enc?
641     \ifin@
642       \lowercase{\bbl@xin@{,#1enc.def,}{,\@filelist,}}%
643     \fi}%
644   \ifin@ % if a text non-ascii has been loaded
645     \def\ensureascii#1{{\fontencoding{OT1}\selectfont#1}}%
646     \DeclareTextCommandDefault{\TeX}{\org@TeX}%
647     \DeclareTextCommandDefault{\LaTeX}{\org@LaTeX}%
648     \def\bbl@temp#1\@@{\uppercase{\bbl@tempc#1}ENC.DEF\@empty\@@}%
649     \def\bbl@tempc#1ENC.DEF#2\@@{%
650       \ifx\@empty#2\else
651         \bbl@ifunset{T#1}%
652         {}%
653         {\bbl@xin@{,#1,}{,\BabelNonASCII,\BabelNonText,}}%
654       \ifin@
655         \DeclareTextCommand{\TeX}{#1}{\ensureascii{\org@TeX}}%
656         \DeclareTextCommand{\LaTeX}{#1}{\ensureascii{\org@LaTeX}}%
657       \else
658         \def\ensureascii#1{{\fontencoding{#1}\selectfont#1}}%
659       \fi}%

```



```

660     \fi}%
661     \bbl@foreach\@filelist{\bbl@tempb#1\@@}% TODO - \@@ de mas??
662     \bbl@xin@{\cf@encoding,}{,\BabelNonASCII,\BabelNonText,}%
663     \ifin@else
664         \edef\ensureascii#1{%
665             \noexpand\fontencoding{\cf@encoding}\noexpand\selectfont#1}}%
666     \fi
667 \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.

```

668 \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.

```

669 \AtBeginDocument{%
670     \ifpackageloaded{fontspec}%
671     {\xdef\latinencoding{%
672         \ifx\UTFencname\@undefined
673             EU\ifcase\bbl@engine\or2\or1\fi
674         \else
675             \UTFencname
676         \fi}}%
677     {\gdef\latinencoding{OT1}%
678         \ifx\cf@encoding\bbl@t@one
679             \xdef\latinencoding{\bbl@t@one}%
680         \else
681             \ifx\@fontenc@load@list\@undefined
682                 \@ifl@aded{def}{t1enc}{\xdef\latinencoding{\bbl@t@one}}}%
683             \else
684                 \def\@elt#1{,#1,}%
685                 \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
686                 \let\@elt\relax
687                 \bbl@xin@{,T1,}\bbl@tempa
688                 \ifin@
689                     \xdef\latinencoding{\bbl@t@one}%
690                 \fi
691             \fi
692         \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.

```

693 \DeclareRobustCommand{\latintext}{%
694     \fontencoding{\latinencoding}\selectfont
695     \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.

```

696 \ifx\@undefined\DeclareTextFontCommand
697     \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}

```

```

698 \else
699   \DeclareTextFontCommand{\textlatin}{\latintext}
700 \fi

```

7.9 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.

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.

```

701 \ifodd\bbl@engine
702   \def\bbl@activate@preotf{%
703     \let\bbl@activate@preotf\relax % only once
704     \directlua{
705       Babel = Babel or {}
706       %
707       function Babel.pre_otfload_v(head)
708         if Babel.numbers and Babel.digits_mapped then
709           head = Babel.numbers(head)
710         end
711         if Babel.bidi_enabled then
712           head = Babel.bidi(head, false, dir)
713         end
714         return head
715       end
716       %
717       function Babel.pre_otfload_h(head, gc, sz, pt, dir)
718         if Babel.numbers and Babel.digits_mapped then
719           head = Babel.numbers(head)
720         end
721         if Babel.bidi_enabled then
722           head = Babel.bidi(head, false, dir)
723         end
724         return head

```

```

725     end
726     %
727     luatexbase.add_to_callback('pre_linebreak_filter',
728         Babel.pre_otfload_v,
729         'Babel.pre_otfload_v',
730         luatexbase.priority_in_callback('pre_linebreak_filter',
731             'luaotfload.node_processor') or nil)
732     %
733     luatexbase.add_to_callback('hpack_filter',
734         Babel.pre_otfload_h,
735         'Babel.pre_otfload_h',
736         luatexbase.priority_in_callback('hpack_filter',
737             'luaotfload.node_processor') or nil)
738     }}
739 \fi

```

The basic setup. In luatex, the output is modified at a very low level to set the `\bodydir` to the `\pagedir`.

```

740 \bbl@trace{Loading basic (internal) bidi support}
741 \ifodd\bbl@engine
742   \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
743     \let\bbl@beforeforeign\leavevmode
744     \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
745     \RequirePackage{luatexbase}
746     \bbl@activate@preotf
747     \directlua{
748       require('babel-data-bidi.lua')
749       \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
750         require('babel-bidi-basic.lua')
751       \or
752         require('babel-bidi-basic-r.lua')
753     \fi}
754     % TODO - to locale_props, not as separate attribute
755     \newattribute\bbl@attr@dir
756     % TODO. I don't like it, hackish:
757     \bbl@exp{\output{\bodydir\pagedir\the\output}}
758     \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
759   \fi\fi
760 \else
761   \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
762     \bbl@error
763     {The bidi method `basic' is available only in\\%
764       luatex. I'll continue with `bidi=default', so\\%
765       expect wrong results}%
766     {See the manual for further details.}%
767     \let\bbl@beforeforeign\leavevmode
768     \AtEndOfPackage{%
769       \EnableBabelHook{babel-bidi}%
770       \bbl@xebidipar}
771   \fi\fi
772   \def\bbl@loadxebidi#1{%
773     \ifx\RTLfootnotetext\@undefined
774       \AtEndOfPackage{%
775         \EnableBabelHook{babel-bidi}%
776         \ifx\fontspec\@undefined
777           \bbl@loadfontspec % bidi needs fontspec
778         \fi
779         \usepackage#1{bidi}}%
780   \fi}

```

```

781 \ifnum\bbl@bidimode>200
782   \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
783     \bbl@tentative{bidi=bidi}
784     \bbl@loadxebidi{}
785   \or
786     \bbl@loadxebidi{[rldocument]}
787   \or
788     \bbl@loadxebidi{}
789   \fi
790 \fi
791 \fi
792 \ifnum\bbl@bidimode=\@ne
793   \let\bbl@beforeforeign\leavevmode
794   \ifodd\bbl@engine
795     \newattribute\bbl@attr@dir
796     \bbl@exp{\output{\bodydir\pagedir\the\output}}%
797   \fi
798   \AtEndOfPackage{%
799     \EnableBabelHook{babel-bidi}%
800   \ifodd\bbl@engine\else
801     \bbl@xebidipar
802   \fi}
803 \fi

```

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

```

804 \bbl@trace{Macros to switch the text direction}
805 \def\bbl@alscripts{,Arabic,Syriac,Thaana,}
806 \def\bbl@rscripts{% TODO. Base on codes ??
807   ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
808   Old Hungarian,Old Hungarian,Lydian,Mandaean,Manichaeen,%
809   Manichaeen,Meroitic Cursive,Meroitic,Old North Arabian,%
810   Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
811   Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%
812   Old South Arabian,%
813 \def\bbl@provide@dirs#1{%
814   \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts\bbl@rscripts}%
815   \ifin@
816     \global\bbl@csarg\chardef{wdir@#1}\@ne
817     \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts}%
818   \ifin@
819     \global\bbl@csarg\chardef{wdir@#1}\tw@ % useless in xetex
820   \fi
821   \else
822     \global\bbl@csarg\chardef{wdir@#1}\z@
823   \fi
824   \ifodd\bbl@engine
825     \bbl@csarg\ifcase{wdir@#1}%
826       \directlua{ Babel.locale_props[\the\localeid].textdir = 'l' }%
827     \or
828       \directlua{ Babel.locale_props[\the\localeid].textdir = 'r' }%
829     \or
830       \directlua{ Babel.locale_props[\the\localeid].textdir = 'al' }%
831     \fi
832   \fi}
833 \def\bbl@switchdir{%
834   \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
835   \bbl@ifunset{bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{}%
836   \bbl@exp{\bbl@setdirs\bbl@cl{wdir}}%

```

```

837 \def\bbl@setdirs#1{% TODO - math
838 \ifcase\bbl@select@type % TODO - strictly, not the right test
839 \bbl@bodydir{#1}%
840 \bbl@pardir{#1}%
841 \fi
842 \bbl@texkdir{#1}}
843 % TODO. Only if \bbl@bidimode > 0?:
844 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
845 \DisableBabelHook{babel-bidi}

```

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

```

846 \ifodd\bbl@engine % luatex=1
847 \chardef\bbl@thetexkdir\z@
848 \chardef\bbl@thepardir\z@
849 \def\bbl@getluadir#1{%
850 \directlua{
851   if tex.#1dir == 'TLT' then
852     tex.sprint('0')
853   elseif tex.#1dir == 'TRT' then
854     tex.sprint('1')
855   end}}
856 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\texkdir.. 3=0 lr/1 rl
857 \ifcase#3\relax
858 \ifcase\bbl@getluadir{#1}\relax\else
859 #2 TLT\relax
860 \fi
861 \else
862 \ifcase\bbl@getluadir{#1}\relax
863 #2 TRT\relax
864 \fi
865 \fi}
866 \def\bbl@texkdir#1{%
867 \bbl@setluadir{tex}\texkdir{#1}%
868 \chardef\bbl@thetexkdir#1\relax
869 \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*3+#1}}
870 \def\bbl@pardir#1{%
871 \bbl@setluadir{par}\pardir{#1}%
872 \chardef\bbl@thepardir#1\relax}
873 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}
874 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}
875 \def\bbl@dirparastext{\pardir\the\texkdir\relax}% %%%
876 % Sadly, we have to deal with boxes in math with basic.
877 % Activated every math with the package option bidi=:
878 \def\bbl@mathboxdir{%
879 \ifcase\bbl@thetexkdir\relax
880 \everyhbox{\texkdir TLT\relax}%
881 \else
882 \everyhbox{\texkdir TRT\relax}%
883 \fi}
884 \frozen@everymath\expandafter{%
885 \expandafter\bbl@mathboxdir\the\frozen@everymath}
886 \frozen@everydisplay\expandafter{%
887 \expandafter\bbl@mathboxdir\the\frozen@everydisplay}
888 \else % pdftex=0, xetex=2
889 \newcount\bbl@dirlevel
890 \chardef\bbl@thetexkdir\z@
891 \chardef\bbl@thepardir\z@
892 \def\bbl@texkdir#1{%
893 \ifcase#1\relax

```

```

894     \chardef\bbl@thetextdir\z@
895     \bbl@textdir@i\beginL\endL
896     \else
897     \chardef\bbl@thetextdir\@ne
898     \bbl@textdir@i\beginR\endR
899     \fi}
900 \def\bbl@textdir@i#1#2{%
901     \ifhmode
902     \ifnum\currentgrouplevel>\z@
903     \ifnum\currentgrouplevel=\bbl@dirlevel
904     \bbl@error{Multiple bidi settings inside a group}%
905     {I'll insert a new group, but expect wrong results.}%
906     \bgroup\aftergroup#2\aftergroup\egroup
907     \else
908     \ifcase\currentgrouptype\or % 0 bottom
909     \aftergroup#2% 1 simple {}
910     \or
911     \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
912     \or
913     \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
914     \or\or\or % vbox vtop align
915     \or
916     \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
917     \or\or\or\or\or\or % output math disc insert vcent mathchoice
918     \or
919     \aftergroup#2% 14 \begingroup
920     \else
921     \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
922     \fi
923     \fi
924     \bbl@dirlevel\currentgrouplevel
925     \fi
926     #1%
927     \fi}
928 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
929 \let\bbl@bodydir\@gobble
930 \let\bbl@pagedir\@gobble
931 \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).

```

932 \def\bbl@xebidipar{%
933     \let\bbl@xebidipar\relax
934     \TeXeTstate\@ne
935     \def\bbl@xeverypar{%
936         \ifcase\bbl@thepardir
937         \ifcase\bbl@thetextdir\else\beginR\fi
938         \else
939         {\setbox\z@\lastbox\beginR\box\z@}%
940         \fi}%
941     \let\bbl@severypar\everypar
942     \newtoks\everypar
943     \everypar=\bbl@severypar
944     \bbl@severypar{\bbl@xeverypar\the\everypar}}
945 \ifnum\bbl@bidimode>200
946     \let\bbl@textdir@i\@gobbletwo
947     \let\bbl@xebidipar\@empty
948     \AddBabelHook{bidi}{foreign}{%

```

```

949 \def\bbl@tempa{\def\BabelText####1}%
950 \ifcase\bbl@thetextdir
951 \expandafter\bbl@tempa\expandafter{\BabelText{\LR{##1}}}%
952 \else
953 \expandafter\bbl@tempa\expandafter{\BabelText{\RL{##1}}}%
954 \fi}
955 \def\bbl@pardir#1{\ifcase#1\relax\setLR\else\setRL\fi}
956 \fi
957 \fi

```

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

```

958 \DeclareRobustCommand\babelsublr[1]{\leavevmode{\bbl@textdir\z@#1}}
959 \AtBeginDocument{%
960 \ifx\pdfstringdefDisableCommands\@undefined\else
961 \ifx\pdfstringdefDisableCommands\relax\else
962 \pdfstringdefDisableCommands{\let\babelsublr\@firstofone}%
963 \fi
964 \fi}

```

7.10 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`.

```

965 \bbl@trace{Local Language Configuration}
966 \ifx\loadlocalcfg\@undefined
967 \@ifpackagewith{babel}{noconfigs}%
968 {\let\loadlocalcfg\@gobble}%
969 {\def\loadlocalcfg#1{%
970 \InputIfFileExists{#1.cfg}%
971 {\typeout{*****^J%
972 * Local config file #1.cfg used^^J%
973 *}}}%
974 \@empty}}
975 \fi

```

Just to be compatible with L^AT_EX 2.09 we add a few more lines of code. TODO. Necessary? Correct place? Used by some ldf file?

```

976 \ifx\@unexpandable@protect\@undefined
977 \def\@unexpandable@protect{\noexpand\protect\noexpand}
978 \long\def\protected@write#1#2#3{%
979 \begingroup
980 \let\thepage\relax
981 #2%
982 \let\protect\@unexpandable@protect
983 \edef\reserved@a{\write#1{#3}}%
984 \reserved@a
985 \endgroup
986 \if@nobreak\ifvmode\nobreak\fi\fi}
987 \fi
988 %
989 % \subsection{Language options}
990 %
991 % Languages are loaded when processing the corresponding option

```

```

992% \textit{except} if a |main| language has been set. In such a
993% case, it is not loaded until all options has been processed.
994% The following macro inputs the ldf file and does some additional
995% checks (|\input| works, too, but possible errors are not caught).
996%
997% \begin{macrocode}
998 \bbl@trace{Language options}
999 \let\bbl@afterlang\relax
1000 \let\BabelModifiers\relax
1001 \let\bbl@loaded@empty
1002 \def\bbl@load@language#1{%
1003 \InputIfFileExists{#1.ldf}%
1004 {\edef\bbl@loaded{\CurrentOption
1005 \ifx\bbl@loaded\empty\else,\bbl@loaded\fi}%
1006 \expandafter\let\expandafter\bbl@afterlang
1007 \csname\CurrentOption.ldf-h@k\endcsname
1008 \expandafter\let\expandafter\BabelModifiers
1009 \csname bbl@mod@\CurrentOption\endcsname}%
1010 {\bbl@error{%
1011 Unknown option '\CurrentOption'. Either you misspelled it\\%
1012 or the language definition file \CurrentOption.ldf was not found}}%
1013 Valid options are, among others: shorthands=, KeepShorthandsActive,\\%
1014 activeacute, activegrave, noconfigs, safe=, main=, math=\\%
1015 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.

```

1016 \def\bbl@try@load@lang#1#2#3{%
1017 \IfFileExists{\CurrentOption.ldf}%
1018 {\bbl@load@language{\CurrentOption}}%
1019 {#1\bbl@load@language{#2#3}}
1020 % \DeclareOption{afrikaans}{\bbl@try@load@lang{}{dutch}{}}
1021 \DeclareOption{hebrew}{%
1022 \input{rlbabel.def}%
1023 \bbl@load@language{hebrew}}
1024 \DeclareOption{hungarian}{\bbl@try@load@lang{}{magyar}{}}
1025 \DeclareOption{lowersorbian}{\bbl@try@load@lang{}{lsorbian}{}}
1026 \DeclareOption{nynorsk}{\bbl@try@load@lang{}{norsk}{}}
1027 \DeclareOption{polutonikogreek}{%
1028 \bbl@try@load@lang{}{greek}{\languageattribute{greek}{polutoniko}}}
1029 \DeclareOption{russian}{\bbl@try@load@lang{}{russianb}{}}
1030 \DeclareOption{ukrainian}{\bbl@try@load@lang{}{ukraineb}{}}
1031 \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.

```

1032 \ifx\bbl@opt@config\@nnil
1033 \@ifpackagewith{babel}{noconfigs}{}%
1034 {\InputIfFileExists{bblopts.cfg}%
1035 {\typeout{*****^^J%
1036 * Local config file bblopts.cfg used^^J%
1037 *}}%
1038 {}}%
1039 \else

```



```

1040 \InputIfFileExists{\bbl@opt@config.cfg}%
1041 {\typeout{*****^J%
1042          * Local config file \bbl@opt@config.cfg used^^J%
1043          *}}%
1044 {\bbl@error{%
1045   Local config file '\bbl@opt@config.cfg' not found}{%
1046   Perhaps you misspelled it.}}%
1047 \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.

```

1048 \let\bbl@tempc\relax
1049 \bbl@foreach\bbl@language@opts{%
1050   \ifcase\bbl@iniflag
1051     \bbl@ifunset{ds@#1}%
1052     {\DeclareOption{#1}{\bbl@load@language{#1}}}%
1053     {}%
1054   \or
1055     \@gobble % case 2 same as 1
1056   \or
1057     \bbl@ifunset{ds@#1}%
1058     {\IfFileExists{#1.ldf}{}%
1059      {\IfFileExists{babel-#1.tex}{\DeclareOption{#1}}}%
1060      {}%
1061     \bbl@ifunset{ds@#1}%
1062     {\def\bbl@tempc{#1}%
1063      \DeclareOption{#1}{%
1064        \ifnum\bbl@iniflag>\@ne
1065          \bbl@ldfinit
1066          \babelprovide[import]{#1}%
1067          \bbl@afterldf}%
1068        \else
1069          \bbl@load@language{#1}%
1070        \fi}}%
1071     {}%
1072   \or
1073     \def\bbl@tempc{#1}%
1074     \bbl@ifunset{ds@#1}%
1075     {\DeclareOption{#1}{%
1076       \bbl@ldfinit
1077       \babelprovide[import]{#1}%
1078       \bbl@afterldf}}%
1079     {}%
1080   \fi}

```

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

```

1081 \let\bbl@tempb\@nnil
1082 \bbl@foreach\@classoptionslist{%
1083   \bbl@ifunset{ds@#1}%
1084   {\IfFileExists{#1.ldf}{}%
1085    {\IfFileExists{babel-#1.tex}{\DeclareOption{#1}}}%
1086    {}%
1087   \bbl@ifunset{ds@#1}%

```

```

1088 {\def\bbl@tempb{#1}%
1089 \DeclareOption{#1}{%
1090 \ifnum\bbl@iniflag>\@ne
1091 \bbl@ldfinit
1092 \babelprovide[import]{#1}%
1093 \bbl@afterldf{}}%
1094 \else
1095 \bbl@load@language{#1}%
1096 \fi}}%
1097 {}

```

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

```

1098 \ifnum\bbl@iniflag=\z@\else
1099 \ifx\bbl@opt@main\@nnil
1100 \ifx\bbl@tempc\relax
1101 \let\bbl@opt@main\bbl@tempb
1102 \else
1103 \let\bbl@opt@main\bbl@tempc
1104 \fi
1105 \fi
1106 \fi
1107 \ifx\bbl@opt@main\@nnil\else
1108 \expandafter
1109 \let\expandafter\bbl@loadmain\csname ds@\bbl@opt@main\endcsname
1110 \expandafter\let\csname ds@\bbl@opt@main\endcsname\@empty
1111 \fi

```

And we are done, because all options for this pass has been declared. Those already processed in the first pass are just ignored.

The options have to be processed in the order in which the user specified them (except, of course, global options, which \LaTeX processes before):

```

1112 \def\AfterBabelLanguage#1{%
1113 \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang}{}}
1114 \DeclareOption*{}
1115 \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`.

```

1116 \bbl@trace{Option 'main'}
1117 \ifx\bbl@opt@main\@nnil
1118 \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
1119 \let\bbl@tempc\@empty
1120 \bbl@for\bbl@tempb\bbl@tempa{%
1121 \bbl@xin@{\bbl@tempb,}{,\bbl@loaded,}%
1122 \ifin@{\edef\bbl@tempc{\bbl@tempb}\fi}
1123 \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
1124 \expandafter\bbl@tempa\bbl@loaded,\@nnil
1125 \ifx\bbl@tempb\bbl@tempc\else
1126 \bbl@warning{%
1127 Last declared language option is ``\bbl@tempc',\%
1128 but the last processed one was ``\bbl@tempb'.\%
1129 The main language cannot be set as both a global\%
1130 and a package option. Use `main=\bbl@tempc' as\%
1131 option. Reported}%
1132 \fi

```

```

1133 \else
1134   \ifodd\bbl@iniflag % case 1,3
1135     \bbl@ldfinit
1136     \let\CurrentOption\bbl@opt@main
1137     \bbl@exp{\bbl@provide[import,main]{\bbl@opt@main}}
1138     \bbl@afterldf{}%
1139   \else % case 0,2
1140     \chardef\bbl@iniflag\z@ % Force ldf
1141     \expandafter\let\csname ds@\bbl@opt@main\endcsname\bbl@loadmain
1142     \ExecuteOptions{\bbl@opt@main}
1143     \DeclareOption*{}%
1144     \ProcessOptions*
1145   \fi
1146 \fi
1147 \def\AfterBabelLanguage{%
1148   \bbl@error
1149   {Too late for \string\AfterBabelLanguage}%
1150   {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.

1151 \ifx\bbl@main@language@undefined
1152   \bbl@info{%
1153     You haven't specified a language. I'll use 'nil'%%
1154     as the main language. Reported}
1155   \bbl@load@language{nil}
1156 \fi
1157 \endpackage
1158 \core

```

8 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.

8.1 Tools

```

1159 \ifx\ldf@quit\undefined\else
1160 \endinput\fi % Same line!
1161 <<Make sure ProvidesFile is defined>>
1162 \ProvidesFile{babel.def}[\<date>] <<version>> Babel common definitions]

```

The file babel.def expects some definitions made in the L^AT_EX 2_ε style file. So, In L^AT_EX 2.09 and Plain we must provide at least some predefined values as well some tools to set them (even if not all options are available). There 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).

```

1163 \ifx\AtBeginDocument\@undefined % TODO. change test.
1164 <<Emulate LaTeX>>
1165 \def\language{english}%
1166 \let\bbl@opt@shorthands\@nnil
1167 \def\bbl@ifshorthand#1#2#3{#2}%
1168 \let\bbl@language@opts\@empty
1169 \ifx\babeloptionstrings\@undefined
1170   \let\bbl@opt@strings\@nnil
1171 \else
1172   \let\bbl@opt@strings\babeloptionstrings
1173 \fi
1174 \def\BabelStringsDefault{generic}
1175 \def\bbl@tempa{normal}
1176 \ifx\babeloptionmath\bbl@tempa
1177   \def\bbl@mathnormal{\noexpand\textormath}
1178 \fi
1179 \def\AfterBabelLanguage#1#2{}
1180 \ifx\BabelModifiers\@undefined\let\BabelModifiers\relax\fi
1181 \let\bbl@afterlang\relax
1182 \def\bbl@opt@safe{BR}
1183 \ifx\@uclclist\@undefined\let\@uclclist\@empty\fi
1184 \ifx\bbl@trace\@undefined\def\bbl@trace#1{}\fi
1185 \expandafter\newif\csname ifbbl@single\endcsname
1186 \chardef\bbl@bidimode\z@
1187 \fi

```

Exit immediately with 2.09. An error is raised by the sty file, but also try to minimize the number of errors.

```

1188 \ifx\bbl@trace\@undefined
1189   \let\LdfInit\endinput
1190   \def\ProvidesLanguage#1{\endinput}
1191 \endinput\fi % Same line!

```

And continue.

9 Multiple languages

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

Plain T_EX 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.

```

1192 <<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.

```

1193 \def\bbl@version{<<version>>}
1194 \def\bbl@date{<<date>>}
1195 \def\adddialect#1#2{%
1196   \global\chardef#1#2\relax
1197   \bbl@usehooks{adddialect}{#1}{#2}}%
1198   \begingroup
1199     \count@#1\relax
1200     \def\bbl@elt###1##2###3###4{%
1201       \ifnum\count@=##2\relax
1202         \bbl@info{\string#1 = using hyphenrules for ##1\\%
1203           (\string\language\the\count@)}%
1204         \def\bbl@elt####1####2####3####4{}%
1205       \fi}%
1206   \bbl@cs{languages}%

```

```
1207 \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 intended 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.

```
1208 \def\bbl@fixname#1{%
1209   \begingroup
1210   \def\bbl@tempe{#1}%
1211   \edef\bbl@tempd{\noexpand\@ifundefined{\noexpand\bbl@tempe#1}}%
1212   \bbl@tempd
1213   {\lowercase\expandafter{\bbl@tempd}%
1214    {\uppercase\expandafter{\bbl@tempd}%
1215     \@empty
1216     {\edef\bbl@tempd{\def\noexpand#1{#1}}%
1217      \uppercase\expandafter{\bbl@tempd}}}%
1218    {\edef\bbl@tempd{\def\noexpand#1{#1}}%
1219     \lowercase\expandafter{\bbl@tempd}}}%
1220   \@empty
1221   \edef\bbl@tempd{\endgroup\def\noexpand#1{#1}}%
1222   \bbl@tempd
1223   \bbl@exp{\bbl@usehooks{language}{\language}{#1}}}%
1224 \def\bbl@iflanguage#1{%
1225   \@ifundefined{#1}{\@nolanner{#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`.

```
1226 \def\bbl@bcpcase#1#2#3#4\@#5{%
1227   \ifx\@empty#3%
1228     \uppercase{\def#5{#1#2}}%
1229   \else
1230     \uppercase{\def#5{#1}}%
1231     \lowercase{\edef#5{#5#2#3#4}}%
1232   \fi}
1233 \def\bbl@bcpllookup#1-#2-#3-#4\@#5{%
1234   \let\bbl@bcp\relax
1235   \lowercase{\def\bbl@tempa{#1}}%
1236   \ifx\@empty#2%
1237     \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
1238   \else\ifx\@empty#3%
1239     \bbl@bcpcase#2\@empty\@empty\@#5\bbl@tempb
1240     \IfFileExists{babel-\bbl@tempa-\bbl@tempb.ini}%
1241     {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb}}%
1242   {\}%
1243   \ifx\bbl@bcp\relax
1244     \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
1245   \fi
1246   \else
1247     \bbl@bcpcase#2\@empty\@empty\@#5\bbl@tempb
1248     \bbl@bcpcase#3\@empty\@empty\@#5\bbl@tempc
```

```

1249 \IfFileExists{babel-\bbl@tempa-\bbl@tempb-\bbl@tempc.ini}%
1250 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb-\bbl@tempc}}}%
1251 {}%
1252 \ifx\bbl@bcp\relax
1253 \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
1254 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}}%
1255 {}%
1256 \fi
1257 \ifx\bbl@bcp\relax
1258 \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
1259 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}}%
1260 {}%
1261 \fi
1262 \ifx\bbl@bcp\relax
1263 \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}}}%
1264 \fi
1265 \fi\fi}
1266 \let\bbl@initoload\relax
1267 \def\bbl@provide@locale{%
1268 \ifx\babelprovide\undefined
1269 \bbl@error{For a language to be defined on the fly 'base'\\%
1270 is not enough, and the whole package must be\\%
1271 loaded. Either delete the 'base' option or\\%
1272 request the languages explicitly}%
1273 {See the manual for further details.}%
1274 \fi
1275 % TODO. Option to search if loaded, with \LocaleForEach
1276 \let\bbl@auxname\language % Still necessary. TODO
1277 \bbl@ifunset{bbl@bcp@map@\language}{}% Move uplevel??
1278 {\edef\language{\@nameuse{bbl@bcp@map@\language}}}%
1279 \ifbbl@bcpallowed
1280 \expandafter\ifx\csname date\language\endcsname\relax
1281 \expandafter
1282 \bbl@bcplookup\language-\@empty-\@empty-\@empty\@@
1283 \ifx\bbl@bcp\relax\else % Returned by \bbl@bcplookup
1284 \edef\language{\bbl@bcp@prefix\bbl@bcp}%
1285 \edef\localename{\bbl@bcp@prefix\bbl@bcp}%
1286 \expandafter\ifx\csname date\language\endcsname\relax
1287 \let\bbl@initoload\bbl@bcp
1288 \bbl@exp{\\\babelprovide[\bbl@autoload@bcptoptions]{\language}}%
1289 \let\bbl@initoload\relax
1290 \fi
1291 \bbl@csarg\xdef{bcp@map@\bbl@bcp}{\localename}%
1292 \fi
1293 \fi
1294 \fi
1295 \expandafter\ifx\csname date\language\endcsname\relax
1296 \IfFileExists{babel-\language.tex}%
1297 {\bbl@exp{\\\babelprovide[\bbl@autoload@options]{\language}}}%
1298 {}%
1299 \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.

```

1300 \def\iflanguage#1{%

```

```

1301 \bbl@iflanguage{#1}{%
1302   \ifnum\csname l@#1\endcsname=\language
1303     \expandafter\@firstoftwo
1304   \else
1305     \expandafter\@secondoftwo
1306   \fi}}

```

9.1 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.

```

1307 \let\bbl@select@type\z@
1308 \edef\selectlanguage{%
1309   \noexpand\protect
1310   \expandafter\noexpand\csname selectlanguage \endcsname}

```

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

```
1311 \ifx\@undefined\protect\let\protect\relax\fi
```

The following definition is preserved for backwards compatibility. It is related to a trick for 2.09.

```
1312 \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.

```
1313 \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:

```

1314 \def\bbl@push@language{%
1315   \ifx\language\@undefined\else
1316     \xdef\bbl@language@stack{\language+\bbl@language@stack}%
1317   \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`.

```
1318 \def\bbl@pop@lang#1+#2\@@{%
1319   \edef\language{#1}%
1320   \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).

```
1321 \let\bbl@ifrestoring\@secondoftwo
1322 \def\bbl@pop@language{%
1323   \expandafter\bbl@pop@lang\bbl@language@stack\@@
1324   \let\bbl@ifrestoring\@firstoftwo
1325   \expandafter\bbl@set@language\expandafter{\language}%
1326   \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).

```
1327 \chardef\localeid\z@
1328 \def\bbl@id@last{0} % No real need for a new counter
1329 \def\bbl@id@assign{%
1330   \bbl@ifunset{bbl@id@\language}%
1331   {\count@bbl@id@last\relax
1332    \advance\count@bbl@id@last\ne
1333    \bbl@csarg\chardef{id@\language}\count@
1334    \edef\bbl@id@last{\the\count@}%
1335    \ifcase\bbl@engine\or
1336      \directlua{
1337        Babel = Babel or {}
1338        Babel.locale_props = Babel.locale_props or {}
1339        Babel.locale_props[\bbl@id@last] = {}
1340        Babel.locale_props[\bbl@id@last].name = '\language'
1341      }%
1342    \fi}%
1343   }%
1344   \chardef\localeid\bbl@cl{id@}}
```

The unprotected part of `\selectlanguage`.

```
1345 \expandafter\def\csname selectlanguage \endcsname#1{%
1346   \ifnum\bbl@hymapsel=\ccclv\let\bbl@hymapsel\tw\fi
1347   \bbl@push@language
1348   \aftergroup\bbl@pop@language
1349   \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.

```

1350 \def\BabelContentsFiles{toc,lof,lot}
1351 \def\bbl@set@language#1{% from selectlanguage, pop@
1352 % The old buggy way. Preserved for compatibility.
1353 \edef\language{%
1354   \ifnum\escapechar=\expandafter`\string#1\@empty
1355   \else\string#1\@empty\fi}%
1356 \ifcat\relax\noexpand#1%
1357   \expandafter\ifx\csname date\language\endcsname\relax
1358   \edef\language{#1}%
1359   \let\locale\language
1360 \else
1361   \bbl@info{Using '\string\language' instead of 'language' is\\%
1362             deprecated. If what you want is to use a\\%
1363             macro containing the actual locale, make\\%
1364             sure it does not not match any language.\\%
1365             Reported}%
1366   \ll\\%
1367   try to fix '\string\locale', but I cannot promise\\%
1368   anything. Reported}%
1369   \ifx\scantokens\undefined
1370     \def\locale{??}%
1371   \else
1372     \scantokens\expandafter{\expandafter
1373       \def\expandafter\locale\expandafter{\language}}%
1374   \fi
1375 \fi
1376 \else
1377   \def\locale{#1}% This one has the correct catcodes
1378 \fi
1379 \select@language{\language}%
1380 % write to auxs
1381 \expandafter\ifx\csname date\language\endcsname\relax\else
1382   \if@files
1383     \ifx\babel@aux\@gobbletwo\else % Set if single in the first, redundant
1384       \protected@write\auxout{}\string\babel@aux{\bbl@auxname}{}}%
1385     \fi
1386     \bbl@usehooks{write}{}%
1387   \fi
1388 \fi}
1389 %
1390 \newif\ifbbl@bcpallowed
1391 \bbl@bcpallowedfalse
1392 \def\select@language#1{% from set@, babel@aux
1393 % set hymap
1394 \ifnum\bbl@hymapset=\@cclv\chardef\bbl@hymapset4\relax\fi
1395 % set name
1396 \edef\language{#1}%
1397 \bbl@fixname\language
1398 % TODO. name@map must be here?
1399 \bbl@provide@locale
1400 \bbl@iflanguage\language{%
1401   \expandafter\ifx\csname date\language\endcsname\relax
1402   \bbl@error
1403     {Unknown language '\language'. Either you have\\%
1404     misspelled its name, it has not been installed,\\%

```

```

1405         or you requested it in a previous run. Fix its name,\%
1406         install it or just rerun the file, respectively. In\%
1407         some cases, you may need to remove the aux file}%
1408         {You may proceed, but expect wrong results}%
1409     \else
1410         % set type
1411         \let\bbl@select@type\z@
1412         \expandafter\bbl@switch\expandafter{\language}%
1413     \fi}}
1414 \def\babel@aux#1#2{% TODO. See how to avoid undefined nil's
1415     \select@language{#1}%
1416     \bbl@foreach\BabelContentsFiles{%
1417         \@writefile{##1}{\babel@toc{#1}{#2}}}% %% TODO - ok in plain?
1418 \def\babel@toc#1#2{%
1419     \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.

```

1420 \newif\ifbbl@usedatagroup
1421 \def\bbl@switch#1{% from select@, foreign@
1422     % make sure there is info for the language if so requested
1423     \bbl@ensureinfo{#1}%
1424     % restore
1425     \originalTeX
1426     \expandafter\def\expandafter\originalTeX\expandafter{%
1427         \csname noextras#1\endcsname
1428         \let\originalTeX\@empty
1429         \babel@beginsave}%
1430     \bbl@usehooks{afterreset}{}%
1431     \languageshorthands{none}%
1432     % set the locale id
1433     \bbl@id@assign
1434     % switch captions, date
1435     % No text is supposed to be added here, so we remove any
1436     % spurious spaces.
1437     \bbl@bsphack
1438     \ifcase\bbl@select@type
1439         \csname captions#1\endcsname\relax
1440         \csname date#1\endcsname\relax
1441     \else
1442         \bbl@xin@{,captions,}{, \bbl@select@opts,}%
1443         \ifin@
1444             \csname captions#1\endcsname\relax
1445         \fi
1446         \bbl@xin@{,date,}{, \bbl@select@opts,}%

```

```

1447     \ifin@ % if \foreign... within \<lang>date
1448     \csname date#1\endcsname\relax
1449     \fi
1450     \fi
1451     \bbl@esphack
1452     % switch extras
1453     \bbl@usehooks{beforeextras}{}%
1454     \csname extras#1\endcsname\relax
1455     \bbl@usehooks{afterextras}{}%
1456     % > babel-ensure
1457     % > babel-sh-<short>
1458     % > babel-bidi
1459     % > babel-fontspec
1460     % hyphenation - case mapping
1461     \ifcase\bbl@opt@hyphenmap\or
1462     \def\BabelLower##1##2{\lccode##1=##2\relax}%
1463     \ifnum\bbl@hymapsel>4\else
1464     \csname\language @bbl@hyphenmap\endcsname
1465     \fi
1466     \chardef\bbl@opt@hyphenmap\z@
1467     \else
1468     \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
1469     \csname\language @bbl@hyphenmap\endcsname
1470     \fi
1471     \fi
1472     \global\let\bbl@hymapsel@cclv
1473     % hyphenation - select patterns
1474     \bbl@patterns{#1}%
1475     % hyphenation - allow stretching with babelnohyphens
1476     \ifnum\language=\l@babelnohyphens
1477     \babel@savevariable\emergencystretch
1478     \emergencystretch\maxdimen
1479     \babel@savevariable\hbadness
1480     \hbadness\@M
1481     \fi
1482     % hyphenation - mins
1483     \babel@savevariable\lefthyphenmin
1484     \babel@savevariable\righthyphenmin
1485     \expandafter\ifx\csname #1hyphenmins\endcsname\relax
1486     \set@hyphenmins\tw@\thr@@\relax
1487     \else
1488     \expandafter\expandafter\expandafter\set@hyphenmins
1489     \csname #1hyphenmins\endcsname\relax
1490     \fi}

```

otherlanguage The otherlanguage environment can be used as an alternative to using the \selectlanguage declarative command. When you are typesetting a document which mixes left-to-right and right-to-left typesetting you have to use this environment in order to let things work as you expect them to. The \ignorespaces command is necessary to hide the environment when it is entered in horizontal mode.

```

1491 \long\def\otherlanguage#1{%
1492 \ifnum\bbl@hymapsel=\cclv\let\bbl@hymapsel\thr@@\fi
1493 \csname selectlanguage \endcsname{#1}%
1494 \ignorespaces}

```

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

```

1495 \long\def\endotherlanguage{%
1496   \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`.

```

1497 \expandafter\def\csname otherlanguage*\endcsname{%
1498   \@ifnextchar[\bbl@otherlanguage@s{\bbl@otherlanguage@s[]}}
1499 \def\bbl@otherlanguage@s[#1]#2{%
1500   \ifnum\bbl@hymapsel=\@cclv\chardef\bbl@hymapsel4\relax\fi
1501   \def\bbl@select@opts{#1}%
1502   \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”.

```

1503 \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`.

```

1504 \providecommand\bbl@beforeforeign{}
1505 \edef\foreignlanguage{%
1506   \noexpand\protect
1507   \expandafter\noexpand\csname foreignlanguage \endcsname}
1508 \expandafter\def\csname foreignlanguage \endcsname{%
1509   \@ifstar\bbl@foreign@s\bbl@foreign@x}
1510 \providecommand\bbl@foreign@x[3][]{%
1511   \begingroup
1512     \def\bbl@select@opts{#1}%
1513     \let\BabelText\@firstofone
1514     \bbl@beforeforeign
1515     \foreign@language{#2}%
1516     \bbl@usehooks{foreign}{}%
1517     \BabelText{#3}% Now in horizontal mode!
1518   \endgroup}
1519 \def\bbl@foreign@s#1#2{% TODO - \shapemode, \setpar, ?\@par

```

```

1520 \begingroup
1521   {\par}%
1522   \let\BabelText\@firstofone
1523   \foreign@language{#1}%
1524   \bbl@usehooks{foreign*}{}%
1525   \bbl@dirparastext
1526   \BabelText{#2}% Still in vertical mode!
1527   {\par}%
1528 \endgroup}

```

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

```

1529 \def\foreign@language#1{%
1530   % set name
1531   \edef\language#1}%
1532   \ifbbl@usedategroup
1533     \bbl@add\bbl@select@opts{,date,}%
1534     \bbl@usedategroupfalse
1535   \fi
1536   \bbl@fixname\language
1537   % TODO. name@map here?
1538   \bbl@provide@locale
1539   \bbl@iflanguage\language{%
1540     \expandafter\ifx\csname date\language\endcsname\relax
1541       \bbl@warning % TODO - why a warning, not an error?
1542       {Unknown language `#1'. Either you have\\%
1543        misspelled its name, it has not been installed,\\%
1544        or you requested it in a previous run. Fix its name,\\%
1545        install it or just rerun the file, respectively. In\\%
1546        some cases, you may need to remove the aux file.\\%
1547        I'll proceed, but expect wrong results.\\%
1548        Reported}%
1549     \fi
1550     % set type
1551     \let\bbl@select@type\@ne
1552     \expandafter\bbl@switch\expandafter{\language}}

```

`\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 `\lcode'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.

```

1553 \let\bbl@hyphlist\@empty
1554 \let\bbl@hyphenation@\relax
1555 \let\bbl@pttnlist\@empty
1556 \let\bbl@patterns@\relax
1557 \let\bbl@hymapsel=\@cclv
1558 \def\bbl@patterns#1{%
1559   \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
1560     \csname l@#1\endcsname
1561     \edef\bbl@tempa{#1}%
1562     \else

```

```

1563     \csname l@#1:\f@encoding\endcsname
1564     \edef\bbl@tempa{#1:\f@encoding}%
1565     \fi
1566     \@expandtwoargs\bbl@usehooks{patterns}{#1}{\bbl@tempa}%
1567     % > luatex
1568     \ifundefined\bbl@hyphenation@{}{}% Can be \relax!
1569     \begingroup
1570     \bbl@xin@{,\number\language,}{,\bbl@hyphlist}%
1571     \ifin@else
1572     \expandtwoargs\bbl@usehooks{hyphenation}{#1}{\bbl@tempa}%
1573     \hyphenation{%
1574     \bbl@hyphenation@
1575     \ifundefined\bbl@hyphenation@#1}%
1576     \@empty
1577     {\space\csname bbl@hyphenation@#1\endcsname}}%
1578     \xdef\bbl@hyphlist{\bbl@hyphlist\number\language,}%
1579     \fi
1580     \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 other language*.

```

1581 \def\hyphenrules#1{%
1582   \edef\bbl@tempf{#1}%
1583   \bbl@fixname\bbl@tempf
1584   \bbl@iflanguage\bbl@tempf{%
1585     \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
1586     \ifx\languageshorthands\undefined\else
1587       \languageshorthands{none}%
1588     \fi
1589     \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
1590       \set@hyphenmins\tw@\thr@@\relax
1591     \else
1592       \expandafter\expandafter\expandafter\set@hyphenmins
1593       \csname\bbl@tempf hyphenmins\endcsname\relax
1594     \fi}}
1595 \let\endhyphenrules\@empty

```

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

```

1596 \def\providehyphenmins#1#2{%
1597   \expandafter\ifx\csname #1hyphenmins\endcsname\relax
1598     \@namedef{#1hyphenmins}{#2}%
1599   \fi}

```

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

```

1600 \def\set@hyphenmins#1#2{%
1601   \lefthyphenmin#1\relax
1602   \righthyphenmin#2\relax}

```

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

```

1603 \ifx\ProvidesFile\undefined
1604 \def\ProvidesLanguage#1[#2 #3 #4]{%
1605   \wlog{Language: #1 #4 #3 <#2>}%
1606 }
1607 \else
1608 \def\ProvidesLanguage#1{%
1609   \begingroup
1610   \catcode`\ 10 %
1611   \@makeother\/%
1612   \@ifnextchar[%]
1613     {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}
1614 \def\@provideslanguage#1[#2]{%
1615   \wlog{Language: #1 #2}%
1616   \expandafter\xdef\csname ver@#1.ldf\endcsname{#2}%
1617   \endgroup}
1618 \fi

```

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

```

1619 \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.

```

1620 \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’:

```

1621 \providecommand\setlocale{%
1622   \bbl@error
1623   {Not yet available}%
1624   {Find an armchair, sit down and wait}}
1625 \let\uselocale\setlocale
1626 \let\locale\setlocale
1627 \let\selectlocale\setlocale
1628 \let\localename\setlocale
1629 \let\textlocale\setlocale
1630 \let\textlanguage\setlocale
1631 \let\languagetext\setlocale

```

9.2 Errors

`\@nolanerr` The babel package will signal an error when a documents tries to select a language that hasn’t been defined earlier. When a user selects a language for which no hyphenation patterns were loaded into the format he will be given a warning about that fact. We revert to the patterns for `\language=0` in that case. In most formats that will be (US)english, but it might also be empty.

`\@noopterr` When the package was loaded without options not everything will work as expected. An error message is issued in that case.
When the format knows about `\PackageError` it must be $\LaTeX 2_{\epsilon}$, so we can safely use its error handling interface. Otherwise we’ll have to ‘keep it simple’.
Infos are not written to the console, but on the other hand many people think warnings are errors, so a further message type is defined: an important info which is sent to the console.

```

1632 \edef\bbl@nulllanguage{\string\language=0}
1633 \ifx\PackageError\undefined % TODO. Move to Plain

```

```

1634 \def\bbl@error#1#2{%
1635   \begingroup
1636     \newlinechar=`^^J
1637     \def\{^^J(babel) }%
1638     \errhelp{#2}\errmessage{\#1}%
1639   \endgroup}
1640 \def\bbl@warning#1{%
1641   \begingroup
1642     \newlinechar=`^^J
1643     \def\{^^J(babel) }%
1644     \message{\#1}%
1645   \endgroup}
1646 \let\bbl@infowarn\bbl@warning
1647 \def\bbl@info#1{%
1648   \begingroup
1649     \newlinechar=`^^J
1650     \def\{^^J}%
1651     \wlog{#1}%
1652   \endgroup}
1653 \fi
1654 \def\bbl@nocaption{\protect\bbl@nocaption@i}
1655 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
1656   \global\@namedef{#2}{\textbf{?#1?}}%
1657   \@nameuse{#2}%
1658   \bbl@warning{%
1659     \@backslashchar#2 not set. Please, define it\\%
1660     after the language has been loaded (typically\\%
1661     in the preamble) with something like:\\%
1662     \string\renewcommand\@backslashchar#2{..}\\%
1663     Reported}}
1664 \def\bbl@tentative{\protect\bbl@tentative@i}
1665 \def\bbl@tentative@i#1{%
1666   \bbl@warning{%
1667     Some functions for '#1' are tentative.\\%
1668     They might not work as expected and their behavior\\%
1669     could change in the future.\\%
1670     Reported}}
1671 \def\@nolanerr#1{%
1672   \bbl@error
1673     {You haven't defined the language #1\space yet.\\%
1674     Perhaps you misspelled it or your installation\\%
1675     is not complete}%
1676     {Your command will be ignored, type <return> to proceed}}
1677 \def\@nopatterns#1{%
1678   \bbl@warning
1679     {No hyphenation patterns were preloaded for\\%
1680     the language `#1' into the format.\\%
1681     Please, configure your TeX system to add them and\\%
1682     rebuild the format. Now I will use the patterns\\%
1683     preloaded for \bbl@nulllanguage\space instead}}
1684 \let\bbl@usehooks\@gobbletwo
1685 \ifx\bbl@onlyswitch\@empty\endinput\fi
1686 % Here ended switch.def

Here ended switch.def.

1687 \ifx\directlua\@undefined\else
1688   \ifx\bbl@luapatterns\@undefined
1689     \input luababel.def
1690   \fi

```



```

1691 \fi
1692 <<Basic macros>>
1693 \bbl@trace{Compatibility with language.def}
1694 \ifx\bbl@languages@undefined
1695   \ifx\directlua@undefined
1696     \openin1 = language.def % TODO. Remove hardcoded number
1697     \ifeof1
1698       \closein1
1699       \message{I couldn't find the file language.def}
1700     \else
1701       \closein1
1702       \begingroup
1703         \def\addlanguage#1#2#3#4#5{%
1704           \expandafter\ifx\csname lang@#1\endcsname\relax\else
1705             \global\expandafter\let\csname l@#1\expandafter\endcsname
1706               \csname lang@#1\endcsname
1707           \fi}%
1708         \def\uselanguage#1{%
1709           \input language.def
1710         \endgroup
1711       \fi
1712     \fi
1713   \chardef\l@english\z@
1714 \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.

```

1715 \def\addto#1#2{%
1716   \ifx#1\@undefined
1717     \def#1{#2}%
1718   \else
1719     \ifx#1\relax
1720       \def#1{#2}%
1721     \else
1722       {\toks@\expandafter{#1#2}%
1723        \xdef#1{\the\toks@}}%
1724     \fi
1725   \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?

```

1726 \def\bbl@withactive#1#2{%
1727   \begingroup
1728     \lccode`~=#2\relax
1729     \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 L^AT_EX 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.

```

1730 \def\bbl@redefine#1{%
1731   \edef\bbl@tempa{\bbl@stripslash#1}%
1732   \expandafter\let\csname org\bbl@tempa\endcsname#1%
1733   \expandafter\def\csname\bbl@tempa\endcsname}
1734 \@onlypreamble\bbl@redefine

```

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

```

1735 \def\bbl@redefine@long#1{%
1736   \edef\bbl@tempa{\bbl@stripslash#1}%
1737   \expandafter\let\csname org\bbl@tempa\endcsname#1%
1738   \expandafter\long\expandafter\def\csname\bbl@tempa\endcsname}
1739 \@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_␣.

```

1740 \def\bbl@redefineroobust#1{%
1741   \edef\bbl@tempa{\bbl@stripslash#1}%
1742   \bbl@ifunset{\bbl@tempa\space}%
1743   {\expandafter\let\csname org\bbl@tempa\endcsname#1%
1744     \bbl@exp{\def\#1{\protect\<\bbl@tempa\space>}}}%
1745   {\bbl@exp{\let\<org\bbl@tempa>\<\bbl@tempa\space>}}}%
1746   \@namedef{\bbl@tempa\space}}
1747 \@onlypreamble\bbl@redefineroobust

```

9.3 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.

```

1748 \bbl@trace{Hooks}
1749 \newcommand\AddBabelHook[3][{}]{%
1750   \bbl@ifunset{bbl@hk@#2}{\EnableBabelHook{#2}}}%
1751   \def\bbl@tempa##1,#3=##2,##3\@empty{\def\bbl@tempb{##2}}%
1752   \expandafter\bbl@tempa\bbl@evargs,#3=,\@empty
1753   \bbl@ifunset{bbl@ev@#2@#3@#1}%
1754   {\bbl@csarg\bbl@add{ev@#3@#1}{\bbl@elth{#2}}}%
1755   {\bbl@csarg\let{ev@#2@#3@#1}\relax}%
1756   \bbl@csarg\newcommand{ev@#2@#3@#1}[\bbl@tempb]}
1757 \newcommand\EnableBabelHook[1]{\bbl@csarg\let{hk@#1}\@firstofone}
1758 \newcommand\DisableBabelHook[1]{\bbl@csarg\let{hk@#1}\@gobble}
1759 \def\bbl@usehooks#1#2{%
1760   \def\bbl@elth##1{%
1761     \bbl@cs{hk@##1}{\bbl@cs{ev@##1@#1}{#2}}}%
1762   \bbl@cs{ev@#1@}%
1763   \ifx\language\@undefined\else % Test required for Plain (?)
1764     \def\bbl@elth##1{%
1765       \bbl@cs{hk@##1}{\bbl@cl{ev@##1@#1}{#2}}}%
1766     \bbl@cl{ev@#1}%
1767   \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).

```

1768 \def\bbl@evargs{,% <- don't delete this comma

```

```

1769 everylanguage=1,loadkernel=1,loadpatterns=1,loadexceptions=1,%
1770 adddialect=2,patterns=2,defaultcommands=0,encodedcommands=2,write=0,%
1771 beforeextras=0,afterextras=0,stopcommands=0,stringprocess=0,%
1772 hyphenation=2,initiateactive=3,afterreset=0,foreign=0,foreign*=0,%
1773 beforestart=0,language=2}

```

\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.

```

1774 \bbl@trace{Defining babelensure}
1775 \newcommand\babelensure[2][{}% TODO - revise test files
1776   \AddBabelHook{babel-ensure}{afterextras}{%
1777     \ifcase\bbl@select@type
1778       \bbl@cl{e}%
1779     \fi}%
1780   \begingroup
1781     \let\bbl@ens@include\@empty
1782     \let\bbl@ens@exclude\@empty
1783     \def\bbl@ens@fontenc{\relax}%
1784     \def\bbl@tempb##1{%
1785       \ifx\@empty##1\else\noexpand##1\expandafter\bbl@tempb\fi}%
1786     \def\bbl@tempa{\bbl@tempb#1\@empty}%
1787     \def\bbl@tempb##1=##2\@{\@namedef{\bbl@ens@##1}{##2}}%
1788     \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
1789     \def\bbl@tempc{\bbl@ensure}%
1790     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1791       \expandafter{\bbl@ens@include}}%
1792     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1793       \expandafter{\bbl@ens@exclude}}%
1794     \toks@\expandafter{\bbl@tempc}%
1795     \bbl@exp{%
1796   \endgroup
1797   \def<\bbl@e@#2>{\the\toks@{\bbl@ens@fontenc}}}%
1798 \def\bbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
1799 \def\bbl@tempb##1{% elt for (excluding) \bbl@captionslist list
1800   \ifx##1\@undefined % 3.32 - Don't assume the macro exists
1801     \edef##1{\noexpand\bbl@nocaption
1802       {\bbl@stripslash##1}{\language\bbl@stripslash##1}}%
1803   \fi
1804   \ifx##1\@empty\else
1805     \in@{##1}{#2}%
1806     \ifin\else
1807       \bbl@ifunset{\bbl@ensure@\language}%
1808       {\bbl@exp{%
1809         \\DeclareRobustCommand\bbl@ensure@\language>[1]{%
1810           \\foreignlanguage{\language}%
1811           {\ifx\relax#3\else
1812             \\fontencoding{#3}\\selectfont
1813           \fi
1814           #####1}}}%

```

```

1815      {}%
1816      \toks@\expandafter{##1}%
1817      \edef##1{%
1818          \bbl@csarg\noexpand{ensure@\language}%
1819          {\the\toks@}}%
1820      \fi
1821      \expandafter\bbl@tempb
1822      \fi}%
1823      \expandafter\bbl@tempb\bbl@captionslist\today\@empty
1824      \def\bbl@tempa##1{% elt for include list
1825          \ifx##1\@empty\else
1826              \bbl@csarg\in{ensure@\language\expandafter}\expandafter{##1}%
1827              \ifin\else
1828                  \bbl@tempb##1\@empty
1829              \fi
1830              \expandafter\bbl@tempa
1831              \fi}%
1832      \bbl@tempa#1\@empty}
1833      \def\bbl@captionslist{%
1834          \prefacename\refname\abstractname\bibname\chaptername\appendixname
1835          \contentsname\listfigurename\listtablename\indexname\figurename
1836          \tablename\partname\encname\ccname\headtoname\pagename\seename
1837          \alsiname\proofname\glossaryname}

```

9.4 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`.

```

1838 \bbl@trace{Macros for setting language files up}
1839 \def\bbl@ldfinit{% TODO. Merge into the next macro? Unused elsewhere
1840     \let\bbl@screset\@empty
1841     \let\BabelStrings\bbl@opt@string
1842     \let\BabelOptions\@empty
1843     \let\BabelLanguages\relax
1844     \ifx\originalTeX\@undefined
1845         \let\originalTeX\@empty
1846     \else
1847         \originalTeX
1848     \fi}

```

```

1849 \def\LdfInit#1#2{%
1850   \chardef\atcatcode=\catcode`\@
1851   \catcode`\@=11\relax
1852   \chardef\eqcatcode=\catcode`\=
1853   \catcode`\==12\relax
1854   \expandafter\if\expandafter\@backslashchar
1855     \expandafter\@car\string#2@nil
1856     \ifx#2\@undefined\else
1857       \ldf@quit{#1}%
1858     \fi
1859   \else
1860     \expandafter\ifx\csname#2\endcsname\relax\else
1861       \ldf@quit{#1}%
1862     \fi
1863   \fi
1864   \bbl@ldfinit}

```

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

```

1865 \def\ldf@quit#1{%
1866   \expandafter\main@language\expandafter{#1}%
1867   \catcode`\@=\atcatcode \let\atcatcode\relax
1868   \catcode`\==\eqcatcode \let\eqcatcode\relax
1869   \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.

```

1870 \def\bbl@afterldf#1{% TODO. Merge into the next macro? Unused elsewhere
1871   \bbl@afterlang
1872   \let\bbl@afterlang\relax
1873   \let\BabelModifiers\relax
1874   \let\bbl@screset\relax}%
1875 \def\ldf@finish#1{%
1876   \ifx\loadlocalcfg\@undefined\else % For LaTeX 209
1877     \loadlocalcfg{#1}%
1878   \fi
1879   \bbl@afterldf{#1}%
1880   \expandafter\main@language\expandafter{#1}%
1881   \catcode`\@=\atcatcode \let\atcatcode\relax
1882   \catcode`\==\eqcatcode \let\eqcatcode\relax}

```

After the preamble of the document the commands `\LdfInit`, `\ldf@quit` and `\ldf@finish` are no longer needed. Therefore they are turned into warning messages in \LaTeX .

```

1883 \@onlypreamble\LdfInit
1884 \@onlypreamble\ldf@quit
1885 \@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.

```

1886 \def\main@language#1{%
1887   \def\bbl@main@language{#1}%
1888   \let\language\bbl@main@language % TODO. Set localename
1889   \bbl@id@assign
1890   \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`.

```

1891 \def\bbl@beforestart{%
1892   \bbl@usehooks{beforestart}}}%
1893 \global\let\bbl@beforestart\relax}
1894 \AtBeginDocument{%
1895   \@nameuse{bbl@beforestart}%
1896   \if@filesw
1897     \providecommand\babel@aux[2]{}%
1898     \immediate\write\@mainaux{%
1899       \string\providecommand\string\babel@aux[2]{}%
1900       \immediate\write\@mainaux{\string\@nameuse{bbl@beforestart}}}%
1901   \fi
1902   \expandafter\selectlanguage\expandafter{\bbl@main@language}%
1903   \ifbbl@single % must go after the line above.
1904     \renewcommand\selectlanguage[1]{}%
1905     \renewcommand\foreignlanguage[2]{#2}%
1906     \global\let\babel@aux\@gobbletwo % Also as flag
1907   \fi
1908   \ifcase\bbl@engine\or\pagedir\bodydir\fi} % TODO - a better place

```

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

```

1909 \def\select@language@x#1{%
1910   \ifcase\bbl@select@type
1911     \bbl@ifsamestring\languagename{#1}{\select@language{#1}}%
1912   \else
1913     \select@language{#1}%
1914   \fi}

```

9.5 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.

```

1915 \bbl@trace{Shorhands}
1916 \def\bbl@add@special#1{% 1:a macro like "\, \?, etc.
1917   \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
1918   \bbl@ifunset{@sanitize}{\bbl@add\@sanitize{\@makeother#1}}%
1919   \ifx\nfss@catcodes\undefined\else % TODO - same for above
1920     \begingroup
1921       \catcode`#1\active
1922       \nfss@catcodes
1923       \ifnum\catcode`#1=\active
1924         \endgroup
1925         \bbl@add\nfss@catcodes{\@makeother#1}%
1926       \else
1927         \endgroup
1928       \fi
1929   \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.

```

1930 \def\bbl@remove@special#1{%
1931   \begingroup
1932     \def\x##1##2{\ifnum`#1=`##2\noexpand\@empty
1933       \else\noexpand##1\noexpand##2\fi}%
1934     \def\do{\x\do}%
1935     \def\@makeother{\x\@makeother}%
1936   \edef\x{\endgroup
1937     \def\noexpand\dospecials{\dospecials}%
1938     \expandafter\ifx\csname @sanitize\endcsname\relax\else
1939       \def\noexpand\@sanitize{\@sanitize}%
1940     \fi}%
1941   \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).

```

1942 \def\bbl@active@def#1#2#3#4{%
1943   \@namedef{#3#1}{%
1944     \expandafter\ifx\csname#2@sh@#1\endcsname\relax
1945       \bbl@afterelse\bbl@sh@select#2#1{#3@arg#1}{#4#1}%
1946     \else
1947       \bbl@afterfi\csname#2@sh@#1\endcsname
1948     \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.

```

1949   \long\@namedef{#3@arg#1}##1{%
1950     \expandafter\ifx\csname#2@sh@#1\string##1\endcsname\relax
1951       \bbl@afterelse\csname#4#1\endcsname##1%
1952     \else
1953       \bbl@afterfi\csname#2@sh@#1\string##1\endcsname
1954     \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.

```

1955 \def\initiate@active@char#1{%

```

```

1956 \bbl@ifunset{active@char\string#1}%
1957 {\bbl@withactive
1958   {\expandafter\@initiate@active@char\expandafter}#1\string#1}%
1959 {}}

```

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`).

```

1960 \def\@initiate@active@char#1#2#3{%
1961   \bbl@csarg\edef{oricat@#2}{\catcode`#2=\the\catcode`#2\relax}%
1962   \ifx#1\@undefined
1963     \bbl@csarg\edef{oridef@#2}{\let\noexpand#1\noexpand\@undefined}%
1964   \else
1965     \bbl@csarg\let{oridef@#2}#1%
1966     \bbl@csarg\edef{oridef@#2}{%
1967       \let\noexpand#1%
1968       \expandafter\noexpand\csname bbl@oridef@#2\endcsname}%
1969   \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`).

```

1970 \ifx#1#3\relax
1971   \expandafter\let\csname normal@char#2\endcsname#3%
1972 \else
1973   \bbl@info{Making #2 an active character}%
1974   \ifnum\mathcode`#2=\ifodd\bbl@engine"1000000 \else"8000 \fi
1975     \@namedef{normal@char#2}{%
1976       \textormath{#3}{\csname bbl@oridef@#2\endcsname}}%
1977   \else
1978     \@namedef{normal@char#2}{#3}%
1979   \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).

```

1980 \bbl@restoreactive{#2}%
1981 \AtBeginDocument{%
1982   \catcode`#2\active
1983   \if@filesw
1984     \immediate\write\@mainaux{\catcode`\string#2\active}%
1985   \fi}%
1986 \expandafter\bbl@add@special\csname#2\endcsname
1987 \catcode`#2\active
1988 \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⟩`).


```

1989 \let\bbl@tempa\@firstoftwo
1990 \if\string^#2%
1991 \def\bbl@tempa{\noexpand\textormath}%
1992 \else
1993 \ifx\bbl@mathnormal\@undefined\else
1994 \let\bbl@tempa\bbl@mathnormal
1995 \fi
1996 \fi
1997 \expandafter\edef\csname active@char#2\endcsname{%
1998 \bbl@tempa
1999 {\noexpand\if@safe@actives
2000 \noexpand\expandafter
2001 \expandafter\noexpand\csname normal@char#2\endcsname
2002 \noexpand\else
2003 \noexpand\expandafter
2004 \expandafter\noexpand\csname bbl@doactive#2\endcsname
2005 \noexpand\fi}%
2006 {\expandafter\noexpand\csname normal@char#2\endcsname}}%
2007 \bbl@csarg\edef{doactive#2}{%
2008 \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!).

```

2009 \bbl@csarg\edef{active@#2}{%
2010 \noexpand\active@prefix\noexpand#1%
2011 \expandafter\noexpand\csname active@char#2\endcsname}%
2012 \bbl@csarg\edef{normal@#2}{%
2013 \noexpand\active@prefix\noexpand#1%
2014 \expandafter\noexpand\csname normal@char#2\endcsname}%
2015 \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.

```

2016 \bbl@active@def#2\user@group{user@active}{language@active}%
2017 \bbl@active@def#2\language@group{language@active}{system@active}%
2018 \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.

```

2019 \expandafter\edef\csname\user@group @sh#2@@\endcsname
2020 {\expandafter\noexpand\csname normal@char#2\endcsname}%
2021 \expandafter\edef\csname\user@group @sh#2@\string\protect\endcsname
2022 {\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.

```

2023 \if\string'#2%
2024 \let\prim@s\bbl@prim@s

```

```

2025 \let\active@math@prime#1%
2026 \fi
2027 \bbl@usehooks{initiateactive}{\#1}{\#2}{\#3}}

```

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

```

2028 <<(*More package options)>> ≡
2029 \DeclareOption{math=active}{}
2030 \DeclareOption{math=normal}{\def\bbl@mathnormal{\noexpand\textormath}}
2031 <</More package options>>

```

Initiating a shorthand makes active the char. That is not strictly necessary but it is still done for backward compatibility. So we need to restore the original catcode at the end of package *and* and the end of the ldf.

```

2032 \@ifpackagewith{babel}{KeepShorthandsActive}%
2033 {\let\bbl@restoreactive\@gobble}%
2034 {\def\bbl@restoreactive#1{%
2035   \bbl@exp{%
2036     \\\AfterBabelLanguage\\CurrentOption
2037     {\catcode`#1=\the\catcode`#1\relax}%
2038     \\\AtEndOfPackage
2039     {\catcode`#1=\the\catcode`#1\relax}}}%
2040 \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.

```

2041 \def\bbl@sh@select#1#2{%
2042   \expandafter\ifx\csname#1@sh@#2@sel\endcsname\relax
2043     \bbl@afterelse\bbl@scndcs
2044   \else
2045     \bbl@afterfi\csname#1@sh@#2@sel\endcsname
2046   \fi}

```

`\active@prefix` The command `\active@prefix` which is used in the expansion of active characters has a function similar to `\OT1-cmd` in that it `\protects` the active character whenever `\protect` is *not* `\@typeset@protect`. The `\@gobble` is needed to remove a token such as `\activechar`: (when the double colon was the active character to be dealt with). There are two definitions, depending of `\ifincsname` is available. If there is, the expansion will be more robust.

```

2047 \begingroup
2048 \bbl@ifunset{ifincsname}% TODO. Ugly. Correct?
2049 {\gdef\active@prefix#1{%
2050   \ifx\protect\@typeset@protect
2051   \else
2052     \ifx\protect\@unexpandable@protect
2053       \noexpand#1%
2054     \else
2055       \protect#1%
2056     \fi
2057   \expandafter\@gobble
2058   \fi}}
2059 {\gdef\active@prefix#1{%
2060   \ifincsname
2061     \string#1%

```

```

2062      \expandafter\@gobble
2063    \else
2064      \ifx\protect\@typeset@protect
2065    \else
2066      \ifx\protect\@unexpandable@protect
2067        \noexpand#1%
2068      \else
2069        \protect#1%
2070      \fi
2071      \expandafter\expandafter\expandafter\@gobble
2072    \fi
2073  \fi}}
2074 \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⟩`.

```

2075 \newif\if@safe@actives
2076 \@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.

```

2077 \def\bbl@restore@actives{\if@safe@actives\@safe@activesfalse\fi}

```

`\bbl@activate` Both macros take one argument, like `\initiate@active@char`. The macro is used to
`\bbl@deactivate` change the definition of an active character to expand to `\active@char⟨char⟩` in the case of `\bbl@activate`, or `\normal@char⟨char⟩` in the case of `\bbl@deactivate`.

```

2078 \def\bbl@activate#1{%
2079   \bbl@withactive{\expandafter\let\expandafter}#1%
2080   \csname bbl@active@\string#1\endcsname}
2081 \def\bbl@deactivate#1{%
2082   \bbl@withactive{\expandafter\let\expandafter}#1%
2083   \csname bbl@normal@\string#1\endcsname}

```

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

```

\bbl@scndcs
2084 \def\bbl@firstcs#1#2{\csname#1\endcsname}
2085 \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.

```

2086 \def\babel@texpdf#1#2#3#4{%
2087   \ifx\texorpdfstring\undefined
2088     \textormath{#1}{#2}%
2089   \else

```

```

2090 \texorpdfstring{\textormath{#1}{#3}}{#2}%
2091 % \texorpdfstring{\textormath{#1}{#3}}{\textormath{#2}{#4}}%
2092 \fi}
2093 %
2094 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
2095 \def\@decl@short#1#2#3\@nil#4{%
2096 \def\bbl@tempa{#3}%
2097 \ifx\bbl@tempa\@empty
2098 \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
2099 \bbl@ifunset{#1@sh@\string#2@}{}%
2100 {\def\bbl@tempa{#4}%
2101 \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbl@tempa
2102 \else
2103 \bbl@info
2104 {Redefining #1 shorthand \string#2\\%
2105 in language \CurrentOption}%
2106 \fi}%
2107 \@namedef{#1@sh@\string#2@}{#4}%
2108 \else
2109 \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@firstcs
2110 \bbl@ifunset{#1@sh@\string#2@\string#3@}{}%
2111 {\def\bbl@tempa{#4}%
2112 \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bbl@tempa
2113 \else
2114 \bbl@info
2115 {Redefining #1 shorthand \string#2\string#3\\%
2116 in language \CurrentOption}%
2117 \fi}%
2118 \@namedef{#1@sh@\string#2@\string#3@}{#4}%
2119 \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.

```

2120 \def\textormath{%
2121 \ifmmode
2122 \expandafter\@secondoftwo
2123 \else
2124 \expandafter\@firstoftwo
2125 \fi}

```

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

```

2126 \def\user@group{user}
2127 \def\language@group{english} % TODO. I don't like defaults
2128 \def\system@group{system}

```

`\usesshorthands` This is the user level macro. It initializes and activates the character for use as a shorthand character (ie, it’s active in the preamble). Languages can deactivate shorthands, so a starred version is also provided which activates them always after the language has been switched.

```

2129 \def\usesshorthands{%
2130 \@ifstar\bbl@usesesh{s}\bbl@usesesh{x}}
2131 \def\bbl@usesesh@s#1{%
2132 \bbl@usesesh@x
2133 {\AddBabelHook{babel-sh-\string#1}{afterextras}}{\bbl@activate{#1}}}%

```

```

2134     {#1}}
2135 \def\bbl@usesesh@x#1#2{%
2136   \bbl@ifshorthand{#2}%
2137   {\def\user@group{user}%
2138     \initiate@active@char{#2}%
2139     #1%
2140     \bbl@activate{#2}}%
2141   {\bbl@error
2142     {Cannot declare a shorthand turned off (\string#2)}
2143     {Sorry, but you cannot use shorthands which have been\\%
2144       turned off in the package options}}}

```

`\defineshorthand` Currently we only support two groups of user level shorthands, named internally `user` and `user<lang>` (language-dependent user shorthands). By default, only the first one is taken into account, but if the former is also used (in the optional argument of `\defineshorthand`) a new level is inserted for it (`user@generic`, done by `\bbl@set@user@generic`); we make also sure `{}` and `\protect` are taken into account in this new top level.

```

2145 \def\user@language@group{user@\language@group}
2146 \def\bbl@set@user@generic#1#2{%
2147   \bbl@ifunset{user@generic@active#1}%
2148   {\bbl@active@def#1\user@language@group{user@active}{user@generic@active}%
2149     \bbl@active@def#1\user@group{user@generic@active}{language@active}%
2150     \expandafter\edef\csname#2@sh@#1@@\endcsname{%
2151       \expandafter\noexpand\csname normal@char#1\endcsname}%
2152     \expandafter\edef\csname#2@sh@#1@\string\protect@\endcsname{%
2153       \expandafter\noexpand\csname user@active#1\endcsname}%
2154     \@empty}
2155 \newcommand\defineshorthand[3][user]{%
2156   \edef\bbl@tempa{\zap@space#1 \@empty}%
2157   \bbl@for\bbl@tempb\bbl@tempa{%
2158     \if*\expandafter\@car\bbl@tempb\@nil
2159       \edef\bbl@tempb{user@\expandafter\@gobble\bbl@tempb}%
2160       \@expandtwoargs
2161       \bbl@set@user@generic{\expandafter\string\@car#2\@nil}\bbl@tempb
2162     \fi
2163     \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].

```

2164 \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`.

```

2165 \def\aliasshorthand#1#2{%
2166   \bbl@ifshorthand{#2}%
2167   {\expandafter\ifx\csname active@char\string#2\endcsname\relax
2168     \ifx\document\@notprerr
2169       \@notshorthand{#2}%
2170     \else
2171       \initiate@active@char{#2}%
2172       \expandafter\let\csname active@char\string#2\endcsname
2173         \csname active@char\string#1\endcsname
2174       \expandafter\let\csname normal@char\string#2\endcsname
2175         \csname normal@char\string#1\endcsname

```

```

2176      \bbl@activate{#2}%
2177      \fi
2178      \fi}%
2179      {\bbl@error
2180       {Cannot declare a shorthand turned off (\string#2)}
2181       {Sorry, but you cannot use shorthands which have been\\%
2182        turned off in the package options}}}

```

\@notshorthand

```

2183 \def\@notshorthand#1{%
2184   \bbl@error{%
2185     The character '\string #1' should be made a shorthand character;\\%
2186     add the command \string\useshorthands\string{#1\string} to
2187     the preamble.\\%
2188     I will ignore your instruction}%
2189   {You may proceed, but expect unexpected results}}

```

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

```

2190 \newcommand*\shorthandon[1]{\bbl@switch@sh\@ne#1\@nnil}
2191 \DeclareRobustCommand*\shorthandoff{%
2192   \@ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
2193 \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.

```

2194 \def\bbl@switch@sh#1#2{%
2195   \ifx#2\@nnil\else
2196     \bbl@ifunset{\bbl@active@\string#2}%
2197     {\bbl@error
2198      {I cannot switch '\string#2' on or off--not a shorthand}%
2199      {This character is not a shorthand. Maybe you made\\%
2200       a typing mistake? I will ignore your instruction}}%
2201     {\ifcase#1%
2202      \catcode`#212\relax
2203      \or
2204      \catcode`#2\active
2205      \or
2206      \csname bbl@oricat@\string#2\endcsname
2207      \csname bbl@oridef@\string#2\endcsname
2208      \fi}%
2209     \bbl@afterfi\bbl@switch@sh#1%
2210   \fi}

```

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

```

2211 \def\babelshorthand{\active@prefix\babelshorthand\bbl@putsh}
2212 \def\bbl@putsh#1{%
2213   \bbl@ifunset{\bbl@active@\string#1}%
2214   {\bbl@putsh#i#1\@empty\@nnil}%

```

```

2215      {\csname bbl@active@string#1\endcsname}}
2216 \def\bbl@putsh@i#1#2\@nnil{%
2217   \csname\language@group @sh@string#1@%
2218     \ifx\@empty#2\else\string#2\fi\endcsname}
2219 \ifx\bbl@opt@shorthands\@nnil\else
2220   \let\bbl@s@initiate@active@char\initiate@active@char
2221   \def\initiate@active@char#1{%
2222     \bbl@ifshorthand{#1}{\bbl@s@initiate@active@char{#1}}{}}
2223 \let\bbl@s@switch@sh\bbl@switch@sh
2224 \def\bbl@switch@sh#1#2{%
2225   \ifx#2\@nnil\else
2226     \bbl@afterfi
2227     \bbl@ifshorthand{#2}{\bbl@s@switch@sh#1{#2}}{\bbl@switch@sh#1}%
2228   \fi}
2229 \let\bbl@s@activate\bbl@activate
2230 \def\bbl@activate#1{%
2231   \bbl@ifshorthand{#1}{\bbl@s@activate{#1}}{}}
2232 \let\bbl@s@deactivate\bbl@deactivate
2233 \def\bbl@deactivate#1{%
2234   \bbl@ifshorthand{#1}{\bbl@s@deactivate{#1}}{}}
2235 \fi

```

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

```

2236 \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.

```

2237 \def\bbl@prim@s{%
2238   \prime\futurelet\@let@token\bbl@pr@m@s}
2239 \def\bbl@if@primes#1#2{%
2240   \ifx#1\@let@token
2241     \expandafter\@firstoftwo
2242   \else\ifx#2\@let@token
2243     \bbl@afterelse\expandafter\@firstoftwo
2244   \else
2245     \bbl@afterfi\expandafter\@secondoftwo
2246   \fi\fi}
2247 \begingroup
2248   \catcode`\^=7 \catcode`\*=\active \lccode`\*='^
2249   \catcode`\'=12 \catcode`\"=\active \lccode`\"=' '
2250   \lowercase{%
2251     \gdef\bbl@pr@m@s{%
2252       \bbl@if@primes" "%
2253       \pr@@@s
2254       {\bbl@if@primes*^ \pr@@@t\egroup}}}
2255 \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).

```

2256 \initiate@active@char{~}
2257 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }

```

```
2258 \bbl@activate{~}
```

\OT1dqpos The position of the double quote character is different for the OT1 and T1 encodings. It will
 \T1dqpos later be selected using the \f@encoding macro. Therefore we define two macros here to store the position of the character in these encodings.

```
2259 \expandafter\def\csname OT1dqpos\endcsname{127}
```

```
2260 \expandafter\def\csname T1dqpos\endcsname{4}
```

When the macro \f@encoding is undefined (as it is in plain T_EX) we define it here to expand to OT1

```
2261 \ifx\f@encoding\@undefined
```

```
2262 \def\f@encoding{OT1}
```

```
2263 \fi
```

9.6 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.

```
2264 \bbl@trace{Language attributes}
```

```
2265 \newcommand\languageattribute[2]{%
```

```
2266 \def\bbl@tempc{#1}%
```

```
2267 \bbl@fixname\bbl@tempc
```

```
2268 \bbl@iflanguage\bbl@tempc{%
```

```
2269 \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.

```
2270 \ifx\bbl@known@attrs\@undefined
```

```
2271 \in@false
```

```
2272 \else
```

```
2273 \bbl@xin@{,\bbl@tempc-##1,}{,\bbl@known@attrs,}%
```

```
2274 \fi
```

```
2275 \ifin@
```

```
2276 \bbl@warning{%
```

```
2277 You have more than once selected the attribute '##1'\%
```

```
2278 for language #1. Reported}%
```

```
2279 \else
```

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

```
2280 \bbl@exp{%
```

```
2281 \bbl@add@list\bbl@known@attrs{\bbl@tempc-##1}}%
```

```
2282 \edef\bbl@tempa{\bbl@tempc-##1}%
```

```
2283 \expandafter\bbl@ifknown@ttrib\expandafter{\bbl@tempa}\bbl@attributes%
```

```
2284 {\csname\bbl@tempc @attr##1\endcsname}%
```

```
2285 {\@attrerr{\bbl@tempc}{##1}}%
```

```
2286 \fi}}
```

```
2287 \@onlypreamble\languageattribute
```

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

```
2288 \newcommand*{\@attrerr}[2]{%
```

```
2289 \bbl@error
```

```
2290 {The attribute #2 is unknown for language #1.}%
```

```
2291 {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}`.

```

2292 \def\bbl@declare@ttribute#1#2#3{%
2293   \bbl@xin@{,#2,}{,\BabelModifiers,}%
2294   \ifin@
2295     \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
2296   \fi
2297   \bbl@add@list\bbl@attributes{#1-#2}%
2298   \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.

First we need to find out if any attributes were set; if not we're done. Then we need to check the list of known attributes. When we're this far `\ifin@` has a value indicating if the attribute in question was set or not. Just to be safe the code to be executed is 'thrown over the `\fi`'.

```

2299 \def\bbl@ifattributeset#1#2#3#4{%
2300   \ifx\bbl@known@attribs\undefined
2301     \in@false
2302   \else
2303     \bbl@xin@{,#1-#2,}{,\bbl@known@attribs,}%
2304   \fi
2305   \ifin@
2306     \bbl@afterelse#3%
2307   \else
2308     \bbl@afterfi#4%
2309   \fi
2310 }

```

`\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. When a match is found the definition of `\bbl@tempa` is changed. Finally we execute `\bbl@tempa`.

```

2311 \def\bbl@ifknown@ttrib#1#2{%
2312   \let\bbl@tempa\@secondoftwo
2313   \bbl@loopx\bbl@tempb{#2}{%
2314     \expandafter\in@\expandafter{\expandafter,\bbl@tempb,}{,#1,}%
2315     \ifin@
2316       \let\bbl@tempa\@firstoftwo
2317     \else
2318       \fi}%
2319   \bbl@tempa
2320 }

```

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

```

2321 \def\bbl@clear@ttribs{%
2322   \ifx\bbl@attributes\@undefined\else
2323     \bbl@loopx\bbl@tempa{\bbl@attributes}{%
2324       \expandafter\bbl@clear@ttrib\bbl@tempa.
2325     }%
2326     \let\bbl@attributes\@undefined
2327   \fi}
2328 \def\bbl@clear@ttrib#1-#2.{%
2329   \expandafter\let\csname#1@attr@#2\endcsname\@undefined}
2330 \AtBeginDocument{\bbl@clear@ttribs}

```

9.7 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` 2331 \bbl@trace{Macros for saving definitions}
 2332 \def\babel@beginsave{\babel@savecnt\z@}

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

```

2333 \newcount\babel@savecnt
2334 \babel@beginsave

```

`\babel@save` The macro `\babel@save<csname>` saves the current meaning of the control sequence
`\babel@savevariable` `<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.

```

2335 \def\babel@save#1{%
2336   \expandafter\let\csname babel@\number\babel@savecnt\endcsname#1\relax
2337   \toks@\expandafter{\originalTeX\let#1=}%
2338   \bbl@exp{%
2339     \def\\originalTeX{\the\toks@<\babel@\number\babel@savecnt>\relax}}%
2340   \advance\babel@savecnt\@ne}
2341 \def\babel@savevariable#1{%
2342   \toks@\expandafter{\originalTeX #1=}%
2343   \bbl@exp{\def\\originalTeX{\the\toks@the#1\relax}}}

```

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

```

2344 \def\bbl@frenchspacing{%
2345   \ifnum\the\sffcode\`.\=@m
2346     \let\bbl@nonfrenchspacing\relax
2347   \else
2348     \frenchspacing
2349     \let\bbl@nonfrenchspacing\nonfrenchspacing
2350   \fi}
2351 \let\bbl@nonfrenchspacing\nonfrenchspacing

```

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

```

2352 %
2353 \let\bbl@elt\relax
2354 \edef\bbl@fs@chars{%
2355   \bbl@elt{\string.}\@m{3000}\bbl@elt{\string?}\@m{3000}%
2356   \bbl@elt{\string!}\@m{3000}\bbl@elt{\string:}\@m{2000}%
2357   \bbl@elt{\string;}\@m{1500}\bbl@elt{\string,}\@m{1250}}

```

9.8 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.

```

2358 \bbl@trace{Short tags}
2359 \def\babeltags#1{%
2360   \edef\bbl@tempa{\zap@space#1 \@empty}%
2361   \def\bbl@tempb##1=##2\@{%
2362     \edef\bbl@tempc{%
2363       \noexpand\newcommand
2364       \expandafter\noexpand\csname ##1\endcsname{%
2365         \noexpand\protect
2366         \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
2367       \noexpand\newcommand
2368       \expandafter\noexpand\csname text##1\endcsname{%
2369         \noexpand\foreignlanguage{##2}}
2370     \bbl@tempc}%
2371   \bbl@for\bbl@tempa\bbl@tempa{%
2372     \expandafter\bbl@tempb\bbl@tempa\@{}}

```

9.9 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.

```

2373 \bbl@trace{Hyphens}
2374 \@onlypreamble\babelhyphenation
2375 \AtEndOfPackage{%
2376   \newcommand\babelhyphenation[2][\@empty]{%
2377     \ifx\bbl@hyphenation@relax
2378       \let\bbl@hyphenation@\@empty
2379     \fi
2380     \ifx\bbl@hyphlist\@empty\else
2381       \bbl@warning{%
2382         You must not intermingle \string\selectlanguage\space and\%
2383         \string\babelhyphenation\space or some exceptions will not\%
2384         be taken into account. Reported}%
2385     \fi
2386     \ifx\@empty#1%
2387       \protected@edef\bbl@hyphenation@{\bbl@hyphenation@\space#2}%
2388     \else
2389       \bbl@vforeach{#1}{%
2390         \def\bbl@tempa{##1}%
2391         \bbl@fixname\bbl@tempa
2392         \bbl@iflanguage\bbl@tempa{%
2393           \bbl@csarg\protected@edef{hyphenation@\bbl@tempa}{%
2394             \bbl@ifunset{bbl@hyphenation@\bbl@tempa}%
2395             \@empty

```

```

2396          {\csname bbl@hyphenation@\bbl@tempa\endcsname\space}%
2397          #2}}}%
2398      \fi}}

```

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

```

2399 \def\bbl@allowhyphens{\ifvmode\else\nobreak\hskip\z@skip\fi}
2400 \def\bbl@t@one{T1}
2401 \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.

```

2402 \newcommand\babellnullhyphen{\char\hyphenchar\font}
2403 \def\babelhyphen{\active@prefix\babelhyphen\bbl@hyphen}
2404 \def\bbl@hyphen{%
2405   \@ifstar{\bbl@hyphen@i @}{\bbl@hyphen@i \@empty}}
2406 \def\bbl@hyphen@i#1#2{%
2407   \bbl@ifunset{\bbl@hy@#1#2\@empty}%
2408   {\csname bbl@#1usehyphen\endcsname{\discretionary{#2}{}{#2}}}%
2409   {\csname bbl@hy@#1#2\@empty\endcsname}}

```

The following two commands are used to wrap the “hyphen” and set the behavior of the rest of the word – the version with a single @ is used when further hyphenation is allowed, while that with @@ if no more hyphens are allowed. In both cases, if the hyphen is preceded by a positive space, breaking after the hyphen is disallowed.

There should not be a discretionary after a hyphen at the beginning of a word, so it is prevented if preceded by a skip. Unfortunately, this does handle cases like “(-suffix)”.

`\nobreak` is always preceded by `\leavevmode`, in case the shorthand starts a paragraph.

```

2410 \def\bbl@usehyphen#1{%
2411   \leavevmode
2412   \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
2413   \nobreak\hskip\z@skip}
2414 \def\bbl@usehyphen#1{%
2415   \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}

```

The following macro inserts the hyphen char.

```

2416 \def\bbl@hyphenchar{%
2417   \ifnum\hyphenchar\font=\m@ne
2418     \babellnullhyphen
2419   \else
2420     \char\hyphenchar\font
2421   \fi}

```

Finally, we define the hyphen “types”. Their names will not change, so you may use them in ldf’s. After a space, the `\mbox` in `\bbl@hy@nobreak` is redundant.

```

2422 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
2423 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
2424 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
2425 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
2426 \def\bbl@hy@nobreak{\bbl@usehyphen{\mbox{\bbl@hyphenchar}}}
2427 \def\bbl@hy@nobreak{\mbox{\bbl@hyphenchar}}
2428 \def\bbl@hy@repeat{%
2429   \bbl@usehyphen{%
2430     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}
2431 \def\bbl@hy@repeat{%

```

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

```

2432 \bbl@usehyphen{%
2433   \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}
2434 \def\bbl@hy@empty{\hskip\z@skip}
2435 \def\bbl@hy@empty{\discretionary{}{}{}}

```

\bbl@disc For some languages the macro \bbl@disc is used to ease the insertion of discretionaries for letters that behave ‘abnormally’ at a breakpoint.

```

2436 \def\bbl@disc#1#2{\nobreak\discretionary{#2-}{}{#1}\bbl@allowhyphens}

```

9.10 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.

```

2437 \bbl@trace{Multiencoding strings}
2438 \def\bbl@tglobal#1{\global\let#1#1}
2439 \def\bbl@recatcode#1{% TODO. Used only once?
2440   \@tempcnta="7F
2441   \def\bbl@tempa{%
2442     \ifnum\@tempcnta>"FF\else
2443       \catcode\@tempcnta=#1\relax
2444       \advance\@tempcnta\@ne
2445       \expandafter\bbl@tempa
2446     \fi}%
2447   \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@ucllc. The parser is restarted inside \<lang>\bbl@ucllc 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).

```

2448 \@ifpackagewith{babel}{nocase}%
2449   {\let\bbl@patchucllc\relax}%
2450   {\def\bbl@patchucllc{%
2451     \global\let\bbl@patchucllc\relax
2452     \g@addto@macro\@uclclist{\reserved@b{\reserved@b\bbl@ucllc}}%
2453     \gdef\bbl@ucllc##1{%
2454       \let\bbl@encoded\bbl@encoded@ucllc
2455       \bbl@ifunset{\language @bbl@ucllc}% and resumes it
2456       {##1}%
2457       {\let\bbl@tempa##1\relax % Used by LANG@bbl@ucllc
2458        \csname\language @bbl@ucllc\endcsname}%
2459       {\bbl@tolower\@empty}{\bbl@toupper\@empty}}%
2460     \gdef\bbl@tolower{\csname\language @bbl@lc\endcsname}%
2461     \gdef\bbl@toupper{\csname\language @bbl@uc\endcsname}}}

```

```

2462 <<*More package options>> ≡
2463 \DeclareOption{nocase}{}
2464 <</More package options>>

```

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

```

2465 <<*More package options>> ≡
2466 \let\bbl@opt@strings\@nnil % accept strings=value
2467 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
2468 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
2469 \def\BabelStringsDefault{generic}
2470 <</More package options>>

```

Main command This is the main command. With the first use it is redefined to omit the basic setup in subsequent blocks. We make sure strings contain actual letters in the range 128-255, not active characters.

```

2471 \@onlypreamble\StartBabelCommands
2472 \def\StartBabelCommands{%
2473   \begingroup
2474   \bbl@recatcode{11}%
2475   <<Macros local to BabelCommands>>
2476   \def\bbl@provstring##1##2{%
2477     \providecommand##1{##2}%
2478     \bbl@tglobal##1}%
2479   \global\let\bbl@scafter\@empty
2480   \let\StartBabelCommands\bbl@startcmds
2481   \ifx\BabelLanguages\relax
2482     \let\BabelLanguages\CurrentOption
2483   \fi
2484   \begingroup
2485   \let\bbl@screset\@nnil % local flag - disable 1st stopcommands
2486   \StartBabelCommands}
2487 \def\bbl@startcmds{%
2488   \ifx\bbl@screset\@nnil\else
2489     \bbl@usehooks{stopcommands}{}%
2490   \fi
2491   \endgroup
2492   \begingroup
2493   \@ifstar
2494   {\ifx\bbl@opt@strings\@nnil
2495     \let\bbl@opt@strings\BabelStringsDefault
2496     \fi
2497     \bbl@startcmds@i}%
2498   \bbl@startcmds@i}
2499 \def\bbl@startcmds@i#1#2{%
2500   \edef\bbl@L{\zap@space#1 \@empty}%
2501   \edef\bbl@G{\zap@space#2 \@empty}%
2502   \bbl@startcmds@ii}
2503 \let\bbl@startcmds\StartBabelCommands

```

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

Select the behavior of `\SetString`. There are two main cases, depending of if there is an optional argument: without it and `strings=encoded`, strings are defined always; otherwise, they are set only if they are still undefined (ie, fallback values). With labelled blocks and `strings=encoded`, define the strings, but with another value, define strings only if the current label or font encoding is the value of `strings`; otherwise (ie, no strings or a block whose label is not in strings=) do nothing.

We presume the current block is not loaded, and therefore set (above) a couple of default values to gobble the arguments. Then, these macros are redefined if necessary according to several parameters.

```

2504 \newcommand\bb@startcmds@ii[1][\@empty]{%
2505   \let\SetString\@gobbletwo
2506   \let\bb@stringdef\@gobbletwo
2507   \let\AfterBabelCommands\@gobble
2508   \ifx\@empty#1%
2509     \def\bb@sc@label{generic}%
2510     \def\bb@encstring##1##2{%
2511       \ProvideTextCommandDefault##1{##2}%
2512       \bb@tglobal##1%
2513       \expandafter\bb@tglobal\csname\string?\string##1\endcsname}%
2514     \let\bb@sctest\in@true
2515   \else
2516     \let\bb@sc@charset\space % <- zapped below
2517     \let\bb@sc@fontenc\space % <- " "
2518     \def\bb@tempa##1=##2\@nil{%
2519       \bb@csarg\edef{sc@\zap@space##1 \@empty}{##2 }}%
2520     \bb@vforeach{label=#1}{\bb@tempa##1\@nil}%
2521     \def\bb@tempa##1 ##2{% space -> comma
2522       ##1%
2523       \ifx\@empty##2\else\ifx,##1,\else,\fi\bb@afterfi\bb@tempa##2\fi}%
2524     \edef\bb@sc@fontenc{\expandafter\bb@tempa\bb@sc@fontenc\@empty}%
2525     \edef\bb@sc@label{\expandafter\zap@space\bb@sc@label\@empty}%
2526     \edef\bb@sc@charset{\expandafter\zap@space\bb@sc@charset\@empty}%
2527     \def\bb@encstring##1##2{%
2528       \bb@foreach\bb@sc@fontenc{%
2529         \bb@ifunset{T####1}%
2530         }%
2531         {\ProvideTextCommand##1{####1}{##2}%
2532         \bb@tglobal##1%
2533         \expandafter
2534         \bb@tglobal\csname####1\string##1\endcsname}}}%
2535     \def\bb@sctest{%
2536       \bb@xin@{\bb@opt@strings,}{,\bb@sc@label,\bb@sc@fontenc,}}%
2537   \fi
2538   \ifx\bb@opt@strings\@nnil % ie, no strings key -> defaults
2539   \else\ifx\bb@opt@strings\relax % ie, strings=encoded
2540     \let\AfterBabelCommands\bb@aftercmds
2541     \let\SetString\bb@setstring
2542     \let\bb@stringdef\bb@encstring
2543   \else % ie, strings=value
2544     \bb@sctest
2545   \fin@
2546     \let\AfterBabelCommands\bb@aftercmds
2547     \let\SetString\bb@setstring
2548     \let\bb@stringdef\bb@provstring
2549   \fi\fi\fi
2550   \bb@scswitch
2551   \ifx\bb@G\@empty
2552     \def\SetString##1##2{%
2553       \bb@error{Missing group for string \string##1}%
2554       {You must assign strings to some category, typically\\%
2555         captions or extras, but you set none}}%
2556   \fi
2557   \ifx\@empty#1%
2558     \bb@usehooks{defaultcommands}{}%

```

```

2559 \else
2560 \expandafter\@expandtwoargs
2561 \bbl@usehooks{encodedcommands}{\bbl@sc@charset}{\bbl@sc@fontenc}}}%
2562 \fi}

```

There are two versions of `\bbl@scswitch`. The first version is used when `ldfs` are read, and it makes sure `\group\language` is reset, but only once (`\bbl@screset` is used to keep track of this). The second version is used in the preamble and packages loaded after `babel` and does nothing.

The macro `\bbl@forlang` loops `\bbl@L` but its body is executed only if the value is in `\BabelLanguages` (inside `babel`) or `\date\language` is defined (after `babel` has been loaded). There are also two version of `\bbl@forlang`. The first one skips the current iteration if the language is not in `\BabelLanguages` (used in `ldfs`), and the second one skips undefined languages (after `babel` has been loaded).

```

2563 \def\bbl@forlang#1#2{%
2564 \bbl@for#1\bbl@L{%
2565 \bbl@xin{,#1,},{\BabelLanguages,}%
2566 \ifin#2\relax\fi}}
2567 \def\bbl@scswitch{%
2568 \bbl@forlang\bbl@tempa{%
2569 \ifx\bbl@G\@empty\else
2570 \ifx\SetString\@gobbletwo\else
2571 \edef\bbl@GL{\bbl@G\bbl@tempa}%
2572 \bbl@xin{\bbl@GL,},{\bbl@screset,}%
2573 \ifin\else
2574 \global\expandafter\let\csname\bbl@GL\endcsname\@undefined
2575 \xdef\bbl@screset{\bbl@screset,\bbl@GL}%
2576 \fi
2577 \fi
2578 \fi}}
2579 \AtEndOfPackage{%
2580 \def\bbl@forlang#1#2{\bbl@for#1\bbl@L{\bbl@ifunset{date#1}{\#2}}}%
2581 \let\bbl@scswitch\relax}
2582 \@onlypreamble\EndBabelCommands
2583 \def\EndBabelCommands{%
2584 \bbl@usehooks{stopcommands}{}%
2585 \endgroup
2586 \endgroup
2587 \bbl@scafter}
2588 \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.

```

2589 \def\bbl@setstring#1#2{% eg, \prefacename{<string>}
2590 \bbl@forlang\bbl@tempa{%
2591 \edef\bbl@LC{\bbl@tempa\bbl@stripslash#1}%
2592 \bbl@ifunset{\bbl@LC}% eg, \germanchaptername
2593 {\bbl@exp{%
2594 \global\bbbl@add\<\bbl@G\bbl@tempa>{\bbbl@scset\#1\<\bbl@LC>}}}%
2595 {}}%
2596 \def\BabelString{#2}%
2597 \bbl@usehooks{stringprocess}{}%

```



```

2598 \expandafter\bb1@stringdef
2599 \csname\bb1@LC\expandafter\endcsname\expandafter{\BabelString}}

```

Now, some additional stuff to be used when encoded strings are used. Captions then include `\bb1@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`.

```

2600 \ifx\bb1@opt@strings\relax
2601 \def\bb1@scset#1#2{\def#1{\bb1@encoded#2}}
2602 \bb1@patchuclc
2603 \let\bb1@encoded\relax
2604 \def\bb1@encoded@uclc#1{%
2605   \@inmathwarn#1%
2606   \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
2607     \expandafter\ifx\csname ?\string#1\endcsname\relax
2608       \TextSymbolUnavailable#1%
2609     \else
2610       \csname ?\string#1\endcsname
2611     \fi
2612   \else
2613     \csname\cf@encoding\string#1\endcsname
2614   \fi}
2615 \else
2616 \def\bb1@scset#1#2{\def#1{#2}}
2617 \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.

```

2618 <<*Macros local to BabelCommands>> ≡
2619 \def\SetStringLoop##1##2{%
2620   \def\bb1@templ####1{\expandafter\noexpand\csname##1\endcsname}%
2621   \count@\z@
2622   \bb1@loop\bb1@tempa{##2}{% empty items and spaces are ok
2623     \advance\count@\@ne
2624     \toks@\expandafter{\bb1@tempa}%
2625     \bb1@exp{%
2626       \\SetString\bb1@templ{\romannumeral\count@}{\the\toks@}%
2627       \count@=\the\count@\relax}}}%
2628 <</Macros local to BabelCommands>>

```

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

```

2629 \def\bb1@aftercmds#1{%
2630   \toks@\expandafter{\bb1@scafter#1}%
2631   \xdef\bb1@scafter{\the\toks@}}

```

Case mapping The command `\SetCase` provides a way to change the behavior of `\MakeUppercase` and `\MakeLowercase`. `\bb1@tempa` is set by the patched `@uclclist` to the parsing command.

```

2632 <<*Macros local to BabelCommands>> ≡
2633 \newcommand\SetCase[3][{}%
2634   \bb1@patchuclc
2635   \bb1@forlang\bb1@tempa{%
2636     \expandafter\bb1@encstring
2637     \csname\bb1@tempa @bb1@uclc\endcsname{\bb1@tempa##1}%

```

```

2638 \expandafter\bb1@encstring
2639 \csname\bb1@tempa @bb1@uc\endcsname{##2}%
2640 \expandafter\bb1@encstring
2641 \csname\bb1@tempa @bb1@lc\endcsname{##3}}}%
2642 <</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.

```

2643 <<(*Macros local to BabelCommands)>> ≡
2644 \newcommand\SetHyphenMap[1]{%
2645 \bb1@forlang\bb1@tempa{%
2646 \expandafter\bb1@stringdef
2647 \csname\bb1@tempa @bb1@hyphenmap\endcsname{##1}}}%
2648 <</Macros local to BabelCommands>>

```

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

```

2649 \newcommand\BabelLower[2]{% one to one.
2650 \ifnum\lccode#1=#2\else
2651 \babel@savevariable{\lccode#1}%
2652 \lccode#1=#2\relax
2653 \fi}
2654 \newcommand\BabelLowerMM[4]{% many-to-many
2655 \@tempcnta=#1\relax
2656 \@tempcntb=#4\relax
2657 \def\bb1@tempa{%
2658 \ifnum\@tempcnta>#2\else
2659 \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
2660 \advance\@tempcnta#3\relax
2661 \advance\@tempcntb#3\relax
2662 \expandafter\bb1@tempa
2663 \fi}%
2664 \bb1@tempa}
2665 \newcommand\BabelLowerMO[4]{% many-to-one
2666 \@tempcnta=#1\relax
2667 \def\bb1@tempa{%
2668 \ifnum\@tempcnta>#2\else
2669 \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
2670 \advance\@tempcnta#3
2671 \expandafter\bb1@tempa
2672 \fi}%
2673 \bb1@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

2674 <<(*More package options)>> ≡
2675 \DeclareOption{hyphenmap=off}{\chardef\bb1@opt@hyphenmap\z@}
2676 \DeclareOption{hyphenmap=first}{\chardef\bb1@opt@hyphenmap\@ne}
2677 \DeclareOption{hyphenmap=select}{\chardef\bb1@opt@hyphenmap\tw@}
2678 \DeclareOption{hyphenmap=other}{\chardef\bb1@opt@hyphenmap\thr@@}
2679 \DeclareOption{hyphenmap=other*}{\chardef\bb1@opt@hyphenmap4\relax}
2680 <</More package options>>

```

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

```

2681 \AtEndOfPackage{%
2682 \ifx\bb1@opt@hyphenmap\undefined
2683 \bb1@xin@{,}{\bb1@language@opts}%
2684 \chardef\bb1@opt@hyphenmap\ifin4\else\@ne\fi
2685 \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.

```

2686 \newcommand\setlocalecaption{% TODO. Catch typos. What about ensure?
2687 \@ifstar\bb1@setcaption@s\bb1@setcaption@x}
2688 \def\bb1@setcaption@x#1#2#3{% language caption-name string
2689 \edef\bb1@tempa{#1}%
2690 \edef\bb1@tempd{%
2691 \expandafter\expandafter\expandafter
2692 \strip@prefix\expandafter\meaning\csname captions#1\endcsname}%
2693 \bb1@xin@
2694 {\expandafter\string\csname #2name\endcsname}%
2695 {\bb1@tempd}%
2696 \ifin@ % Renew caption
2697 \bb1@xin@{\string\bb1@scset}{\bb1@tempd}%
2698 \ifin@
2699 \bb1@exp{%
2700 \\\bb1@ifsamestring{\bb1@tempa}{\language}%
2701 {\\\bb1@scset\<#2name>\<#1#2name>}}%
2702 {}}%
2703 \else % Old way converts to new way
2704 \bb1@ifunset{#1#2name}%
2705 {\bb1@exp{%
2706 \\\bb1@add\<captions#1>\def\<#2name>\<#1#2name>}}%
2707 \\\bb1@ifsamestring{\bb1@tempa}{\language}%
2708 {\def\<#2name>\<#1#2name>}}%
2709 {}}%
2710 {}}%
2711 \fi
2712 \else
2713 \bb1@xin@{\string\bb1@scset}{\bb1@tempd}% New
2714 \ifin@ % New way
2715 \bb1@exp{%
2716 \\\bb1@add\<captions#1>\\\bb1@scset\<#2name>\<#1#2name>}}%
2717 \\\bb1@ifsamestring{\bb1@tempa}{\language}%
2718 {\\\bb1@scset\<#2name>\<#1#2name>}}%
2719 {}}%
2720 \else % Old way, but defined in the new way
2721 \bb1@exp{%
2722 \\\bb1@add\<captions#1>\def\<#2name>\<#1#2name>}}%
2723 \\\bb1@ifsamestring{\bb1@tempa}{\language}%
2724 {\def\<#2name>\<#1#2name>}}%
2725 {}}%
2726 \fi%
2727 \fi
2728 \@namedef{#1#2name}{#3}%
2729 \toks@ \expandafter{\bb1@captionslist}%
2730 \bb1@exp{\in@{\<#2name>}{\the\toks@}}%
2731 \ifin@ \else
2732 \bb1@exp{\\\bb1@add\\bb1@captionslist{\<#2name>}}%
2733 \bb1@tglobal\bb1@captionslist
2734 \fi}
2735 % \def\bb1@setcaption@s#1#2#3{} % Not yet implemented

```

9.11 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.

```
2736 \bbl@trace{Macros related to glyphs}
2737 \def\set@low@box#1{\setbox\tw@hbox{,}\setbox\z@hbox{#1}%
2738   \dimen\z@ht\z@ \advance\dimen\z@ -ht\tw@%
2739   \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.

```
2740 \def\save@sf@q#1{\leavevmode
2741   \begingroup
2742   \edef\@SF{\spacefactor\the\spacefactor}#1\@SF
2743   \endgroup}
```

9.12 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`.

9.12.1 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.

```
2744 \ProvideTextCommand{\quotedblbase}{OT1}{%
2745   \save@sf@q{\set@low@box{\textquotedblright\}}%
2746   \box\z@\kern-.04em\bbl@allowhyphens}}
```

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

```
2747 \ProvideTextCommandDefault{\quotedblbase}{%
2748   \UseTextSymbol{OT1}{\quotedblbase}}
```

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

```
2749 \ProvideTextCommand{\quotesinglbase}{OT1}{%
2750   \save@sf@q{\set@low@box{\textquoteright\}}%
2751   \box\z@\kern-.04em\bbl@allowhyphens}}
```

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

```
2752 \ProvideTextCommandDefault{\quotesinglbase}{%
2753   \UseTextSymbol{OT1}{\quotesinglbase}}
```

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

```
2754 \ProvideTextCommand{\guillemetleft}{OT1}{%
2755   \ifmmode
2756     \ll
2757   \else
2758     \save@sf@q{\nobreak
2759       \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bbl@allowhyphens}%
2760   \fi}
2761 \ProvideTextCommand{\guillemetright}{OT1}{%
2762   \ifmmode
2763     \gg
```

```

2764 \else
2765   \save@sf@q{\nobreak
2766     \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bbl@allowhyphens}%
2767   \fi}
2768 \ProvideTextCommand{\guillemotleft}{OT1}{%
2769   \ifmmode
2770     \ll
2771   \else
2772     \save@sf@q{\nobreak
2773       \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bbl@allowhyphens}%
2774     \fi}
2775 \ProvideTextCommand{\guillemotright}{OT1}{%
2776   \ifmmode
2777     \gg
2778   \else
2779     \save@sf@q{\nobreak
2780       \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bbl@allowhyphens}%
2781     \fi}

```

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

```

2782 \ProvideTextCommandDefault{\guillemetleft}{%
2783   \UseTextSymbol{OT1}{\guillemetleft}}
2784 \ProvideTextCommandDefault{\guillemetright}{%
2785   \UseTextSymbol{OT1}{\guillemetright}}
2786 \ProvideTextCommandDefault{\guillemotleft}{%
2787   \UseTextSymbol{OT1}{\guillemotleft}}
2788 \ProvideTextCommandDefault{\guillemotright}{%
2789   \UseTextSymbol{OT1}{\guillemotright}}

```

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

```

2790 \ProvideTextCommand{\guilsinglleft}{OT1}{%
2791   \ifmmode
2792     <%
2793   \else
2794     \save@sf@q{\nobreak
2795       \raise.2ex\hbox{$\scriptscriptstyle<$}\bbl@allowhyphens}%
2796     \fi}
2797 \ProvideTextCommand{\guilsinglright}{OT1}{%
2798   \ifmmode
2799     >%
2800   \else
2801     \save@sf@q{\nobreak
2802       \raise.2ex\hbox{$\scriptscriptstyle>$}\bbl@allowhyphens}%
2803     \fi}

```

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

```

2804 \ProvideTextCommandDefault{\guilsinglleft}{%
2805   \UseTextSymbol{OT1}{\guilsinglleft}}
2806 \ProvideTextCommandDefault{\guilsinglright}{%
2807   \UseTextSymbol{OT1}{\guilsinglright}}

```

9.12.2 Letters

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

```

2808 \DeclareTextCommand{\ij}{OT1}{%

```

```

2809 i\kern-0.02em\bbl@allowhyphens j}
2810 \DeclareTextCommand{\IJ}{OT1}{%
2811 I\kern-0.02em\bbl@allowhyphens J}
2812 \DeclareTextCommand{\ij}{T1}{\char188}
2813 \DeclareTextCommand{\IJ}{T1}{\char156}

```

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

```

2814 \ProvideTextCommandDefault{\ij}{%
2815 \UseTextSymbol{OT1}{\ij}}
2816 \ProvideTextCommandDefault{\IJ}{%
2817 \UseTextSymbol{OT1}{\IJ}}

```

`\dj` The croatian language needs the letters `\dj` and `\DJ`; they are available in the T1 encoding, `\DJ` but not in the OT1 encoding by default.

Some code to construct these glyphs for the OT1 encoding was made available to me by Stipčević Mario, (stipcevic@olimp.irb.hr).

```

2818 \def\crrtic@{\hrule height0.1ex width0.3em}
2819 \def\crttic@{\hrule height0.1ex width0.33em}
2820 \def\ddj@{%
2821 \setbox0\hbox{d}\dimen@=\ht0
2822 \advance\dimen@1ex
2823 \dimen@.45\dimen@
2824 \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2825 \advance\dimen@ii.5ex
2826 \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
2827 \def\DDJ@{%
2828 \setbox0\hbox{D}\dimen@=.55\ht0
2829 \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2830 \advance\dimen@ii.15ex % correction for the dash position
2831 \advance\dimen@ii-.15\fontdimen7\font % correction for cmtt font
2832 \dimen\thr@@\expandafter\rem@pt\the\fontdimen7\font\dimen@
2833 \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crttic@}}}}
2834 %
2835 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
2836 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}

```

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

```

2837 \ProvideTextCommandDefault{\dj}{%
2838 \UseTextSymbol{OT1}{\dj}}
2839 \ProvideTextCommandDefault{\DJ}{%
2840 \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.

```

2841 \DeclareTextCommand{\SS}{OT1}{SS}
2842 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}

```

9.12.3 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 2843 \ProvideTextCommandDefault{\glq}{%
2844 \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}

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

2845 \ProvideTextCommand{\grq}{T1}{%
2846 \textormath{\kern\z@\textquoteleft}{\mbox{\textquoteleft}}}
2847 \ProvideTextCommand{\grq}{TU}{%
2848 \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
2849 \ProvideTextCommand{\grq}{OT1}{%
2850 \save@sf@q{\kern-.0125em
2851 \textormath{\textquoteleft}{\mbox{\textquoteleft}}}%
2852 \kern.07em\relax}}
2853 \ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}
```

`\glqq` The ‘german’ double quotes.

```
\grqq 2854 \ProvideTextCommandDefault{\glqq}{%
2855 \textormath{\quotedblbase}{\mbox{\quotedblbase}}}

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

2856 \ProvideTextCommand{\grqq}{T1}{%
2857 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
2858 \ProvideTextCommand{\grqq}{TU}{%
2859 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
2860 \ProvideTextCommand{\grqq}{OT1}{%
2861 \save@sf@q{\kern-.07em
2862 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}%
2863 \kern.07em\relax}}
2864 \ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}
```

`\flq` The ‘french’ single guillemets.

```
\frq 2865 \ProvideTextCommandDefault{\flq}{%
2866 \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}
2867 \ProvideTextCommandDefault{\frq}{%
2868 \textormath{\guilsinglright}{\mbox{\guilsinglright}}}
```

`\flqq` The ‘french’ double guillemets.

```
\frqq 2869 \ProvideTextCommandDefault{\flqq}{%
2870 \textormath{\guillemetleft}{\mbox{\guillemetleft}}}
2871 \ProvideTextCommandDefault{\frqq}{%
2872 \textormath{\guillemetright}{\mbox{\guillemetright}}}
```

9.12.4 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
`\umlautlow` positioning, the default will be `\umlauthigh` (the normal positioning).

```
2873 \def\umlauthigh{%
2874 \def\bb1@umlauta##1{\leavevmode\bggroup%
2875 \expandafter\accent\csname\f@encoding dqpos\endcsname
```

```

2876      ##1\bb1@allowhyphens\egroup}%
2877 \let\bb1@umlaut\bb1@umlaut
2878 \def\umlautlow{%
2879 \def\bb1@umlaut{\protect\lower@umlaut}}
2880 \def\umlautelow{%
2881 \def\bb1@umlaut{\protect\lower@umlaut}}
2882 \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.

```

2883 \expandafter\ifx\csname U@D\endcsname\relax
2884 \csname newdimen\endcsname\U@D
2885 \fi

```

The following code fools T_EX'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.

```

2886 \def\lower@umlaut#1{%
2887 \leavevmode\bgroup
2888 \U@D 1ex%
2889 {\setbox\z@\hbox{%
2890 \expandafter\char\csname\fontencoding dqpos\endcsname}%
2891 \dimen@ -.45ex\advance\dimen@\ht\z@
2892 \ifdim 1ex<\dimen@ \fontdimen5\font\dimen@ \fi}%
2893 \expandafter\accent\csname\fontencoding dqpos\endcsname
2894 \fontdimen5\font\U@D #1%
2895 \egroup}

```

For all vowels we declare \" to be a composite command which uses \bb1@umlaut or \bb1@umlaut 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 \bb1@umlaut and/or \bb1@umlaut for a language in the corresponding ldf (using the babel switching mechanism, of course).

```

2896 \AtBeginDocument{%
2897 \DeclareTextCompositeCommand{\"}{OT1}{a}{\bb1@umlaut{a}}%
2898 \DeclareTextCompositeCommand{\"}{OT1}{e}{\bb1@umlaut{e}}%
2899 \DeclareTextCompositeCommand{\"}{OT1}{i}{\bb1@umlaut{ i}}%
2900 \DeclareTextCompositeCommand{\"}{OT1}{o}{\bb1@umlaut{o}}%
2901 \DeclareTextCompositeCommand{\"}{OT1}{u}{\bb1@umlaut{u}}%
2902 \DeclareTextCompositeCommand{\"}{OT1}{A}{\bb1@umlaut{A}}%
2903 \DeclareTextCompositeCommand{\"}{OT1}{E}{\bb1@umlaut{E}}%
2904 \DeclareTextCompositeCommand{\"}{OT1}{I}{\bb1@umlaut{I}}%
2905 \DeclareTextCompositeCommand{\"}{OT1}{O}{\bb1@umlaut{O}}%
2906 \DeclareTextCompositeCommand{\"}{OT1}{U}{\bb1@umlaut{U}}%
2907 \DeclareTextCompositeCommand{\"}{OT1}{U}{\bb1@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.


```

2908 \ifx\l@english\@undefined
2909   \chardef\l@english\z@
2910 \fi
2911 % The following is used to cancel rules in ini files (see Amharic).
2912 \ifx\l@babelnohyphens\@undefined
2913   \newlanguage\l@babelnohyphens
2914 \fi

```

9.13 Layout

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

```

2915 \bbl@trace{Bidi layout}
2916 \providecommand\IfBabelLayout[3]{#3}%
2917 \newcommand\BabelPatchSection[1]{%
2918   \@ifundefined{#1}{}{%
2919     \bbl@exp{\let\<bbl@ss@#1>\<#1>}%
2920     \@namedef{#1}{%
2921       \@ifstar{\bbl@presec@#1}%
2922       {\@dblarg{\bbl@presec@x{#1}}}}%
2923 \def\bbl@presec@x#1[#2]#3{%
2924   \bbl@exp{%
2925     \\\select@language@x{\bbl@main@language}%
2926     \\\bbl@cs{sspre@#1}%
2927     \\\bbl@cs{ss@#1}%
2928     [\\foreignlanguage{\language}{\unexpanded{#2}}}%
2929     {\\foreignlanguage{\language}{\unexpanded{#3}}}%
2930     \\\select@language@x{\language}}}%
2931 \def\bbl@presec@#1#2{%
2932   \bbl@exp{%
2933     \\\select@language@x{\bbl@main@language}%
2934     \\\bbl@cs{sspre@#1}%
2935     \\\bbl@cs{ss@#1}*%
2936     {\\foreignlanguage{\language}{\unexpanded{#2}}}%
2937     \\\select@language@x{\language}}}%
2938 \IfBabelLayout{sectioning}%
2939   {\BabelPatchSection{part}%
2940    \BabelPatchSection{chapter}%
2941    \BabelPatchSection{section}%
2942    \BabelPatchSection{subsection}%
2943    \BabelPatchSection{subsubsection}%
2944    \BabelPatchSection{paragraph}%
2945    \BabelPatchSection{subparagraph}%
2946    \def\babel@toc#1{%
2947      \select@language@x{\bbl@main@language}}}%
2948 \IfBabelLayout{captions}%
2949   {\BabelPatchSection{caption}}}%

```

9.14 Load engine specific macros

```

2950 \bbl@trace{Input engine specific macros}
2951 \ifcase\bbl@engine
2952   \input txtbabel.def
2953 \or
2954   \input luababel.def
2955 \or
2956   \input xebabel.def
2957 \fi

```

9.15 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.

```
2958 \bbl@trace{Creating languages and reading ini files}
2959 \newcommand\babelprovide[2][{}]{%
2960   \let\bbl@savelangname\language
2961   \edef\bbl@savelocaleid{\the\localeid}%
2962   % Set name and locale id
2963   \edef\language{#2}%
2964   % \global\@namedef\bbl@lcname{#2}{#2}%
2965   \bbl@id@assign
2966   \let\bbl@KVP@captions\@nil
2967   \let\bbl@KVP@date\@nil
2968   \let\bbl@KVP@import\@nil
2969   \let\bbl@KVP@main\@nil
2970   \let\bbl@KVP@script\@nil
2971   \let\bbl@KVP@language\@nil
2972   \let\bbl@KVP@hyphenrules\@nil
2973   \let\bbl@KVP@mapfont\@nil
2974   \let\bbl@KVP@maparabic\@nil
2975   \let\bbl@KVP@mapdigits\@nil
2976   \let\bbl@KVP@intraspace\@nil
2977   \let\bbl@KVP@intrapenalty\@nil
2978   \let\bbl@KVP@onchar\@nil
2979   \let\bbl@KVP@alph\@nil
2980   \let\bbl@KVP@Alph\@nil
2981   \let\bbl@KVP@labels\@nil
2982   \bbl@csarg\let{KVP@labels*}\@nil
2983   \bbl@forkv{#1}{% TODO - error handling
2984     \in@{/}{##1}%
2985     \ifin@
2986       \bbl@renewinikey##1\@{##2}%
2987     \else
2988       \bbl@csarg\def{KVP@##1}{##2}%
2989     \fi}%
2990   % == import, captions ==
2991   \ifx\bbl@KVP@import\@nil\else
2992     \bbl@exp{\bbl@ifblank{\bbl@KVP@import}}%
2993     {\ifx\bbl@initoload\relax
2994       \begingroup
2995         \def\BabelBeforeIni##1##2{\gdef\bbl@KVP@import{##1}\endinput}%
2996         \bbl@input@texini{##2}%
2997       \endgroup
2998     \else
2999       \xdef\bbl@KVP@import{\bbl@initoload}%
3000     \fi}%
3001   {}%
3002 \fi
3003 \ifx\bbl@KVP@captions\@nil
3004   \let\bbl@KVP@captions\bbl@KVP@import
3005 \fi
3006 % Load ini
3007 \bbl@ifunset{date#2}%
3008   {\bbl@provide@new{#2}}%
3009   {\bbl@ifblank{#1}%
3010     {\bbl@error
```

```

3011         {If you want to modify `#2' you must tell how in\\%
3012         the optional argument. See the manual for the\\%
3013         available options.}%
3014         {Use this macro as documented}}%
3015         {\bbl@provide@renew{#2}}}%
3016 % Post tasks
3017 \bbl@ifunset{\bbl@extracaps@#2}%
3018     {\bbl@exp{\babelensure[exclude=\\today]{#2}}}%
3019     {\toks@\expandafter\expandafter\expandafter
3020     {\csname bbl@extracaps@#2\endcsname}%
3021     \bbl@exp{\babelensure[exclude=\\today,include=\the\toks@]{#2}}}%
3022 \bbl@ifunset{\bbl@ensure@language}%
3023     {\bbl@exp{%
3024         \\DeclareRobustCommand<\bbl@ensure@language>[1]{%
3025             \\foreignlanguage{\language}%
3026             {###1}}}%
3027     }%
3028 \bbl@exp{%
3029     \\bbl@tglobal<\bbl@ensure@language>%
3030     \\bbl@tglobal<\bbl@ensure@language\space>%
3031 % At this point all parameters are defined if 'import'. Now we
3032 % execute some code depending on them. But what about if nothing was
3033 % imported? We just load the very basic parameters.
3034 \bbl@load@basic{#2}%
3035 % == script, language ==
3036 % Override the values from ini or defines them
3037 \ifx\bbl@KVP@script\@nil\else
3038     \bbl@csarg\edef{sname@#2}{\bbl@KVP@script}%
3039 \fi
3040 \ifx\bbl@KVP@language\@nil\else
3041     \bbl@csarg\edef{lname@#2}{\bbl@KVP@language}%
3042 \fi
3043 % == onchar ==
3044 \ifx\bbl@KVP@onchar\@nil\else
3045     \bbl@luahyphenate
3046     \directlua{
3047         if Babel.locale_mapped == nil then
3048             Babel.locale_mapped = true
3049             Babel.linebreaking.add_before(Babel.locale_map)
3050             Babel.loc_to_scr = {}
3051             Babel.chr_to_loc = Babel.chr_to_loc or {}
3052         end}%
3053 \bbl@xin@{ ids }{ \bbl@KVP@onchar\space}%
3054 \ifin@
3055     \ifx\bbl@starthyphens\@undefined % Needed if no explicit selection
3056         \AddBabelHook{babel-onchar}{beforestart}{\bbl@starthyphens}%
3057     \fi
3058     \bbl@exp{\bbl@add\bbl@starthyphens
3059     {\bbl@patterns@lua{\language}}}%
3060 % TODO - error/warning if no script
3061     \directlua{
3062         if Babel.script_blocks['\bbl@cl{sbcp}'] then
3063             Babel.loc_to_scr[\the\localeid] =
3064             Babel.script_blocks['\bbl@cl{sbcp}']
3065             Babel.locale_props[\the\localeid].lc = \the\localeid\space
3066             Babel.locale_props[\the\localeid].lg = \the\nameuse{1@language}\space
3067         end
3068     }%
3069 \fi

```

```

3070 \bbl@xin@{ fonts }{ \bbl@KVP@onchar\space}%
3071 \ifin@
3072 \bbl@ifunset{\bbl@lsys@\language}\bbl@provide@lsys{\language}}{}%
3073 \bbl@ifunset{\bbl@wdir@\language}\bbl@provide@dirs{\language}}{}%
3074 \directlua{
3075   if Babel.script_blocks['\bbl@cl{sbc}'] then
3076     Babel.loc_to_scr[\the\localeid] =
3077       Babel.script_blocks['\bbl@cl{sbc}']
3078   end}%
3079 \ifx\bbl@mapselect\undefined
3080 \AtBeginDocument{%
3081   \expandafter\bbl@add\csname selectfont \endcsname{\bbl@mapselect}%
3082   {\selectfont}}%
3083 \def\bbl@mapselect{%
3084   \let\bbl@mapselect\relax
3085   \edef\bbl@prefontid{\fontid\font}%
3086 \def\bbl@mapdir##1{%
3087   {\def\language{##1}%
3088    \let\bbl@ifrestoring\@firstoftwo % To avoid font warning
3089    \bbl@switchfont
3090    \directlua{
3091      Babel.locale_props[\the\csname bbl@id@##1\endcsname]
3092        ['\bbl@prefontid'] = \fontid\font\space}}}%
3093 \fi
3094 \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language}}}%
3095 \fi
3096 % TODO - catch non-valid values
3097 \fi
3098 % == mapfont ==
3099 % For bidi texts, to switch the font based on direction
3100 \ifx\bbl@KVP@mapfont\@nil\else
3101 \bbl@ifsamestring{\bbl@KVP@mapfont}{direction}}{}%
3102 {\bbl@error{Option '\bbl@KVP@mapfont' unknown for\the
3103   mapfont. Use 'direction'.%
3104   {See the manual for details.}}}%
3105 \bbl@ifunset{\bbl@lsys@\language}\bbl@provide@lsys{\language}}{}%
3106 \bbl@ifunset{\bbl@wdir@\language}\bbl@provide@dirs{\language}}{}%
3107 \ifx\bbl@mapselect\undefined
3108 \AtBeginDocument{%
3109   \expandafter\bbl@add\csname selectfont \endcsname{\bbl@mapselect}%
3110   {\selectfont}}%
3111 \def\bbl@mapselect{%
3112   \let\bbl@mapselect\relax
3113   \edef\bbl@prefontid{\fontid\font}%
3114 \def\bbl@mapdir##1{%
3115   {\def\language{##1}%
3116    \let\bbl@ifrestoring\@firstoftwo % avoid font warning
3117    \bbl@switchfont
3118    \directlua{Babel.fontmap
3119      [\the\csname bbl@wdir@##1\endcsname]
3120      [\bbl@prefontid]=\fontid\font}}}%
3121 \fi
3122 \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language}}}%
3123 \fi
3124 % == Line breaking: intraspace, intrapenalty ==
3125 % For CJK, East Asian, Southeast Asian, if interspace in ini
3126 \ifx\bbl@KVP@intraspace\@nil\else % We can override the ini or set
3127 \bbl@csarg\edef{intsp@#2}{\bbl@KVP@intraspace}%
3128 \fi

```

```

3129 \bbl@provide@intraspace
3130 % == Line breaking: hyphenate.other.locale ==
3131 \bbl@ifunset{bbl@hyotl@languagename}{}%
3132 {\bbl@csarg\bbl@replace{hyotl@languagename}{ }{,}%
3133 \bbl@startcommands*{languagename}{}%
3134 \bbl@csarg\bbl@foreach{hyotl@languagename}{%
3135 \ifcase\bbl@engine
3136 \ifnum##1<257
3137 \SetHyphenMap{\BabelLower{##1}{##1}}%
3138 \fi
3139 \else
3140 \SetHyphenMap{\BabelLower{##1}{##1}}%
3141 \fi}%
3142 \bbl@endcommands}%
3143 % == Line breaking: hyphenate.other.script ==
3144 \bbl@ifunset{bbl@hyots@languagename}{}%
3145 {\bbl@csarg\bbl@replace{hyots@languagename}{ }{,}%
3146 \bbl@csarg\bbl@foreach{hyots@languagename}{%
3147 \ifcase\bbl@engine
3148 \ifnum##1<257
3149 \global\lccode##1=##1\relax
3150 \fi
3151 \else
3152 \global\lccode##1=##1\relax
3153 \fi}}%
3154 % == Counters: maparabic ==
3155 % Native digits, if provided in ini (TeX level, xe and lua)
3156 \ifcase\bbl@engine\else
3157 \bbl@ifunset{bbl@dgnat@languagename}{}%
3158 {\expandafter\ifx\csname bbl@dgnat@languagename\endcsname\@empty\else
3159 \expandafter\expandafter\expandafter
3160 \bbl@setdigits\csname bbl@dgnat@languagename\endcsname
3161 \ifx\bbl@KVP@maparabic\@nil\else
3162 \ifx\bbl@latinarabic\@undefined
3163 \expandafter\let\expandafter\@arabic
3164 \csname bbl@counter@languagename\endcsname
3165 \else % ie, if layout=counters, which redefines \@arabic
3166 \expandafter\let\expandafter\bbl@latinarabic
3167 \csname bbl@counter@languagename\endcsname
3168 \fi
3169 \fi
3170 \fi}%
3171 \fi
3172 % == Counters: mapdigits ==
3173 % Native digits (lua level).
3174 \ifodd\bbl@engine
3175 \ifx\bbl@KVP@mapdigits\@nil\else
3176 \bbl@ifunset{bbl@dgnat@languagename}{}%
3177 {\RequirePackage{luatexbase}%
3178 \bbl@activate@preotf
3179 \directlua{
3180 Babel = Babel or {} %% -> presets in luababel
3181 Babel.digits_mapped = true
3182 Babel.digits = Babel.digits or {}
3183 Babel.digits[\the\localeid] =
3184 table.pack(string.utfvalue('\bbl@cl{dgnat}'))
3185 if not Babel.numbers then
3186 function Babel.numbers(head)
3187 local LOCALE = luatexbase.registernumber'bbl@attr@locale'

```

```

3188         local GLYPH = node.id'glyph'
3189         local inmath = false
3190         for item in node.traverse(head) do
3191             if not inmath and item.id == GLYPH then
3192                 local temp = node.get_attribute(item, LOCALE)
3193                 if Babel.digits[temp] then
3194                     local chr = item.char
3195                     if chr > 47 and chr < 58 then
3196                         item.char = Babel.digits[temp][chr-47]
3197                     end
3198                 end
3199             elseif item.id == node.id'math' then
3200                 inmath = (item.subtype == 0)
3201             end
3202         end
3203         return head
3204     end
3205 end
3206 }}%
3207 \fi
3208 \fi
3209 % == Counters: alph, Alph ==
3210 % What if extras<lang> contains a \babel@save\@alph? It won't be
3211 % restored correctly when exiting the language, so we ignore
3212 % this change with the \bbl@alph@saved trick.
3213 \ifx\bbl@KVP@alph\@nil\else
3214     \toks@\expandafter\expandafter\expandafter{%
3215         \csname extras\language\endcsname}%
3216     \bbl@exp{%
3217         \def\<extras\language>{%
3218             \let\\bbl@alph@saved\\@alph
3219             \the\toks@
3220             \let\\@alph\\bbl@alph@saved
3221             \\babel@save\\@alph
3222             \let\\@alph<bbl@cntr@\bbl@KVP@alph @\language>}}%
3223 \fi
3224 \ifx\bbl@KVP@Alph\@nil\else
3225     \toks@\expandafter\expandafter\expandafter{%
3226         \csname extras\language\endcsname}%
3227     \bbl@exp{%
3228         \def\<extras\language>{%
3229             \let\\bbl@Alph@saved\\@Alph
3230             \the\toks@
3231             \let\\@Alph\\bbl@Alph@saved
3232             \\babel@save\\@Alph
3233             \let\\@Alph<bbl@cntr@\bbl@KVP@Alph @\language>}}%
3234 \fi
3235 % == require.babel in ini ==
3236 % To load or reload the babel-*.tex, if require.babel in ini
3237 \ifx\bbl@beforestart\relax\else % But not in doc aux or body
3238     \bbl@ifunset{bbl@rqtex@\language}%
3239     {\expandafter\ifx\csname bbl@rqtex@\language\endcsname\@empty\else
3240         \let\BabelBeforeIni\@gobbletwo
3241         \chardef\atcatcode=\catcode`\@
3242         \catcode`\@=11\relax
3243         \bbl@input@texini{\bbl@cs{rqtex@\language}}%
3244         \catcode`\@=\atcatcode
3245         \let\atcatcode\relax
3246     \fi}%

```

```

3247 \fi
3248 % == main ==
3249 \ifx\bbbl@KVP@main\@nil % Restore only if not 'main'
3250 \let\language\bbbl@savelangname
3251 \chardef\localeid\bbbl@savelocaleid\relax
3252 \fi}

```

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

```

3253 \def\bbbl@provide@new#1{%
3254 \namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
3255 \namedef{extras#1}{}%
3256 \namedef{noextras#1}{}%
3257 \bbbl@startcommands*{#1}{captions}%
3258 \ifx\bbbl@KVP@captions\@nil % and also if import, implicit
3259 \def\bbbl@tempb##1{% elt for \bbbl@captionslist
3260 \ifx##1\@empty\else
3261 \bbbl@exp{%
3262 \\\SetString\\##1{%
3263 \\\bbbl@nocaption{\bbbl@stripslash##1}{#1\bbbl@stripslash##1}}}%
3264 \expandafter\bbbl@tempb
3265 \fi}%
3266 \expandafter\bbbl@tempb\bbbl@captionslist\@empty
3267 \else
3268 \ifx\bbbl@initoload\relax
3269 \bbbl@read@ini{\bbbl@KVP@captions}0% Here letters cat = 11
3270 \else
3271 \bbbl@read@ini{\bbbl@initoload}0% Here all letters cat = 11
3272 \fi
3273 \bbbl@after@ini
3274 \bbbl@savestrings
3275 \fi
3276 \StartBabelCommands*{#1}{date}%
3277 \ifx\bbbl@KVP@import\@nil
3278 \bbbl@exp{%
3279 \\\SetString\\today{\bbbl@nocaption{today}{#1today}}}%
3280 \else
3281 \bbbl@savetoday
3282 \bbbl@savedate
3283 \fi
3284 \bbbl@endcommands
3285 \bbbl@load@basic{#1}%
3286 % == hyphenmins == (only if new)
3287 \bbbl@exp{%
3288 \gdef\<#1hyphenmins>{%
3289 {\bbbl@ifunset{\bbbl@lfthm@#1}{2}{\bbbl@cs{lfthm@#1}}}%
3290 {\bbbl@ifunset{\bbbl@rgthm@#1}{3}{\bbbl@cs{rgthm@#1}}}}}%
3291 % == hyphenrules ==
3292 \bbbl@provide@hyphens{#1}%
3293 % == frenchspacing == (only if new)
3294 \bbbl@ifunset{\bbbl@frspc@#1}{}%
3295 {\edef\bbbl@tempa{\bbbl@cl{frspc}}%
3296 \edef\bbbl@tempa{\expandafter\@car\bbbl@tempa\@nil}%
3297 \if u\bbbl@tempa % do nothing
3298 \else\if n\bbbl@tempa % non french
3299 \expandafter\bbbl@add\csname extras#1\endcsname{%
3300 \let\bbbl@elt\bbbl@fs@elt@i
3301 \bbbl@fs@chars}%
3302 \else\if y\bbbl@tempa % french
3303 \expandafter\bbbl@add\csname extras#1\endcsname{%

```

```

3304         \let\bbl@elt\bbl@fs@elt@ii
3305         \bbl@fs@chars}%
3306     \fi\fi\fi}%
3307 %
3308 \ifx\bbl@KVP@main\@nil\else
3309     \expandafter\main@language\expandafter{#1}%
3310 \fi}
3311 % A couple of macros used above, to avoid hashes #####...
3312 \def\bbl@fs@elt@i#1#2#3{%
3313     \ifnum\sfcode`#1=#2\relax
3314         \babel@savevariable{\sfcode`#1}%
3315         \sfcode`#1=#3\relax
3316     \fi}%
3317 \def\bbl@fs@elt@ii#1#2#3{%
3318     \ifnum\sfcode`#1=#3\relax
3319         \babel@savevariable{\sfcode`#1}%
3320         \sfcode`#1=#2\relax
3321     \fi}%
3322 %
3323 \def\bbl@provide@renew#1{%
3324     \ifx\bbl@KVP@captions\@nil\else
3325         \StartBabelCommands*{#1}{captions}%
3326         \bbl@read@ini{\bbl@KVP@captions}0%   Here all letters cat = 11
3327         \bbl@after@ini
3328         \bbl@savestrings
3329         \EndBabelCommands
3330     \fi
3331     \ifx\bbl@KVP@import\@nil\else
3332         \StartBabelCommands*{#1}{date}%
3333         \bbl@savetoday
3334         \bbl@savestate
3335         \EndBabelCommands
3336     \fi
3337 % == hyphenrules ==
3338     \bbl@provide@hyphens{#1}}
3339 % Load the basic parameters (ids, typography, counters, and a few
3340 % more), while captions and dates are left out. But it may happen some
3341 % data has been loaded before automatically, so we first discard the
3342 % saved values.
3343 \def\bbl@linebreak@export{%
3344     \bbl@exportkey{lnbrk}{typography.linebreaking}{h}%
3345     \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
3346     \bbl@exportkey{lfthm}{typography.lefthyphenmin}{2}%
3347     \bbl@exportkey{rgthm}{typography.righthyphenmin}{3}%
3348     \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
3349     \bbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
3350     \bbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
3351     \bbl@exportkey{intsp}{typography.intraspace}{}%
3352     \bbl@exportkey{chrng}{characters.ranges}{}}
3353 \def\bbl@load@basic#1{%
3354     \bbl@ifunset{bbl@inidata@\language}\@nil\else
3355         {\getlocaleproperty\bbl@tempa{\language}{identification/load.level}%
3356         \ifcase\bbl@tempa\else
3357             \bbl@csarg\let{lname@\language}\relax
3358         \fi}%
3359     \bbl@ifunset{bbl@lname@#1}%
3360     {\def\BabelBeforeIni##1##2{%
3361         \begingroup
3362         \let\bbl@ini@captions@aux\@gobbletwo

```



```

3363 \def\bbl@inidate #####1.####2.####3.####4\relax #####5####6}%
3364 \bbl@read@ini{##1}0%
3365 \bbl@linebreak@export
3366 \bbl@exportkey{dgnat}{numbers.digits.native}{}%
3367 \bbl@exportkey{frspc}{typography.frenchspacing}{u}% unset
3368 \ifx\bbl@initoload\relax\endinput\fi
3369 \endgroup}%
3370 \begingroup % boxed, to avoid extra spaces:
3371 \ifx\bbl@initoload\relax
3372 \bbl@input@texini{#1}%
3373 \else
3374 \setbox\z@\hbox{\BabelBeforeIni{\bbl@initoload}{}}%
3375 \fi
3376 \endgroup}%
3377 {}%

```

The hyphenrules option is handled with an auxiliary macro.

```

3378 \def\bbl@provide@hyphens#1{%
3379 \let\bbl@tempa\relax
3380 \ifx\bbl@KVP@hyphenrules\@nil\else
3381 \bbl@replace\bbl@KVP@hyphenrules{ }{,}%
3382 \bbl@foreach\bbl@KVP@hyphenrules{%
3383 \ifx\bbl@tempa\relax % if not yet found
3384 \bbl@ifsamestring{##1}{+}%
3385 {\bbl@exp{\addlanguage<l@##1>}}}%
3386 {}%
3387 \bbl@ifunset{l@##1}%
3388 {}%
3389 {\bbl@exp{\let\bbl@tempa<l@##1>}}}%
3390 \fi}%
3391 \fi
3392 \ifx\bbl@tempa\relax % if no opt or no language in opt found
3393 \ifx\bbl@KVP@import\@nil
3394 \ifx\bbl@initoload\relax\else
3395 \bbl@exp{% and hyphenrules is not empty
3396 \bbl@ifblank{\bbl@cs{hyphr@#1}}}%
3397 {}%
3398 {\let\bbl@tempa<l@bbl@cl{hyphr}>}}}%
3399 \fi
3400 \else % if importing
3401 \bbl@exp{% and hyphenrules is not empty
3402 \bbl@ifblank{\bbl@cs{hyphr@#1}}}%
3403 {}%
3404 {\let\bbl@tempa<l@bbl@cl{hyphr}>}}}%
3405 \fi
3406 \fi
3407 \bbl@ifunset{\bbl@tempa}% ie, relax or undefined
3408 {\bbl@ifunset{l@#1}% no hyphenrules found - fallback
3409 {\bbl@exp{\adddialect<l@#1>\language}}}%
3410 {}% so, l@<lang> is ok - nothing to do
3411 {\bbl@exp{\adddialect<l@#1>\bbl@tempa}}}% found in opt list or ini
3412

```

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

```

3413 \ifx\bbl@readstream\@undefined
3414 \csname newread\endcsname\bbl@readstream
3415 \fi
3416 \def\bbl@input@texini#1{%

```

```

3417 \bbl@bsphack
3418 \bbl@exp{%
3419 \catcode`\\%=14 \catcode`\\|=0
3420 \catcode`\\{=1 \catcode`\\}=2
3421 \lowercase{\InputIfFileExists{babel-#1.tex}{}}}%
3422 \catcode`\\%= \the\catcode`\%\relax
3423 \catcode`\\|= \the\catcode`\|\relax
3424 \catcode`\\{= \the\catcode`\{\relax
3425 \catcode`\\}= \the\catcode`\}\relax}%
3426 \bbl@esphack}
3427 \def\bbl@inipreread#1=#2\@@{%
3428 \bbl@trim@def\bbl@tempa{#1}% Redundant below !!
3429 \bbl@trim\toks@{#2}%
3430 % Move trims here ??
3431 \bbl@ifunset{bbl@KVP@\bbl@section/\bbl@tempa}%
3432 {\bbl@exp{%
3433 \\\g@addto@macro\\bbl@inidata{%
3434 \\\bbl@elt{\bbl@section}{\bbl@tempa}{\the\toks@}}}%
3435 \expandafter\bbl@inireader\bbl@tempa=#2\@@}%
3436 }%
3437 \def\bbl@fetch@ini#1#2{%
3438 \bbl@exp{\def\\bbl@inidata{%
3439 \\\bbl@elt{identification}{tag.ini}{#1}%
3440 \\\bbl@elt{identification}{load.level}{#2}}}%
3441 \openin\bbl@readstream=babel-#1.ini
3442 \ifeof\bbl@readstream
3443 \bbl@error
3444 {There is no ini file for the requested language\\%
3445 (#1). Perhaps you misspelled it or your installation\\%
3446 is not complete.}%
3447 {Fix the name or reinstall babel.}%
3448 \else
3449 \catcode`\[=12 \catcode`\]=12 \catcode`\==12 \catcode`\&=12
3450 \catcode`\;=12 \catcode`\|=12 \catcode`\%=14 \catcode`\-=12
3451 \bbl@info{Importing
3452 \ifcase#2 \or font and identification \or basic \fi
3453 data for \language\name\\%
3454 from babel-#1.ini. Reported}%
3455 \loop
3456 \if \ifeof\bbl@readstream \fi \T\relax % Trick, because inside \loop
3457 \endlinechar\m@ne
3458 \read\bbl@readstream to \bbl@line
3459 \endlinechar`^^M
3460 \ifx\bbl@line\@empty\else
3461 \expandafter\bbl@inline\bbl@line\bbl@inline
3462 \fi
3463 \repeat
3464 \fi}
3465 \def\bbl@read@ini#1#2{%
3466 \bbl@csarg\xdef{lini@\language}{#1}%
3467 \let\bbl@section\@empty
3468 \let\bbl@savestrings\@empty
3469 \let\bbl@savetoday\@empty
3470 \let\bbl@savestate\@empty
3471 \let\bbl@inireader\bbl@iniskip
3472 \bbl@fetch@ini{#1}{#2}%
3473 \bbl@foreach\bbl@renewlist{%
3474 \bbl@ifunset{bbl@renew@##1}{\bbl@inisec[##1]\@}}}%
3475 \global\let\bbl@renewlist\@empty

```

```

3476 % Ends last section. See \bbl@inisec
3477 \def\bbl@elt##1##2{\bbl@inireader##1=##2\@@}%
3478 \bbl@cs{renew@\bbl@section}%
3479 \global\bbl@csarg\let{renew@\bbl@section}\relax
3480 \bbl@cs{secpost@\bbl@section}%
3481 \bbl@csarg{\global\expandafter\let}{inidata@\language}\bbl@inidata
3482 \bbl@exp{\bbl@add@list\bbl@ini@loaded{\language}}%
3483 \bbl@to\global\bbl@ini@loaded}
3484 \def\bbl@iniline#1\bbl@iniline{%
3485 \@ifnextchar[\bbl@inisec{\@ifnextchar;\bbl@iniskip\bbl@inipreread}#1\@@}% ]

```

The special cases for comment lines and sections are handled by the two following commands. In sections, we provide the possibility to take extra actions at the end or at the start. By default, key=val pairs are ignored. The secpost “hook” is used only by ‘identification’, while secpre only by date.gregorian.licr.

```

3486 \def\bbl@iniskip#1\@@{%          if starts with ;
3487 \def\bbl@inisec[#1]#2\@@{%       if starts with opening bracket
3488 \def\bbl@elt##1##2{%
3489     \expandafter\toks@\expandafter{%
3490     \expandafter{\bbl@section}{##1}{##2}}%
3491     \bbl@exp{%
3492     \g@addto@macro\bbl@inidata{\bbl@elt\the\toks@}}%
3493     \bbl@inireader##1=##2\@@}%
3494 \bbl@cs{renew@\bbl@section}%
3495 \global\bbl@csarg\let{renew@\bbl@section}\relax
3496 \bbl@cs{secpost@\bbl@section}%
3497 % The previous code belongs to the previous section.
3498 % -----
3499 % Now start the current one.
3500 \in@{=date.}{#1}%
3501 \ifin@
3502     \lowercase{\def\bbl@tempa{=#1=}}%
3503     \bbl@replace\bbl@tempa{=date.gregorian.}{}%
3504     \bbl@replace\bbl@tempa{=date.}{}%
3505     \in@{.licr=}{#1=}%
3506     \ifin@
3507         \ifcase\bbl@engine
3508             \bbl@replace\bbl@tempa{.licr=}{}%
3509         \else
3510             \let\bbl@tempa\relax
3511         \fi
3512     \fi
3513     \ifx\bbl@tempa\relax\else
3514         \bbl@replace\bbl@tempa{=}{}%
3515         \bbl@exp{%
3516             \def<\bbl@inikv@#1>####1=####2\@@{%
3517                 \bbl@inidate####1...\relax{####2}{\bbl@tempa}}%
3518             \fi
3519         \fi
3520     \def\bbl@section{#1}%
3521     \def\bbl@elt##1##2{%
3522         \@namedef{\bbl@KVP@#1/#1}{}}%
3523     \bbl@cs{renew@#1}%
3524     \bbl@cs{secpre@#1}% pre-section `hook'
3525     \bbl@ifunset{\bbl@inikv@#1}%
3526         {\let\bbl@inireader\bbl@iniskip}%
3527         {\bbl@exp{\let\bbl@inireader<\bbl@inikv@#1>}}
3528 \let\bbl@renewlist\@empty
3529 \def\bbl@renewinikey#1/#2\@@#3{%

```

```

3530 \bbl@ifunset{bbl@renew@#1}%
3531 {\bbl@add@list\bbl@renewlist{#1}}%
3532 {}%
3533 \bbl@csarg\bbl@add{renew@#1}{\bbl@elt{#2}{#3}}

```

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

```

3534 \def\bbl@inikv#1=#2\@{%      key=value
3535 \bbl@trim@def\bbl@tempa{#1}%
3536 \bbl@trim\toks@{#2}%
3537 \bbl@csarg\edef{@kv@\bbl@section.\bbl@tempa}{\the\toks@}}

```

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

```

3538 \def\bbl@exportkey#1#2#3{%
3539 \bbl@ifunset{bbl@kv@#2}%
3540 {\bbl@csarg\gdef{#1@\language}\language{#3}}%
3541 {\expandafter\ifx\csname bbl@kv@#2\endcsname\@empty
3542 \bbl@csarg\gdef{#1@\language}\language{#3}}%
3543 \else
3544 \bbl@exp{\global\let\<bbl@#1@\language>\<bbl@kv@#2>}%
3545 \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@secpost@identification is called always (via \bbl@inisec), while \bbl@after@ini must be called explicitly after \bbl@read@ini if necessary.

```

3546 \def\bbl@iniwarning#1{%
3547 \bbl@ifunset{bbl@kv@identification.warning#1}{}%
3548 {\bbl@warning{%
3549 From babel-\bbl@cs{lini@\language}.ini:\%
3550 \bbl@cs{@kv@identification.warning#1}\%
3551 Reported }}}
3552 %
3553 \let\bbl@inikv@identification\bbl@inikv
3554 \def\bbl@secpost@identification{%
3555 \bbl@iniwarning}%
3556 \ifcase\bbl@engine
3557 \bbl@iniwarning{.pdflatex}%
3558 \or
3559 \bbl@iniwarning{.lualatex}%
3560 \or
3561 \bbl@iniwarning{.xelatex}%
3562 \fi%
3563 \bbl@exportkey{elname}{identification.name.english}{}%
3564 \bbl@exp{\bbl@exportkey{lname}{identification.name.opentype}%
3565 {\csname bbl@elname@\language\endcsname}}%
3566 \bbl@exportkey{tbcp}{identification.tag.bcp47}{}%
3567 \bbl@exportkey{lbcpl}{identification.language.tag.bcp47}{}%
3568 \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
3569 \bbl@exportkey{esname}{identification.script.name}{}%
3570 \bbl@exp{\bbl@exportkey{sname}{identification.script.name.opentype}%
3571 {\csname bbl@esname@\language\endcsname}}%
3572 \bbl@exportkey{sbcpl}{identification.script.tag.bcp47}{}%
3573 \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}%
3574 \ifbbl@bcptoname
3575 \bbl@csarg\xdef{bcp@map@\bbl@cl{tbcp}}{\language}%
3576 \fi}

```

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

```

3577 \let\bbl@inikv@typography\bbl@inikv
3578 \let\bbl@inikv@characters\bbl@inikv
3579 \let\bbl@inikv@numbers\bbl@inikv

```

Additive numerals require an additional definition. When .1 is found, two macros are defined – the basic one, without .1 called by \localenumeral, and another one preserving the trailing .1 for the ‘units’.

```

3580 \def\bbl@inikv@counters#1=#2\@@{%
3581   \bbl@ifsamestring{#1}{digits}%
3582   {\bbl@error{The counter name 'digits' is reserved for mapping\\%
3583     decimal digits}%
3584     {Use another name.}}%
3585   }%
3586 \def\bbl@tempc{#1}%
3587 \bbl@trim@def{\bbl@tempb*}{#2}%
3588 \in@{.1$}{#1$}%
3589 \ifin@
3590   \bbl@replace\bbl@tempc{.1}{}%
3591   \bbl@csarg\protected@xdef{cntr@\bbl@tempc @\language}\bbl@tempc @\language}%
3592   \noexpand\bbl@alphanumeric{\bbl@tempc}%
3593 \fi
3594 \in@{.F.}{#1}%
3595 \ifin@else\in@{.S.}{#1}\fi
3596 \ifin@
3597   \bbl@csarg\protected@xdef{cntr@#1@\language}\bbl@tempb*}%
3598 \else
3599   \toks@{}% Required by \bbl@buildifcase, which returns \bbl@tempa
3600   \expandafter\bbl@buildifcase\bbl@tempb* \ \ % Space after \
3601   \bbl@csarg{\global\expandafter\let}{cntr@#1@\language}\bbl@tempa
3602 \fi}
3603 \def\bbl@after@ini{%
3604   \bbl@linebreak@export
3605   \bbl@exportkey{dgnat}{numbers.digits.native}{}%
3606   \bbl@exportkey{rqtex}{identification.require.babel}{}%
3607   \bbl@exportkey{frspc}{typography.frenchspacing}{u}% unset
3608   \bbl@toglobal\bbl@savetoday
3609   \bbl@toglobal\bbl@savestate}

```

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.

```

3610 \ifcase\bbl@engine
3611   \bbl@csarg\def{inikv@captions.licr}#1=#2\@@{%
3612     \bbl@ini@captions@aux{#1}{#2}}
3613 \else
3614   \def\bbl@inikv@captions#1=#2\@@{%
3615     \bbl@ini@captions@aux{#1}{#2}}
3616 \fi

```

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

```

3617 \def\bbl@ini@captions@aux#1#2{%
3618   \bbl@trim@def\bbl@tempa{#1}%
3619   \bbl@xin@{.template}{\bbl@tempa}%
3620   \ifin@
3621     \bbl@replace\bbl@tempa{.template}{}%
3622   \def\bbl@toreplace{#2}%
3623   \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace}%
3624   \bbl@replace\bbl@toreplace{[ ]}{\csname}%
3625   \bbl@replace\bbl@toreplace{[ ]}{\csname the}%

```

```

3626 \bbl@replace\bbl@toreplace{}}{name\endcsname{}}}%
3627 \bbl@replace\bbl@toreplace{}}{\endcsname{}}}%
3628 \bbl@xin@{,\bbl@tempa,}{,chapter,}%
3629 \ifin@
3630 \bbl@patchchapter
3631 \global\bbl@csarg\let{chapfmt@\language}\bbl@toreplace
3632 \fi
3633 \bbl@xin@{,\bbl@tempa,}{,appendix,}%
3634 \ifin@
3635 \bbl@patchchapter
3636 \global\bbl@csarg\let{appxfmt@\language}\bbl@toreplace
3637 \fi
3638 \bbl@xin@{,\bbl@tempa,}{,part,}%
3639 \ifin@
3640 \bbl@patchpart
3641 \global\bbl@csarg\let{partfmt@\language}\bbl@toreplace
3642 \fi
3643 \bbl@xin@{,\bbl@tempa,}{,figure,table,}%
3644 \ifin@
3645 \toks@\expandafter{\bbl@toreplace}%
3646 \bbl@exp{\gdef\<fnum@\bbl@tempa>{\the\toks@}}%
3647 \fi
3648 \else
3649 \bbl@ifblank{#2}%
3650 {\bbl@exp{%
3651 \toks@{\bbl@nocaption{\bbl@tempa}{\language\bbl@tempa name}}}%
3652 {\bbl@trim\toks@{#2}}}%
3653 \bbl@exp{%
3654 \bbl@add\bbl@savestrings{%
3655 \SetString\<\bbl@tempa name>{\the\toks@}}}%
3656 \toks@\expandafter{\bbl@captionslist}%
3657 \bbl@exp{\in{\<\bbl@tempa name>}{\the\toks@}}}%
3658 \ifin@else
3659 \bbl@exp{%
3660 \bbl@add\<\bbl@extracaps@\language>{\<\bbl@tempa name>}%
3661 \bbl@to\global\<\bbl@extracaps@\language>}}%
3662 \fi
3663 \fi}

```

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

```

3664 \def\bbl@list@the{%
3665 part,chapter,section,subsection,subsubsection,paragraph,%
3666 subparagraph,enumi,enumii,enumiii,enumiv,equation,figure,%
3667 table,page,footnote,mpfootnote,mpfn}
3668 \def\bbl@map@cnt#1{% #1:roman,etc, // #2:enumi,etc
3669 \bbl@ifunset{bbl@map@#1@\language}%
3670 {\nameuse{#1}}%
3671 {\nameuse{bbl@map@#1@\language}}}
3672 \def\bbl@inikv@labels#1=#2\@@{%
3673 \in@{.map}{#1}%
3674 \ifin@
3675 \ifx\bbl@KVP@labels\@nil\else
3676 \bbl@xin@{ map }{ \bbl@KVP@labels\space}%
3677 \ifin@
3678 \def\bbl@tempc{#1}%
3679 \bbl@replace\bbl@tempc{.map}{}%
3680 \in@{,#2,}{,arabic,roman,Roman,alph,Alph,fnsymbol,}%
3681 \bbl@exp{%

```

```

3682 \gdef\<bbl@map@bbl@tempc @\language>%
3683 {\ifin@<#2>\else\\localecounter{#2}\fi}}%
3684 \bbl@foreach\bbl@list@the{%
3685 \bbl@ifunset{the##1}{}%
3686 {\bbl@exp{\let\\bbl@tempd\<the##1>}%
3687 \bbl@exp{%
3688 \\bbl@sreplace\<the##1>%
3689 {\<bbl@tempc>{##1}}{\\bbl@map@cnt{\bbl@tempc}{##1}}%
3690 \\bbl@sreplace\<the##1>%
3691 {\<\empty @\bbl@tempc>\<c##1>}{\\bbl@map@cnt{\bbl@tempc}{##1}}}%
3692 \expandafter\ifx\csname the##1\endcsname\bbl@tempd\else
3693 \toks@ \expandafter\expandafter\expandafter{%
3694 \csname the##1\endcsname}%
3695 \expandafter\xdef\csname the##1\endcsname{{\the\toks@}}%
3696 \fi}}%
3697 \fi
3698 \fi
3699 %
3700 \else
3701 %
3702 % The following code is still under study. You can test it and make
3703 % suggestions. Eg, enumerate.2 = ([enumi]).([enumii]). It's
3704 % language dependent.
3705 \in@{enumerate.}{#1}%
3706 \ifin@
3707 \def\bbl@tempa{#1}%
3708 \bbl@replace\bbl@tempa{enumerate.}{}%
3709 \def\bbl@toreplace{#2}%
3710 \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace{}}%
3711 \bbl@replace\bbl@toreplace{[ ]}{\csname the}%
3712 \bbl@replace\bbl@toreplace{ ]}{\endcsname{}}%
3713 \toks@ \expandafter{\bbl@toreplace}%
3714 \bbl@exp{%
3715 \\bbl@add\<extras\language>{%
3716 \\babel@save\<labelenum\romannumeral\bbl@tempa>%
3717 \def\<labelenum\romannumeral\bbl@tempa>{\the\toks@}}%
3718 \\bbl@toglobal\<extras\language>}%
3719 \fi
3720 \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.

```

3721 \def\bbl@chapttype{chap}
3722 \ifx\@makechapterhead\@undefined
3723 \let\bbl@patchchapter\relax
3724 \else\ifx\thechapter\@undefined
3725 \let\bbl@patchchapter\relax
3726 \else\ifx\ps@headings\@undefined
3727 \let\bbl@patchchapter\relax
3728 \else
3729 \def\bbl@patchchapter{%
3730 \global\let\bbl@patchchapter\relax
3731 \bbl@add\appendix{\def\bbl@chapttype{appx}}% Not harmful, I hope
3732 \bbl@toglobal\appendix
3733 \bbl@sreplace\ps@headings
3734 {\@chapapp\ thechapter}%
3735 {\bbl@chapterformat}%

```

```

3736 \bbl@toglobal\ps@headings
3737 \bbl@sreplace\chaptermark
3738 {\@chapapp\ thechapter}%
3739 {\bbl@chapterformat}%
3740 \bbl@toglobal\chaptermark
3741 \bbl@sreplace\makechapterhead
3742 {\@chapapp\space\thechapter}%
3743 {\bbl@chapterformat}%
3744 \bbl@toglobal\makechapterhead
3745 \gdef\bbl@chapterformat{%
3746 \bbl@ifunset{\bbl\bbl@chapttype fmt@\language}%
3747 {\@chapapp\space\thechapter}
3748 {\@nameuse{\bbl\bbl@chapttype fmt@\language}}}}
3749 \fi\fi\fi
3750 \ifx\@part\undefined
3751 \let\bbl@patchpart\relax
3752 \else
3753 \def\bbl@patchpart{%
3754 \global\let\bbl@patchpart\relax
3755 \bbl@sreplace\@part
3756 {\partname\nobreakspace\thepart}%
3757 {\bbl@partformat}%
3758 \bbl@toglobal\@part
3759 \gdef\bbl@partformat{%
3760 \bbl@ifunset{\bbl@partfmt@\language}%
3761 {\partname\nobreakspace\thepart}
3762 {\@nameuse{\bbl@partfmt@\language}}}}
3763 \fi

Date. TODO. Document

3764 % Arguments are _not_ protected.
3765 \let\bbl@calendar\@empty
3766 \DeclareRobustCommand\localedate[1][\bbl@localedate{#1}]
3767 \def\bbl@localedate#1#2#3#4{%
3768 \begin{group}
3769 \ifx\@empty#1\@empty\else
3770 \let\bbl@ld@calendar\@empty
3771 \let\bbl@ld@variant\@empty
3772 \edef\bbl@tempa{\zap@space#1 \@empty}%
3773 \def\bbl@tempb##1=##2\@{\@namedef{\bbl@ld@##1}{##2}}%
3774 \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
3775 \edef\bbl@calendar{%
3776 \bbl@ld@calendar
3777 \ifx\bbl@ld@variant\@empty\else
3778 .\bbl@ld@variant
3779 \fi}%
3780 \bbl@replace\bbl@calendar{gregorian}{}}%
3781 \fi
3782 \bbl@cased
3783 {\@nameuse{\bbl@date@\language @\bbl@calendar}{#2}{#3}{#4}}%
3784 \end{group}
3785 % eg: 1=months, 2=wide, 3=1, 4=dummy, 5=value, 6=calendar
3786 \def\bbl@inidate#1.#2.#3.#4\relax#5#6{% TODO - ignore with 'captions'
3787 \bbl@trim@def\bbl@tempa{#1.#2}%
3788 \bbl@ifsamestring{\bbl@tempa}{months.wide}% to savedate
3789 {\bbl@trim@def\bbl@tempa{#3}%
3790 \bbl@trim\toks@{#5}%
3791 \@temptokena\expandafter{\bbl@savedate}%
3792 \bbl@exp{% Reverse order - in ini last wins

```



```

3793 \def\bb@savedate{%
3794 \SetString\<month\romannumeral\bb@tempa#6name>\the\toks@}%
3795 \the\temptokena}}}%
3796 {\bb@ifsamestring{\bb@tempa}{date.long}% defined now
3797 {\lowercase{\def\bb@tempb{#6}}}%
3798 \bb@trim@def\bb@toreplace{#5}%
3799 \bb@TG@date
3800 \bb@ifunset{\bb@date@\language @}%
3801 {\global\bb@csarg\let{date@\language @}\bb@toreplace
3802 % TODO. Move to a better place.
3803 \bb@exp{%
3804 \gdef\<\language date>\protect\<\language date >}%
3805 \gdef\<\language date >####1####2####3{%
3806 \bb@usedategroupttrue
3807 \bb@ensure@\language >{%
3808 \bb@localedate{####1}{####2}{####3}}}%
3809 \bb@add\bb@savedatetoday{%
3810 \SetString\bb@today{%
3811 \<\language date>%
3812 {\the\year}{\the\month}{\the\day}}}%
3813 }%
3814 \ifx\bb@tempb\@empty\else
3815 \global\bb@csarg\let{date@\language @\bb@tempb}\bb@toreplace
3816 \fi}%
3817 {}}

```

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.

```

3818 \let\bb@calendar\@empty
3819 \newcommand\BabelDateSpace{\nobreakspace}
3820 \newcommand\BabelDateDot{.\@} % TODO. \let instead of repeating
3821 \newcommand\BabelDated[1]{\number#1}
3822 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}
3823 \newcommand\BabelDateM[1]{\number#1}
3824 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
3825 \newcommand\BabelDateMMM[1]{%
3826 \csname month\romannumeral#1\bb@calendar name\endcsname}}%
3827 \newcommand\BabelDatey[1]{\number#1}%
3828 \newcommand\BabelDateyy[1]{%
3829 \ifnum#1<10 0\number#1 %
3830 \else\ifnum#1<100 \number#1 %
3831 \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
3832 \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
3833 \else
3834 \bb@error
3835 {Currently two-digit years are restricted to the\
3836 range 0-9999.}%
3837 {There is little you can do. Sorry.}%
3838 \fi\fi\fi\fi}}
3839 \newcommand\BabelDateyyyy[1]{\number#1} % FIXME - add leading 0
3840 \def\bb@replace@finish@iii#1{%
3841 \bb@exp{\def\#1####1####2####3{\the\toks@}}
3842 \def\bb@TG@date{%
3843 \bb@replace\bb@toreplace{[ ]}{\BabelDateSpace}}%
3844 \bb@replace\bb@toreplace{[. ]}{\BabelDateDot}}%
3845 \bb@replace\bb@toreplace{[d]}{\BabelDated{####3}}%
3846 \bb@replace\bb@toreplace{[dd]}{\BabelDatedd{####3}}%
3847 \bb@replace\bb@toreplace{[M]}{\BabelDateM{####2}}%

```

```

3848 \bbl@replace\bbl@toreplace{[MM]}\BabelDateMM{####2}%
3849 \bbl@replace\bbl@toreplace{[MMMM]}\BabelDateMMMM{####2}%
3850 \bbl@replace\bbl@toreplace{[y]}\BabelDatey{####1}%
3851 \bbl@replace\bbl@toreplace{[yy]}\BabelDateyy{####1}%
3852 \bbl@replace\bbl@toreplace{[yyyy]}\BabelDateyyyy{####1}%
3853 \bbl@replace\bbl@toreplace{[y]}\bbl@datecncr[####1]|}%
3854 \bbl@replace\bbl@toreplace{[m]}\bbl@datecncr[####2]|}%
3855 \bbl@replace\bbl@toreplace{[d]}\bbl@datecncr[####3]|}%
3856 % Note after \bbl@replace \toks@ contains the resulting string.
3857 TODO - Using this implicit behavior doesn't seem a good idea.
3858 \bbl@replace@finish@iii\bbl@toreplace}
3859 \def\bbl@datecncr\expandafter\bbl@xdatecncr\expandafter}
3860 \def\bbl@xdatecncr[#1|#2]\localenumeral{#2}{#1}}

```

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

```

3861 \def\bbl@provide@lsys#1{%
3862   \bbl@ifunset{bbl@lname@#1}%
3863   {\bbl@ini@basic{#1}}%
3864   }%
3865   \bbl@csarg\let{lsys@#1}\empty
3866   \bbl@ifunset{bbl@sname@#1}\bbl@csarg\gdef{sname@#1}{Default}}}%
3867   \bbl@ifunset{bbl@sotf@#1}\bbl@csarg\gdef{sotf@#1}{DFLT}}}%
3868   \bbl@csarg\bbl@add@list{lsys@#1}{Script=\bbl@cs{sname@#1}}}%
3869   \bbl@ifunset{bbl@lname@#1}{%
3870     {\bbl@csarg\bbl@add@list{lsys@#1}{Language=\bbl@cs{lname@#1}}}%
3871     \ifcase\bbl@engine\or\or
3872       \bbl@ifunset{bbl@prehc@#1}{%
3873         {\bbl@exp{\bbl@ifblank{\bbl@cs{prehc@#1}}}%
3874         }%
3875         {\ifx\bbl@xenohyph\undefined
3876           \let\bbl@xenohyph\bbl@xenohyph@d
3877           \ifx\AtBeginDocument\@notprerr
3878             \expandafter\@secondoftwo % to execute right now
3879             \fi
3880             \AtBeginDocument{%
3881               \expandafter\bbl@add
3882               \csname selectfont \endcsname{\bbl@xenohyph}%
3883               \expandafter\selectlanguage\expandafter{\languagename}%
3884               \expandafter\bbl@tglobal\csname selectfont \endcsname}%
3885             \fi}}%
3886         \fi
3887       \bbl@csarg\bbl@tglobal{lsys@#1}}
3888 \def\bbl@xenohyph@d{%
3889   \bbl@ifset{bbl@prehc@languagename}%
3890   {\ifnum\hyphenchar\font=\defaultshyphenchar
3891     \iffontchar\font\bbl@c1{prehc}\relax
3892     \hyphenchar\font\bbl@c1{prehc}\relax
3893     \else\iffontchar\font"200B
3894       \hyphenchar\font"200B
3895     \else
3896       \bbl@warning
3897       {Neither 0 nor ZERO WIDTH SPACE are available\\%
3898       in the current font, and therefore the hyphen\\%
3899       will be printed. Try changing the fontspec's\\%
3900       'HyphenChar' to another value, but be aware\\%
3901       this setting is not safe (see the manual)}%
3902       \hyphenchar\font\defaultshyphenchar
3903     \fi\fi

```

The following ini reader ignores everything but the identification section. It is called when a font is defined (ie, when the language is first selected) to know which script/language must be enabled. This means we must make sure a few characters are not active. The ini is not read directly, but with a proxy tex file named as the language (which means any code in it must be skipped, too).

A tool to define the macros for native digits from the list provided in the ini file. Somewhat convoluted because there are 10 digits, but only 9 arguments in T_EX. Non-digits characters are kept. The first macro is the generic “localized” command.

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

154

```

3950 \<ifcase>###1\space\the\toks@\<else>\\\@ctrerr\<fi>}}%
3951 \else
3952 \toks@\expandafter{\the\toks@\or #1}%
3953 \expandafter\bb1@buildifcase
3954 \fi}

```

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

```

3955 \newcommand\localenumeral[2]{\bb1@cs{cntr@#1@\language}\{#2}}
3956 \def\bb1@localecntr#1#2{\localenumeral{#2}{#1}}
3957 \newcommand\localecounter[2]{%
3958 \expandafter\bb1@localecntr
3959 \expandafter{\number\csname c@#2\endcsname}\{#1}}
3960 \def\bb1@alphnumeral#1#2{%
3961 \expandafter\bb1@alphnumeral@i\number#2 76543210\@{#1}}
3962 \def\bb1@alphnumeral@i#1#2#3#4#5#6#7#8\@#9{%
3963 \ifcase\car#8\@nil\or % Currently <10000, but prepared for bigger
3964 \bb1@alphnumeral@ii{#9}000000#1\or
3965 \bb1@alphnumeral@ii{#9}00000#1#2\or
3966 \bb1@alphnumeral@ii{#9}0000#1#2#3\or
3967 \bb1@alphnumeral@ii{#9}000#1#2#3#4\else
3968 \bb1@alphnum@invalid{>9999}%
3969 \fi}
3970 \def\bb1@alphnumeral@ii#1#2#3#4#5#6#7#8{%
3971 \bb1@ifunset{bb1@cntr@#1.F.\number#5#6#7#8@\language}%
3972 {\bb1@cs{cntr@#1.4@\language}\{#5}
3973 \bb1@cs{cntr@#1.3@\language}\{#6}
3974 \bb1@cs{cntr@#1.2@\language}\{#7}
3975 \bb1@cs{cntr@#1.1@\language}\{#8}
3976 \ifnum#6#7#8>\z@ % TODO. An ad hoc rule for Greek. Ugly.
3977 \bb1@ifunset{bb1@cntr@#1.S.321@\language}\{}}%
3978 {\bb1@cs{cntr@#1.S.321@\language}\{}}%
3979 \fi}%
3980 {\bb1@cs{cntr@#1.F.\number#5#6#7#8@\language}}%
3981 \def\bb1@alphnum@invalid#1{%
3982 \bb1@error{Alphabetic numeral too large (#1)}%
3983 {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.

```

3984 \newcommand\localeinfo[1]{%
3985 \bb1@ifunset{bb1@csname bb1@info@#1\endcsname @\language}%
3986 {\bb1@error{I've found no info for the current locale.\%
3987 The corresponding ini file has not been loaded\%
3988 Perhaps it doesn't exist}%
3989 {See the manual for details.}}%
3990 {\bb1@cs{\csname bb1@info@#1\endcsname @\language}}%
3991 % \@namedef{bb1@info@name.locale}\{lname}
3992 \@namedef{bb1@info@tag.ini}\{lini}
3993 \@namedef{bb1@info@name.english}\{elname}
3994 \@namedef{bb1@info@name.opentype}\{lname}
3995 \@namedef{bb1@info@tag.bcp47}\{tbc}
3996 \@namedef{bb1@info@language.tag.bcp47}\{lbc}
3997 \@namedef{bb1@info@tag.opentype}\{lotf}

```

```

3998 \@namedef{bbl@info@script.name}{esname}
3999 \@namedef{bbl@info@script.name.opentype}{sname}
4000 \@namedef{bbl@info@script.tag.bcp47}{sbcp}
4001 \@namedef{bbl@info@script.tag.opentype}{sotf}
4002 \let\bbl@ensureinfo\@gobble
4003 \newcommand\BabelEnsureInfo{%
4004   \ifx\InputIfFileExists\undefined\else
4005     \def\bbl@ensureinfo##1{%
4006       \bbl@ifunset{bbl@lname@##1}{\bbl@ini@basic{##1}}{}}%
4007   \fi
4008   \bbl@foreach\bbl@loaded{%
4009     \def\language{##1}%
4010     \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`.

```

4011 \newcommand\getlocaleproperty{%
4012   \@ifstar\bbl@getproperty@s\bbl@getproperty@x%
4013   \def\bbl@getproperty@s#1#2#3{%
4014     \let#1\relax
4015     \def\bbl@elt##1##2##3{%
4016       \bbl@ifsamestring{##1/##2}{##3}%
4017       {\providecommand#1{##3}%
4018        \def\bbl@elt####1####2####3{}}}%
4019     {}}%
4020     \bbl@cs{inidata@#2}}%
4021   \def\bbl@getproperty@x#1#2#3{%
4022     \bbl@getproperty@s{#1}{#2}{#3}%
4023     \ifx#1\relax
4024       \bbl@error
4025         {Unknown key for locale '#2':\%
4026          #3\%
4027          \string#1 will be set to \relax}%
4028       {Perhaps you misspelled it.}%
4029     \fi}
4030   \let\bbl@ini@loaded\@empty
4031   \newcommand\LocaleForEach{\bbl@foreach\bbl@ini@loaded}

```

10 Adjusting the Babel behavior

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

```

4032 \newcommand\babeladjust[1]{% TODO. Error handling.
4033   \bbl@forkv{#1}{%
4034     \bbl@ifunset{bbl@ADJ@##1@##2}%
4035     {\bbl@cs{ADJ@##1}{##2}}%
4036     {\bbl@cs{ADJ@##1@##2}}}
4037 %
4038 \def\bbl@adjust@lua#1#2{%
4039   \ifvmode
4040     \ifnum\currentgrouplevel=\z@
4041       \directlua{ Babel.#2 }%
4042       \expandafter\expandafter\expandafter\@gobble
4043     \fi
4044   \fi
4045   {\bbl@error % The error is gobbled if everything went ok.
4046    {Currently, #1 related features can be adjusted only\%

```

```

4047         in the main vertical list.}%
4048         {Maybe things change in the future, but this is what it is.}}
4049 \@namedef{bbl@ADJ@bidi.mirroring@on}{%
4050   \bbl@adjust@lua{bidi}{mirroring_enabled=true}}
4051 \@namedef{bbl@ADJ@bidi.mirroring@off}{%
4052   \bbl@adjust@lua{bidi}{mirroring_enabled=false}}
4053 \@namedef{bbl@ADJ@bidi.text@on}{%
4054   \bbl@adjust@lua{bidi}{bidi_enabled=true}}
4055 \@namedef{bbl@ADJ@bidi.text@off}{%
4056   \bbl@adjust@lua{bidi}{bidi_enabled=false}}
4057 \@namedef{bbl@ADJ@bidi.mapdigits@on}{%
4058   \bbl@adjust@lua{bidi}{digits_mapped=true}}
4059 \@namedef{bbl@ADJ@bidi.mapdigits@off}{%
4060   \bbl@adjust@lua{bidi}{digits_mapped=false}}
4061 %
4062 \@namedef{bbl@ADJ@linebreak.sea@on}{%
4063   \bbl@adjust@lua{linebreak}{sea_enabled=true}}
4064 \@namedef{bbl@ADJ@linebreak.sea@off}{%
4065   \bbl@adjust@lua{linebreak}{sea_enabled=false}}
4066 \@namedef{bbl@ADJ@linebreak.cjk@on}{%
4067   \bbl@adjust@lua{linebreak}{cjk_enabled=true}}
4068 \@namedef{bbl@ADJ@linebreak.cjk@off}{%
4069   \bbl@adjust@lua{linebreak}{cjk_enabled=false}}
4070 %
4071 \def\bbl@adjust@layout#1{%
4072   \ifvmode
4073     #1%
4074     \expandafter\@gobble
4075   \fi
4076   {\bbl@error   % The error is gobbled if everything went ok.
4077     {Currently, layout related features can be adjusted only\\%
4078       in vertical mode.}%
4079     {Maybe things change in the future, but this is what it is.}}
4080 \@namedef{bbl@ADJ@layout.tabular@on}{%
4081   \bbl@adjust@layout{\let\@tabular\bbl@NL@tabular}}
4082 \@namedef{bbl@ADJ@layout.tabular@off}{%
4083   \bbl@adjust@layout{\let\@tabular\bbl@OL@tabular}}
4084 \@namedef{bbl@ADJ@layout.lists@on}{%
4085   \bbl@adjust@layout{\let\list\bbl@NL@list}}
4086 \@namedef{bbl@ADJ@layout.lists@off}{%
4087   \bbl@adjust@layout{\let\list\bbl@OL@list}}
4088 \@namedef{bbl@ADJ@hyphenation.extra@on}{%
4089   \bbl@activateposthyphen}
4090 %
4091 \@namedef{bbl@ADJ@autoload.bcp47@on}{%
4092   \bbl@bcpallowedtrue}
4093 \@namedef{bbl@ADJ@autoload.bcp47@off}{%
4094   \bbl@bcpallowedfalse}
4095 \@namedef{bbl@ADJ@autoload.bcp47.prefix}#1{%
4096   \def\bbl@bcp@prefix{#1}}
4097 \def\bbl@bcp@prefix{bcp47-}
4098 \@namedef{bbl@ADJ@autoload.options}#1{%
4099   \def\bbl@autoload@options{#1}}
4100 \let\bbl@autoload@bcptoptions\@empty
4101 \@namedef{bbl@ADJ@autoload.bcp47.options}#1{%
4102   \def\bbl@autoload@bcptoptions{#1}}
4103 \newif\ifbbl@bcptoname
4104 \@namedef{bbl@ADJ@bcp47.toname@on}{%
4105   \bbl@bcptonametrue

```

```

4106 \BabelEnsureInfo}
4107 \@namedef{bbl@ADJ@bcp47.toname@off}{%
4108 \bbl@bcptonamefalse}
4109% TODO: use babel name, override
4110%
4111% As the final task, load the code for lua.
4112%
4113 \ifx\directlua\@undefined\else
4114 \ifx\bbl@luapatterns\@undefined
4115 \input luababel.def
4116 \fi
4117 \fi
4118 </core>

```

A proxy file for switch.def

```

4119 <*kernel>
4120 \let\bbl@onlyswitch\@empty
4121 \input babel.def
4122 \let\bbl@onlyswitch\@undefined
4123 </kernel>
4124 <*patterns>

```

11 Loading hyphenation patterns

The following code is meant to be read by \LaTeX because it should instruct \TeX to read hyphenation patterns. To this end the `docstrip` option `patterns` can be used to include this code in the file `hyphen.cfg`. Code is written with lower level macros.

To make sure that \LaTeX 2.09 executes the `\@begindocumenthook` we would want to alter `\begin{document}`, but as this done too often already, we add the new code at the front of `\@preamblecmds`. But we can only do that after it has been defined, so we add this piece of code to `\dump`.

This new definition starts by adding an instruction to write a message on the terminal and in the transcript file to inform the user of the preloaded hyphenation patterns.

Then everything is restored to the old situation and the format is dumped.

```

4125 <<Make sure ProvidesFile is defined>>
4126 \ProvidesFile{hyphen.cfg}[<<date>> <<version>> Babel hyphens]
4127 \xdef\bbl@format{\jobname}
4128 \def\bbl@version{<<version>>}
4129 \def\bbl@date{<<date>>}
4130 \ifx\AtBeginDocument\@undefined
4131 \def\@empty{}
4132 \let\orig@dump\dump
4133 \def\dump{%
4134 \ifx\@ztryfc\@undefined
4135 \else
4136 \toks0=\expandafter{\@preamblecmds}%
4137 \edef\@preamblecmds{\noexpand\@begindocumenthook\the\toks0}%
4138 \def\@begindocumenthook{}%
4139 \fi
4140 \let\dump\orig@dump\let\orig@dump\@undefined\dump}
4141 \fi
4142 <<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.

```
4143 \def\process@line#1#2 #3 #4 {%
4144   \ifx=#1%
4145     \process@synonym{#2}%
4146   \else
4147     \process@language{#1#2}{#3}{#4}%
4148   \fi
4149   \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.

```
4150 \toks@{}
4151 \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.

```
4152 \def\process@synonym#1{%
4153   \ifnum\last@language=\m@ne
4154     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
4155   \else
4156     \expandafter\chardef\csname l@#1\endcsname\last@language
4157     \wlog{\string\l@#1=\string\language\the\last@language}%
4158     \expandafter\let\csname #1hyphenmins\expandafter\endcsname
4159       \csname\language\name hyphenmins\endcsname
4160     \let\bbl@elt\relax
4161     \edef\bbl@languages{\bbl@languages\bbl@elt{#1}{\the\last@language}{}}%
4162   \fi}
```

`\process@language` The macro `\process@language` is used to process a non-empty line from the ‘configuration file’. It has three arguments, each delimited by white space. The first argument is the ‘name’ of a language; the second is the name of the file that contains the patterns. The optional third argument is the name of a file containing hyphenation exceptions. The first thing to do is call `\addlanguage` to allocate a pattern register and to make that register ‘active’. Then the pattern file is read.

For some hyphenation patterns it is needed to load them with a specific font encoding selected. This can be specified in the file `language.dat` by adding for instance ‘:T1’ to the name of the language. The macro `\bbl@get@enc` extracts the font encoding from the language name and stores it in `\bbl@hyph@enc`. The latter can be used in hyphenation files if you need to set a behavior depending on the given encoding (it is set to empty if no encoding is given).

Pattern files may contain assignments to `\lefthyphenmin` and `\righthyphenmin`. \TeX does not keep track of these assignments. Therefore we try to detect such assignments and store them in the `\<lang>hyphenmins` macro. When no assignments were made we provide a default setting.

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

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

When the hyphenation patterns have been processed we need to see if a file with hyphenation exceptions needs to be read. This is the case when the third argument is not

empty and when it does not contain a space token. (Note however there is no need to save hyphenation exceptions into the format.)

\bbl@languages saves a snapshot of the loaded languages in the form

\bbl@elt{<language-name>}{<number>}{<patterns-file>}{<exceptions-file>}. Note the last 2 arguments are empty in ‘dialects’ defined in language.dat with =. Note also the language name can have encoding info.

Finally, if the counter \language is equal to zero we execute the synonyms stored.

```

4163 \def\process@language#1#2#3{%
4164   \expandafter\addlanguage\csname l@#1\endcsname
4165   \expandafter\language\csname l@#1\endcsname
4166   \edef\language#1{%
4167     \bbl@hook@everylanguage{#1}%
4168     % > luatex
4169     \bbl@get@enc#1::\@@@
4170   \beginngroup
4171     \lefthyphenmin\m@ne
4172     \bbl@hook@loadpatterns{#2}%
4173     % > luatex
4174     \ifnum\lefthyphenmin=\m@ne
4175     \else
4176       \expandafter\xdef\csname #1hyphenmins\endcsname{%
4177         \the\lefthyphenmin\the\righthyphenmin}%
4178     \fi
4179   \endgroup
4180   \def\bbl@tempa{#3}%
4181   \ifx\bbl@tempa\@empty\else
4182     \bbl@hook@loadexceptions{#3}%
4183     % > luatex
4184   \fi
4185   \let\bbl@elt\relax
4186   \edef\bbl@languages{%
4187     \bbl@languages\bbl@elt{#1}{\the\language}{#2}{\bbl@tempa}}%
4188   \ifnum\the\language=\z@
4189     \expandafter\ifx\csname #1hyphenmins\endcsname\relax
4190       \set@hyphenmins\tw@\thr@@\relax
4191     \else
4192       \expandafter\expandafter\expandafter\set@hyphenmins
4193       \csname #1hyphenmins\endcsname
4194     \fi
4195     \the\toks@
4196     \toks@{}%
4197   \fi}

```

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

```

4198 \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.

```

4199 \def\bbl@hook@everylanguage#1{}
4200 \def\bbl@hook@loadpatterns#1{\input #1\relax}
4201 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
4202 \def\bbl@hook@loadkernel#1{%
4203   \def\addlanguage{\csname newlanguage\endcsname}%
4204   \def\adddialect##1##2{%
4205     \global\chardef##1##2\relax

```

```

4206 \wlog{\string##1 = a dialect from \string\language##2}%
4207 \def\iflanguage##1{%
4208 \expandafter\ifx\csname l@##1\endcsname\relax
4209 \@nolanerr{##1}%
4210 \else
4211 \ifnum\csname l@##1\endcsname=\language
4212 \expandafter\expandafter\expandafter\@firstoftwo
4213 \else
4214 \expandafter\expandafter\expandafter\@secondoftwo
4215 \fi
4216 \fi}%
4217 \def\providehyphenmins##1##2{%
4218 \expandafter\ifx\csname ##1hyphenmins\endcsname\relax
4219 \@namedef{##1hyphenmins}{##2}%
4220 \fi}%
4221 \def\set@hyphenmins##1##2{%
4222 \lefthyphenmin##1\relax
4223 \righthyphenmin##2\relax}%
4224 \def\selectlanguage{%
4225 \errhelp{Selecting a language requires a package supporting it}%
4226 \errmessage{Not loaded}}%
4227 \let\foreignlanguage\selectlanguage
4228 \let\otherlanguage\selectlanguage
4229 \expandafter\let\csname otherlanguage*\endcsname\selectlanguage
4230 \def\bbl@usehooks##1##2{% TODO. Temporary!!
4231 \def\setlocale{%
4232 \errhelp{Find an armchair, sit down and wait}%
4233 \errmessage{Not yet available}}%
4234 \let\uselocale\setlocale
4235 \let\locale\setlocale
4236 \let\selectlocale\setlocale
4237 \let\localename\setlocale
4238 \let\textlocale\setlocale
4239 \let\textlanguage\setlocale
4240 \let\languagetext\setlocale}
4241 \begingroup
4242 \def\AddBabelHook#1#2{%
4243 \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
4244 \def\next{\toks1}%
4245 \else
4246 \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname####1}%
4247 \fi
4248 \next}
4249 \ifx\directlua\undefined
4250 \ifx\XeTeXinputencoding\undefined\else
4251 \input xebabel.def
4252 \fi
4253 \else
4254 \input luababel.def
4255 \fi
4256 \openin1 = babel-\bbl@format.cfg
4257 \ifeof1
4258 \else
4259 \input babel-\bbl@format.cfg\relax
4260 \fi
4261 \closein1
4262 \endgroup
4263 \bbl@hook@loadkernel{switch.def}

```

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

```
4264 \openin1 = language.dat
```

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

```
4265 \def\languagename{english}%
4266 \ifeof1
4267 \message{I couldn't find the file language.dat,\space
4268         I will try the file hyphen.tex}
4269 \input hyphen.tex\relax
4270 \chardef\l@english\z@
4271 \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`.

```
4272 \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.

```
4273 \loop
4274 \endlinechar\m@ne
4275 \read1 to \bbl@line
4276 \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.

```
4277 \if T\ifeof1F\fi T\relax
4278 \ifx\bbl@line\@empty\else
4279 \edef\bbl@line{\bbl@line\space\space\space}%
4280 \expandafter\process@line\bbl@line\relax
4281 \fi
4282 \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.

```
4283 \begingroup
4284 \def\bbl@elt#1#2#3#4{%
4285 \global\language=#2\relax
4286 \gdef\languagename{#1}%
4287 \def\bbl@elt##1##2##3##4{}}%
4288 \bbl@languages
4289 \endgroup
4290 \fi
4291 \closein1
```

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

```
4292 \if/\the\toks@/\else
4293 \errhelp{language.dat loads no language, only synonyms}
4294 \errmessage{Orphan language synonym}
4295 \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.

```

4296 \let\bbl@line\@undefined
4297 \let\process@line\@undefined
4298 \let\process@synonym\@undefined
4299 \let\process@language\@undefined
4300 \let\bbl@get@enc\@undefined
4301 \let\bbl@hyph@enc\@undefined
4302 \let\bbl@tempa\@undefined
4303 \let\bbl@hook@loadkernel\@undefined
4304 \let\bbl@hook@everylanguage\@undefined
4305 \let\bbl@hook@loadpatterns\@undefined
4306 \let\bbl@hook@loadexceptions\@undefined
4307 \let\patterns\@undefined

```

Here the code for `iniTeX` ends.

12 Font handling with fontspec

Add the bidi handler just before `luaotfload`, 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].

```

4308 <<*More package options>> ≡
4309 \chardef\bbl@bidimode\z@
4310 \DeclareOption{bidi=default}{\chardef\bbl@bidimode=\@ne}
4311 \DeclareOption{bidi=basic}{\chardef\bbl@bidimode=101 }
4312 \DeclareOption{bidi=basic-r}{\chardef\bbl@bidimode=102 }
4313 \DeclareOption{bidi=bidi}{\chardef\bbl@bidimode=201 }
4314 \DeclareOption{bidi=bidi-r}{\chardef\bbl@bidimode=202 }
4315 \DeclareOption{bidi=bidi-l}{\chardef\bbl@bidimode=203 }
4316 <</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.

```

4317 <<*Font selection>> ≡
4318 \bbl@trace{Font handling with fontspec}
4319 \ifx\ExplSyntaxOn\@undefined\else
4320   \ExplSyntaxOn
4321   \catcode`\ =10
4322   \def\bbl@loadfontspec{%
4323     \usepackage{fontspec}%
4324     \expandafter
4325     \def\csname msg-text->~fontspec/language-not-exist\endcsname##1##2##3##4{%
4326       Font '\l_fontspec_fontname_tl' is using the\\%
4327       default features for language '##1'.\\%
4328       That's usually fine, because many languages\\%
4329       require no specific features, but if the output is\\%
4330       not as expected, consider selecting another font.}
4331     \expandafter
4332     \def\csname msg-text->~fontspec/no-script\endcsname##1##2##3##4{%

```

```

4333     Font '\l_fontspec_fontname_tl' is using the\\%
4334     default features for script '##2'.\\%
4335     That's not always wrong, but if the output is\\%
4336     not as expected, consider selecting another font.}}
4337 \ExplSyntaxOff
4338 \fi
4339 \@onlypreamble\babelfont
4340 \newcommand\babelfont[2][\% 1=langs/scripts 2=fam
4341 \bbl@foreach{#1}{\%
4342 \expandafter\ifx\csname date##1\endcsname\relax
4343 \IfFileExists{babel-##1.tex}%
4344 {\babelprovide{##1}}%
4345 }%
4346 \fi}%
4347 \edef\bbl@tempa{#1}%
4348 \def\bbl@tempb{#2}% Used by \bbl@bblfont
4349 \ifx\fontspec\@undefined
4350 \bbl@loadfontspec
4351 \fi
4352 \EnableBabelHook{babel-fontspec}% Just calls \bbl@switchfont
4353 \bbl@bblfont}
4354 \newcommand\bbl@bblfont[2][\% 1=features 2=fontname, @font=rm|sf|tt
4355 \bbl@ifunset{\bbl@tempb family}%
4356 {\bbl@providefam{\bbl@tempb}}%
4357 {\bbl@exp{%
4358 \\\bbl@sreplace\<\bbl@tempb family >%
4359 {\@nameuse{\bbl@tempb default}}{\<\bbl@tempb default>}}}%
4360 % For the default font, just in case:
4361 \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}}%
4362 \expandafter\bbl@ifblank\expandafter{\bbl@tempa}%
4363 {\bbl@csarg\edef{\bbl@tempb dflt@}{<{#1}{#2}}% save bbl@rmdflt@
4364 \bbl@exp{%
4365 \let\bbl@\bbl@tempb dflt@\languagename>\<\bbl@\bbl@tempb dflt@>%
4366 \\\bbl@font@set\<\bbl@\bbl@tempb dflt@\languagename>%
4367 \<\bbl@tempb default>\<\bbl@tempb family>}}%
4368 {\bbl@foreach\bbl@tempa{% ie bbl@rmdflt@lang / *scrt
4369 \bbl@csarg\def{\bbl@tempb dflt@##1}{<{#1}{#2}}}}}%

```

If the family in the previous command does not exist, it must be defined. Here is how:

```

4370 \def\bbl@providefam#1{%
4371 \bbl@exp{%
4372 \\\newcommand\<#1default>{}% Just define it
4373 \\\bbl@add@list\\\bbl@font@fams{#1}%
4374 \\\DeclareRobustCommand\<#1family>{%
4375 \\\not@math@alphabet\<#1family>\relax
4376 \\\fontfamily\<#1default>\selectfont}%
4377 \\\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.

```

4378 \def\bbl@nostdfont#1{%
4379 \bbl@ifunset{\bbl@WFF@\f@family}%
4380 {\bbl@csarg\gdef{WFF@\f@family}}}% Flag, to avoid dupl warns
4381 \bbl@infowarn{The current font is not a babel standard family:\\%
4382 #1%
4383 \fontname\font\\%
4384 There is nothing intrinsically wrong with this warning, and\\%
4385 you can ignore it altogether if you do not need these\\%
4386 families. But if they are used in the document, you should be\\%

```

```

4387     aware 'babel' will no set Script and Language for them, so\\%
4388     you may consider defining a new family with \\string\\babelfont.\\%
4389     See the manual for further details about \\string\\babelfont.\\%
4390     Reported}}
4391     }\\}%
4392 \\gdef\\bbl@switchfont{%
4393   \\bbl@ifunset{\\bbl@sys@\\language\\name}{\\bbl@provide@sys{\\language\\name}}{\\}%
4394   \\bbl@exp{%   eg Arabic -> arabic
4395     \\lowercase{\\edef\\bbl@tempa{\\bbl@cl{\\sname}}}}}%
4396   \\bbl@foreach\\bbl@font@fams{%
4397     \\bbl@ifunset{\\bbl@##1dflt@\\language\\name}%      (1) language?
4398     {\\bbl@ifunset{\\bbl@##1dflt@*\\bbl@tempa}%      (2) from script?
4399     {\\bbl@ifunset{\\bbl@##1dflt@}%      2=F - (3) from generic?
4400     {\\}%      123=F - nothing!
4401     {\\bbl@exp{%      3=T - from generic
4402       \\global\\let<\\bbl@##1dflt@\\language\\name>%
4403       \\<\\bbl@##1dflt@>}}}%
4404     {\\bbl@exp{%      2=T - from script
4405       \\global\\let<\\bbl@##1dflt@\\language\\name>%
4406       \\<\\bbl@##1dflt@*\\bbl@tempa>}}}%
4407     }\\}%      1=T - language, already defined
4408   \\def\\bbl@tempa{\\bbl@nostdfont}\\}%
4409   \\bbl@foreach\\bbl@font@fams{%   don't gather with prev for
4410     \\bbl@ifunset{\\bbl@##1dflt@\\language\\name}%
4411     {\\bbl@cs{famrst@##1}%
4412     \\global\\bbl@csarg\\let{famrst@##1}\\relax}%
4413     {\\bbl@exp{% order is relevant. TODO: but sometimes wrong!
4414       \\bbl@add\\originalTeX{%
4415       \\bbl@font@rst{\\bbl@cl{\\bbl@##1dflt}}}%
4416       \\<##1default>\\<##1family>{\\bbl@##1dflt}}}%
4417       \\bbl@font@set<\\bbl@##1dflt@\\language\\name>% the main part!
4418       \\<##1default>\\<##1family>}}}%
4419   \\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.

```

4420 \\ifx\\f@family\\undefined\\else   % if latex
4421   \\ifcase\\bbl@engine              % if pdftex
4422     \\let\\bbl@ckeckstdfonts\\relax
4423   \\else
4424     \\def\\bbl@ckeckstdfonts{%
4425       \\begingroup
4426       \\global\\let\\bbl@ckeckstdfonts\\relax
4427       \\let\\bbl@tempa\\empty
4428       \\bbl@foreach\\bbl@font@fams{%
4429         \\bbl@ifunset{\\bbl@##1dflt@}%
4430         {\\nameuse{\\bbl@##1family}%
4431         \\bbl@csarg\\gdef{WFF@\\f@family}}{\\}% Flag
4432         \\bbl@exp{\\bbl@add\\bbl@tempa{* \\<##1family>= \\f@family\\}%
4433         \\space\\space\\fontname\\font\\}%
4434         \\bbl@csarg\\xdef{\\bbl@##1dflt@}{\\f@family}%
4435         \\expandafter\\xdef{\\csname \\bbl@##1default\\endcsname{\\f@family}}%
4436         }\\}%
4437       \\ifx\\bbl@tempa\\empty\\else
4438         \\bbl@infowarn{The following font families will use the default\\%
4439         settings for all or some languages:\\%
4440         \\bbl@tempa
4441         There is nothing intrinsically wrong with it, but\\%
4442         'babel' will no set Script and Language, which could\\%

```

```

4443         be relevant in some languages. If your document uses\\%
4444         these families, consider redefining them with \string\babelfont.\\%
4445         Reported}%
4446         \fi
4447     \endgroup}
4448 \fi
4449 \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.

```

4450 \def\bbl@font@set#1#2#3{% eg \bbl@rmdflt@lang \rmdefault \rmfamily
4451 \bbl@xin@{<>}{#1}%
4452 \ifin@
4453 \bbl@exp{\\bbl@fontspec@set\\#1\expandafter\@gobbletwo#1\\#3}%
4454 \fi
4455 \bbl@exp{%
4456     \def\\#2{#1}% eg, \rmdefault{\bbl@rmdflt@lang}
4457     \\bbl@ifsamestring{#2}{\f@family}%
4458     {\\#3%
4459         \\bbl@ifsamestring{\f@series}{\bfdefault}{\\bfseries}{}%
4460         \let\\bbl@tempa\relax}%
4461     {}}}
4462 % TODO - next should be global?, but even local does its job. I'm
4463 % still not sure -- must investigate:
4464 \def\bbl@fontspec@set#1#2#3#4{% eg \bbl@rmdflt@lang fnt-opt fnt-nme \xxfamily
4465 \let\bbl@tempe\bbl@mapselect
4466 \let\bbl@mapselect\relax
4467 \let\bbl@temp@fam#4% eg, '\rmfamily', to be restored below
4468 \let#4\@empty % Make sure \renewfontfamily is valid
4469 \bbl@exp{%
4470     \let\\bbl@temp@pfam\<\bbl@stripslash#4\space>% eg, '\rmfamily '
4471     \<keys_if_exist:nnF>{fontspec-opentype}{Script/\bbl@cl{sname}}}%
4472     {\\newfontscript{\bbl@cl{sname}}{\bbl@cl{sotf}}}%
4473     \<keys_if_exist:nnF>{fontspec-opentype}{Language/\bbl@cl{lname}}}%
4474     {\\newfontlanguage{\bbl@cl{lname}}{\bbl@cl{lotf}}}%
4475     \\renewfontfamily\\#4%
4476     [\bbl@cs{lsys@\language},#2]{#3}% ie \bbl@exp{..}{#3}
4477 \begingroup
4478     #4%
4479     \xdef#1{\f@family}% eg, \bbl@rmdflt@lang{FreeSerif(0)}
4480 \endgroup
4481 \let#4\bbl@temp@fam
4482 \bbl@exp{\let\<\bbl@stripslash#4\space>}\bbl@temp@pfam
4483 \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.

```

4484 \def\bbl@font@rst#1#2#3#4{%
4485 \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.

```

4486 \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 :-).

```
4487 \newcommand\babelFSstore[2][{%
4488   \bbl@ifblank{#1}%
4489   {\bbl@csarg\def{sname@#2}{Latin}}%
4490   {\bbl@csarg\def{sname@#2}{#1}}%
4491   \bbl@provide@dirs{#2}%
4492   \bbl@csarg\ifnum{wdir@#2}>\z@
4493   \let\bbl@beforeforeign\leavevmode
4494   \EnableBabelHook{babel-bidi}%
4495   \fi
4496   \bbl@foreach{#2}{%
4497     \bbl@FSstore{##1}{rm}\rmdefault\bbl@save@rmdefault
4498     \bbl@FSstore{##1}{sf}\sfdefault\bbl@save@sfdefault
4499     \bbl@FSstore{##1}{tt}\ttdefault\bbl@save@ttdefault}}
4500 \def\bbl@FSstore#1#2#3#4{%
4501   \bbl@csarg\edef{#2default#1}{#3}%
4502   \expandafter\addto\csname extras#1\endcsname{%
4503     \let#4#3%
4504     \ifx#3\f@family
4505       \edef#3{\csname bbl@#2default#1\endcsname}%
4506       \fontfamily{#3}\selectfont
4507     \else
4508       \edef#3{\csname bbl@#2default#1\endcsname}%
4509       \fi}%
4510   \expandafter\addto\csname noextras#1\endcsname{%
4511     \ifx#3\f@family
4512       \fontfamily{#4}\selectfont
4513     \fi
4514     \let#3#4}}
4515 \let\bbl@langfeatures\@empty
4516 \def\babelFSfeatures{% make sure \fontspec is redefined once
4517   \let\bbl@ori@fontspec\fontspec
4518   \renewcommand\fontspec[1][{}]{%
4519     \bbl@ori@fontspec[\bbl@langfeatures##1]}
4520   \let\babelFSfeatures\bbl@FSfeatures
4521   \babelFSfeatures}
4522 \def\bbl@FSfeatures#1#2{%
4523   \expandafter\addto\csname extras#1\endcsname{%
4524     \babel@save\bbl@langfeatures
4525     \edef\bbl@langfeatures{#2,}}
4526 \</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.

```
4527 <<{*Footnote changes}>> ≡
4528 \bbl@trace{Bidi footnotes}
4529 \ifnum\bbl@bidimode>\z@
4530   \def\bbl@footnote#1#2#3{%
4531     \@ifnextchar[%
4532       {\bbl@footnote@o{#1}{#2}{#3}}%
4533       {\bbl@footnote@x{#1}{#2}{#3}}}
4534   \long\def\bbl@footnote@x#1#2#3#4{%
4535     \bgroup
```



```

4536 \select@language@x{\bbl@main@language}%
4537 \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
4538 \egroup}
4539 \long\def\bbl@footnote@o#1#2#3[#4]#5{%
4540 \bgroup
4541 \select@language@x{\bbl@main@language}%
4542 \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
4543 \egroup}
4544 \def\bbl@footnotetext#1#2#3{%
4545 \@ifnextchar[%
4546 {\bbl@footnotetext@o{#1}{#2}{#3}}%
4547 {\bbl@footnotetext@x{#1}{#2}{#3}}}
4548 \long\def\bbl@footnotetext@x#1#2#3#4{%
4549 \bgroup
4550 \select@language@x{\bbl@main@language}%
4551 \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
4552 \egroup}
4553 \long\def\bbl@footnotetext@o#1#2#3[#4]#5{%
4554 \bgroup
4555 \select@language@x{\bbl@main@language}%
4556 \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
4557 \egroup}
4558 \def\BabelFootnote#1#2#3#4{%
4559 \ifx\bbl@fn@footnote\undefined
4560 \let\bbl@fn@footnote\footnote
4561 \fi
4562 \ifx\bbl@fn@footnotetext\undefined
4563 \let\bbl@fn@footnotetext\footnotetext
4564 \fi
4565 \bbl@ifblank{#2}%
4566 {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
4567 \@namedef{\bbl@stripslash#1text}%
4568 {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
4569 {\def#1{\bbl@exp{\bbl@footnote{\foreignlanguage{#2}}}{#3}{#4}}%
4570 \@namedef{\bbl@stripslash#1text}%
4571 {\bbl@exp{\bbl@footnotetext{\foreignlanguage{#2}}}{#3}{#4}}}%
4572 \fi
4573 <</Footnote changes>>

```

Now, the code.

```

4574 (*xetex)
4575 \def\BabelStringsDefault{unicode}
4576 \let\xebbl@stop\relax
4577 \AddBabelHook{xetex}{encodedcommands}{%
4578 \def\bbl@tempa{#1}%
4579 \ifx\bbl@tempa\empty
4580 \XeTeXinputencoding"bytes"%
4581 \else
4582 \XeTeXinputencoding"#1"%
4583 \fi
4584 \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
4585 \AddBabelHook{xetex}{stopcommands}{%
4586 \xebbl@stop
4587 \let\xebbl@stop\relax}
4588 \def\bbl@intraspace#1 #2 #3\@@{%
4589 \bbl@csarg\gdef{\xeisp@language}%
4590 {\XeTeXlinebreakskip #1em plus #2em minus #3em\relax}}
4591 \def\bbl@intrapenalty#1\@@{%
4592 \bbl@csarg\gdef{\xeipn@language}%

```

```

4593 {\XeTeXlinebreakpenalty #1\relax}}
4594 \def\bbl@provide@intraspace{%
4595 \bbl@xin@{\bbl@cl{lnbrk}}{s}%
4596 \ifin@else\bbl@xin@{\bbl@cl{lnbrk}}{c}\fi
4597 \ifin@
4598 \bbl@ifunset{\bbl@intsp@{\language\language}}{s}%
4599 {\expandafter\ifx\cscname\bbl@intsp@{\language\language}\endcsname\empty\else
4600 \ifx\bbl@KVP@intraspace\@nil
4601 \bbl@exp{%
4602 \\\bbl@intraspace\bbl@cl{intsp}}\@{}%
4603 \fi
4604 \ifx\bbl@KVP@intrapenalty\@nil
4605 \bbl@intrapenalty0\@{}
4606 \fi
4607 \fi
4608 \ifx\bbl@KVP@intraspace\@nil\else % We may override the ini
4609 \expandafter\bbl@intraspace\bbl@KVP@intraspace\@{}
4610 \fi
4611 \ifx\bbl@KVP@intrapenalty\@nil\else
4612 \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@{}
4613 \fi
4614 \bbl@exp{%
4615 \\\bbl@add\<extras\language>{%
4616 \XeTeXlinebreaklocale "\bbl@cl{tbcpr}"%
4617 \<bbl@xeisp@\language>%
4618 \<bbl@xeipn@\language>}%
4619 \\\bbl@toglobal\<extras\language>%
4620 \\\bbl@add\<noextras\language>{%
4621 \XeTeXlinebreaklocale "en"%
4622 \\\bbl@toglobal\<noextras\language>}%
4623 \ifx\bbl@ispace\@undefined
4624 \gdef\bbl@ispace{\bbl@cl{xeisp}}%
4625 \ifx\AtBeginDocument\@notprerr
4626 \expandafter\@secondoftwo % to execute right now
4627 \fi
4628 \AtBeginDocument{%
4629 \expandafter\bbl@add
4630 \cscname selectfont \endcsname{\bbl@ispace}%
4631 \expandafter\bbl@toglobal\cscname selectfont \endcsname}%
4632 \fi}%
4633 \fi}
4634 \ifx\DisableBabelHook\@undefined\endinput\fi
4635 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
4636 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@ckeckstdfonts}
4637 \DisableBabelHook{babel-fontspec}
4638 <<Font selection>>
4639 \input txtbabel.def
4640 </xetex>

```

13.2 Layout

In progress.

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

```
4641 (*texxet)
4642 \providecommand\bbl@provide@intraspace{}
4643 \bbl@trace{Redefinitions for bidi layout}
4644 \def\bbl@sspre@caption{%
4645   \bbl@exp{\everyhbox{\bbl@textdir\bbl@cs{wdir\bbl@main@language}}}}
4646 \ifx\bbl@opt@layout\@nnil\endinput\fi % No layout
4647 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
4648 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}
4649 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
4650   \def\hangfrom#1{%
4651     \setbox\@tempboxa\hbox{#1}%
4652     \hangindent\ifcase\bbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
4653     \noindent\box\@tempboxa}
4654 \def\raggedright{%
4655   \let\@centercr
4656   \bbl@startskip\z@skip
4657   \@rightskip\@flushglue
4658   \bbl@endskip\@rightskip
4659   \parindent\z@
4660   \parfillskip\bbl@startskip}
4661 \def\raggedleft{%
4662   \let\@centercr
4663   \bbl@startskip\@flushglue
4664   \bbl@endskip\z@skip
4665   \parindent\z@
4666   \parfillskip\bbl@endskip}
4667 \fi
4668 \IfBabelLayout{lists}
4669   {\bbl@sreplace\list
4670     {\@totalleftmargin\leftmargin}{\@totalleftmargin\bbl@listleftmargin}%
4671     \def\bbl@listleftmargin{%
4672       \ifcase\bbl@thepardir\leftmargin\else\rightmargin\fi}%
4673     \ifcase\bbl@engine
4674       \def\labelenumii{}\theenumii{}\pdfTeX doesn't reverse ()
4675       \def\p@enumiii{\p@enumii}\theenumii{}
4676     \fi
4677     \bbl@sreplace\@verbatim
4678       {\leftskip\@totalleftmargin}%
4679       {\bbl@startskip\textwidth
4680         \advance\bbl@startskip-\linewidth}%
4681     \bbl@sreplace\@verbatim
4682       {\rightskip\z@skip}%
4683       {\bbl@endskip\z@skip}}%
4684   {}
4685 \IfBabelLayout{contents}
4686   {\bbl@sreplace\@dottedtocline{\leftskip}{\bbl@startskip}%
4687     \bbl@sreplace\@dottedtocline{\rightskip}{\bbl@endskip}}
4688   {}
4689 \IfBabelLayout{columns}
4690   {\bbl@sreplace\@outputdblcol{\hb@xt@\textwidth}{\bbl@outputbox}%
4691     \def\bbl@outputbox#1{%
4692       \hb@xt@\textwidth{%
4693         \hskip\columnwidth
4694         \hfil
4695         {\normalcolor\vrule \@width\columnseprule}%
4696         \hfil
4697         \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
4698       }
4699     }
4700   }
```

```

4698      \hskip-\textwidth
4699      \hb@xt@\columnwidth{\box\@outputbox \hss}%
4700      \hskip\columnsep
4701      \hskip\columnwidth}}}%
4702  {}
4703  <<Footnote changes>>
4704  \IfBabelLayout{footnotes}%
4705  {\BabelFootnote\footnote\language\language{}{}}%
4706  \BabelFootnote\localfootnote\language\language{}{}}%
4707  \BabelFootnote\mainfootnote{}{}}{}
4708  {}

```

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.

```

4709  \IfBabelLayout{counters}%
4710  {\let\bbbl@latinarabic=\@arabic
4711   \def\@arabic#1{\babelsublr{\bbbl@latinarabic#1}}}%
4712   \let\bbbl@asciroman=\@roman
4713   \def\@roman#1{\babelsublr{\ensureascii{\bbbl@asciroman#1}}}%
4714   \let\bbbl@asciiRoman=\@Roman
4715   \def\@Roman#1{\babelsublr{\ensureascii{\bbbl@asciiRoman#1}}}}{}
4716  </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, \bbbl@hyphendata@<num> exists (with the names of the files read).

The default setup preloads the first language into the format. This is intended mainly for 'english', so that it's available without further intervention from the user. To avoid duplicating it, the following rule applies: if the "0th" language and the first language in language.dat have the same name then just ignore the latter. If there are new synonymous, they are added, but note if the language patterns have not been preloaded they won't at run time.

Other preloaded languages could be read twice, if they have been preloaded into the format. This is not optimal, but it shouldn't happen very often – with luatex patterns are best loaded when the document is typeset, and the "0th" language is preloaded just for backwards compatibility.

As of 1.1b, lua(e)tex is taken into account. Formerly, loading of patterns on the fly didn't work in this format, but with the new loader it does. Unfortunately, the format is not based on babel, and data could be duplicated, because languages are reassigned above those in the format (nothing serious, anyway). Note even with this format language.dat is used (under the principle of a single source), instead of language.def.

Of course, there is room for improvements, like tools to read and reassign languages, which would require modifying the language list, and better error handling.

We need catcode tables, but no format (targeted by babel) provide a command to allocate them (although there are packages like ctablestack). FIX - This isn't true anymore. For the moment, a dangerous approach is used - just allocate a high random number and cross the fingers. To complicate things, etex.sty changes the way languages are allocated.

This files is read at three places: (1) when plain.def, babel.sty starts, to read the list of available languages from language.dat (for the base option); (2) at hyphen.cfg, to modify some macros; (3) in the middle of plain.def and babel.sty, by babel.def, with the commands and other definitions for luatex (eg, \babelpatterns).

```

4717 (*luatex)
4718 \ifx\AddBabelHook\undefined % When plain.def, babel.sty starts
4719 \bbl@trace{Read language.dat}
4720 \ifx\bbl@readstream\undefined
4721 \csname newread\endcsname\bbl@readstream
4722 \fi
4723 \begingroup
4724 \toks@{}
4725 \count@ \z@ % 0=start, 1=0th, 2=normal
4726 \def\bbl@process@line#1#2 #3 #4 {%
4727   \ifx=#1%
4728     \bbl@process@synonym{#2}%
4729   \else
4730     \bbl@process@language{#1#2}{#3}{#4}%
4731   \fi
4732   \ignorespaces}
4733 \def\bbl@manylang{%
4734   \ifnum\bbl@last>\@ne
4735     \bbl@info{Non-standard hyphenation setup}%
4736   \fi
4737   \let\bbl@manylang\relax}
4738 \def\bbl@process@language#1#2#3{%
4739   \ifcase\count@
4740     \ifundefined{zth#1}{\count@\tw@}{\count@\@ne}%
4741   \or
4742     \count@\tw@
4743   \fi
4744   \ifnum\count@=\tw@
4745     \expandafter\addlanguage\csname l@#1\endcsname
4746     \language\allocationnumber
4747     \chardef\bbl@last\allocationnumber
4748     \bbl@manylang
4749     \let\bbl@elt\relax
4750     \xdef\bbl@languages{%
4751       \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
4752   \fi
4753   \the\toks@
4754   \toks@{}}
4755 \def\bbl@process@synonym@aux#1#2{%
4756   \global\expandafter\chardef\csname l@#1\endcsname#2\relax
4757   \let\bbl@elt\relax
4758   \xdef\bbl@languages{%
4759     \bbl@languages\bbl@elt{#1}{#2}{}}}%
4760 \def\bbl@process@synonym#1{%
4761   \ifcase\count@
4762     \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
4763   \or
4764     \ifundefined{zth#1}{\bbl@process@synonym@aux{#1}{0}}{}%
4765   \else
4766     \bbl@process@synonym@aux{#1}{\the\bbl@last}%
4767   \fi}
4768 \ifx\bbl@languages\undefined % Just a (sensible?) guess
4769   \chardef\l@english\z@
4770   \chardef\l@USenglish\z@

```

```

4771 \chardef\bbl@last\z@
4772 \global\@namedef{bbl@hyphendata@0}{\hyphen.tex}{}
4773 \gdef\bbl@languages{%
4774   \bbl@elt{english}{0}{\hyphen.tex}{}%
4775   \bbl@elt{USenglish}{0}{}{}}
4776 \else
4777   \global\let\bbl@languages@format\bbl@languages
4778   \def\bbl@elt#1#2#3#4{% Remove all except language 0
4779     \ifnum#2>\z@\else
4780       \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
4781     \fi}%
4782   \xdef\bbl@languages{\bbl@languages}%
4783 \fi
4784 \def\bbl@elt#1#2#3#4{\@namedef{zth@#1}{} } % Define flags
4785 \bbl@languages
4786 \openin\bbl@readstream=language.dat
4787 \ifeof\bbl@readstream
4788   \bbl@warning{I couldn't find language.dat. No additional\\%
4789     patterns loaded. Reported}%
4790 \else
4791   \loop
4792     \endlinechar\m@ne
4793     \read\bbl@readstream to \bbl@line
4794     \endlinechar`\^^M
4795     \if T\ifeof\bbl@readstream F\fi T\relax
4796     \ifx\bbl@line\empty\else
4797       \edef\bbl@line{\bbl@line\space\space\space}%
4798       \expandafter\bbl@process@line\bbl@line\relax
4799     \fi
4800   \repeat
4801 \fi
4802 \endgroup
4803 \bbl@trace{Macros for reading patterns files}
4804 \def\bbl@get@enc#1:#2:#3\@@{\def\bbl@hyph@enc{#2}}
4805 \ifx\babelcatcodetablenum\undefined
4806   \ifx\newcatcodetable\undefined
4807     \def\babelcatcodetablenum{5211}
4808     \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4809   \else
4810     \newcatcodetable\babelcatcodetablenum
4811     \newcatcodetable\bbl@pattcodes
4812   \fi
4813 \else
4814   \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4815 \fi
4816 \def\bbl@luapatterns#1#2{%
4817   \bbl@get@enc#1::\@@@
4818   \setbox\z@\hbox\bgroup
4819   \begingroup
4820     \savecatcodetable\babelcatcodetablenum\relax
4821     \initcatcodetable\bbl@pattcodes\relax
4822     \catcodetable\bbl@pattcodes\relax
4823     \catcode`\#=6 \catcode`\$=3 \catcode`\&=4 \catcode`\^=7
4824     \catcode`\_ =8 \catcode`\{=1 \catcode`\}=2 \catcode`\~=13
4825     \catcode`\@=11 \catcode`\^^I=10 \catcode`\^^J=12
4826     \catcode`\<=12 \catcode`\>=12 \catcode`\*=12 \catcode`\.=12
4827     \catcode`\-=12 \catcode`\/=12 \catcode`\[=12 \catcode`\]=12
4828     \catcode`\'=12 \catcode`\'=12 \catcode`\`=12
4829     \input #1\relax

```

```

4830     \catcodetable\babelcatcodetablenum\relax
4831 \endgroup
4832 \def\bbbl@tempa{#2}%
4833 \ifx\bbbl@tempa\@empty\else
4834     \input #2\relax
4835 \fi
4836 \egroup}%
4837 \def\bbbl@patterns@lua#1{%
4838     \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
4839         \csname l@#1\endcsname
4840     \edef\bbbl@tempa{#1}%
4841 \else
4842     \csname l@#1:\f@encoding\endcsname
4843     \edef\bbbl@tempa{#1:\f@encoding}%
4844 \fi\relax
4845 \@namedef{lu@texhyphen@loaded@the\language}{}% Temp
4846 \@ifundefined{bbbl@hyphendata@the\language}%
4847     {\def\bbbl@elt##1##2##3##4{%
4848         \ifnum##2=\csname l@bbbl@tempa\endcsname % #2=spanish, dutch:OT1...
4849         \def\bbbl@tempb{##3}%
4850         \ifx\bbbl@tempb\@empty\else % if not a synonymous
4851             \def\bbbl@tempc{##3}{##4}%
4852         \fi
4853         \bbbl@csarg\xdef{hyphendata@##2}{\bbbl@tempc}%
4854         \fi}%
4855     \bbbl@languages
4856     \@ifundefined{bbbl@hyphendata@the\language}%
4857         {\bbbl@info{No hyphenation patterns were set for\%
4858             language '\bbbl@tempa'. Reported}}%
4859         {\expandafter\expandafter\expandafter\bbbl@luapatterns
4860             \csname bbl@hyphendata@the\language\endcsname}}}%
4861 \endinput\fi
4862 % Here ends \ifx\AddBabelHook\@undefined
4863 % A few lines are only read by hyphen.cfg
4864 \ifx\DisableBabelHook\@undefined
4865     \AddBabelHook{luatex}{everylanguage}{%
4866         \def\process@language##1##2##3{%
4867             \def\process@line####1####2 ####3 ####4 {}}}
4868     \AddBabelHook{luatex}{loadpatterns}{%
4869         \input #1\relax
4870         \expandafter\gdef\csname bbl@hyphendata@the\language\endcsname
4871             {{#1}}}}
4872     \AddBabelHook{luatex}{loadexceptions}{%
4873         \input #1\relax
4874         \def\bbbl@tempb##1##2{{##1}{#1}}%
4875         \expandafter\xdef\csname bbl@hyphendata@the\language\endcsname
4876             {\expandafter\expandafter\expandafter\bbbl@tempb
4877                 \csname bbl@hyphendata@the\language\endcsname}}
4878 \endinput\fi
4879 % Here stops reading code for hyphen.cfg
4880 % The following is read the 2nd time it's loaded
4881 \begingroup % TODO - to a lua file
4882 \catcode`\%=12
4883 \catcode`\'=12
4884 \catcode`\ "=12
4885 \catcode`\:=12
4886 \directlua{
4887     Babel = Babel or {}
4888     function Babel.bytes(line)

```

```

4889     return line:gsub("(.)",
4890         function (chr) return unicode.utf8.char(string.byte(chr)) end)
4891 end
4892 function Babel.begin_process_input()
4893     if luatexbase and luatexbase.add_to_callback then
4894         luatexbase.add_to_callback('process_input_buffer',
4895             Babel.bytes, 'Babel.bytes')
4896     else
4897         Babel.callback = callback.find('process_input_buffer')
4898         callback.register('process_input_buffer', Babel.bytes)
4899     end
4900 end
4901 function Babel.end_process_input ()
4902     if luatexbase and luatexbase.remove_from_callback then
4903         luatexbase.remove_from_callback('process_input_buffer', 'Babel.bytes')
4904     else
4905         callback.register('process_input_buffer', Babel.callback)
4906     end
4907 end
4908 function Babel.addpatterns(pp, lg)
4909     local lg = lang.new(lg)
4910     local pats = lang.patterns(lg) or ''
4911     lang.clear_patterns(lg)
4912     for p in pp:gmatch('[^%s]+') do
4913         ss = ''
4914         for i in string.utfcharacters(p:gsub('%d', '')) do
4915             ss = ss .. '%d?' .. i
4916         end
4917         ss = ss:gsub('^%%d%?%.', '%%.') .. '%d?'
4918         ss = ss:gsub('%.%%d%?$', '%%.')
4919         pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
4920         if n == 0 then
4921             tex.sprint(
4922                 [[\string\csname\space bbl@info\endcsname{New pattern: }]]
4923                 .. p .. [[]])
4924             pats = pats .. ' ' .. p
4925         else
4926             tex.sprint(
4927                 [[\string\csname\space bbl@info\endcsname{Renew pattern: }]]
4928                 .. p .. [[]])
4929         end
4930     end
4931     lang.patterns(lg, pats)
4932 end
4933 }
4934 \endgroup
4935 \ifx\newattribute\@undefined\else
4936     \newattribute\bbl@attr@locale
4937     \directlua{ Babel.attr_locale = luatexbase.registernumber'bbl@attr@locale'}
4938     \AddBabelHook{luatex}{beforeextras}{%
4939         \setattribute\bbl@attr@locale\localeid}
4940 \fi
4941 \def\BabelStringsDefault{unicode}
4942 \let\luabbl@stop\relax
4943 \AddBabelHook{luatex}{encodedcommands}{%
4944     \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
4945     \ifx\bbl@tempa\bbl@tempb\else
4946         \directlua{Babel.begin_process_input()}%
4947     \def\luabbl@stop{%

```



```

4948 \directlua{Babel.end_process_input()}}%
4949 \fi}%
4950 \AddBabelHook{luatex}{stopcommands}{%
4951 \luabbbl@stop
4952 \let\luabbbl@stop\relax}
4953 \AddBabelHook{luatex}{patterns}{%
4954 \@ifundefined{bbl@hyphendata@the\language}%
4955 {\def\bbl@elt##1##2##3##4{%
4956 \ifnum##2=\csname l@##2\endcsname % #2=spanish, dutch:OT1...
4957 \def\bbl@tempb{##3}%
4958 \ifx\bbl@tempb\empty\else % if not a synonymous
4959 \def\bbl@tempc{##3}{##4}}%
4960 \fi
4961 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
4962 \fi}%
4963 \bbl@languages
4964 \@ifundefined{bbl@hyphendata@the\language}%
4965 {\bbl@info{No hyphenation patterns were set for\%
4966 language '#2'. Reported}}%
4967 {\expandafter\expandafter\expandafter\bbl@luapatterns
4968 \csname bbl@hyphendata@the\language\endcsname}}}%
4969 \@ifundefined{bbl@patterns@}{}%
4970 \begingroup
4971 \bbl@xin@{\number\language,}{\bbl@pttnlist}%
4972 \ifin@else
4973 \ifx\bbl@patterns@\empty\else
4974 \directlua{ Babel.addpatterns(
4975 [[\bbl@patterns@]], \number\language) }%
4976 \fi
4977 \@ifundefined{bbl@patterns@#1}%
4978 \empty
4979 {\directlua{ Babel.addpatterns(
4980 [[\space\csname bbl@patterns@#1\endcsname]],
4981 \number\language) }}%
4982 \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
4983 \fi
4984 \endgroup}%
4985 \bbl@exp{%
4986 \bbl@ifunset{bbl@prehc@\languagename}{}%
4987 {\bbl@ifblank{\bbl@cs{prehc@\languagename}}}%
4988 {\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.

```

4989 \@onlypreamble\babelpatterns
4990 \AtEndOfPackage{%
4991 \newcommand\babelpatterns[2][\empty]{%
4992 \ifx\bbl@patterns@\relax
4993 \let\bbl@patterns@\empty
4994 \fi
4995 \ifx\bbl@pttnlist\empty\else
4996 \bbl@warning{%
4997 You must not intermingle \string\selectlanguage\space and\%
4998 \string\babelpatterns\space or some patterns will not\%
4999 be taken into account. Reported}%
5000 \fi
5001 \ifx\@empty#1%

```

```

5002     \protected@edef\bbl@patterns@{\bbl@patterns@\space#2}%
5003   \else
5004     \edef\bbl@tempb{\zap@space#1 \@empty}%
5005     \bbl@for\bbl@tempa\bbl@tempb{%
5006       \bbl@fixname\bbl@tempa
5007       \bbl@iflanguage\bbl@tempa{%
5008         \bbl@csarg\protected@edef{patterns@\bbl@tempa}{%
5009           \@ifundefined{bbl@patterns@\bbl@tempa}%
5010           \@empty
5011           {\csname bbl@patterns@\bbl@tempa\endcsname\space}%
5012           #2}}}%
5013   \fi}}

```

13.4 Southeast Asian scripts

First, some general code for line breaking, used by `\babelposthyphenation`. *In progress*. Replace regular (ie, implicit) discretionary by spaceskips, based on the previous glyph (which I think makes sense, because the hyphen and the previous char go always together). Other discretionary are not touched. See Unicode UAX 14.

```

5014% TODO - to a lua file
5015 \directlua{
5016   Babel = Babel or {}
5017   Babel.linebreaking = Babel.linebreaking or {}
5018   Babel.linebreaking.before = {}
5019   Babel.linebreaking.after = {}
5020   Babel.locale = {} % Free to use, indexed with \localeid
5021   function Babel.linebreaking.add_before(func)
5022     tex.print([[noexpand\csname bbl@luahyphenate\endcsname]])
5023     table.insert(Babel.linebreaking.before , func)
5024   end
5025   function Babel.linebreaking.add_after(func)
5026     tex.print([[noexpand\csname bbl@luahyphenate\endcsname]])
5027     table.insert(Babel.linebreaking.after, func)
5028   end
5029 }
5030 \def\bbl@intraspace#1 #2 #3\@@{%
5031   \directlua{
5032     Babel = Babel or {}
5033     Babel.intraspaces = Babel.intraspaces or {}
5034     Babel.intraspaces['\csname bbl@sbcpr@\languagename\endcsname'] = %
5035       {b = #1, p = #2, m = #3}
5036     Babel.locale_props[\the\localeid].intraspace = %
5037       {b = #1, p = #2, m = #3}
5038   }}
5039 \def\bbl@intrapenalty#1\@@{%
5040   \directlua{
5041     Babel = Babel or {}
5042     Babel.intrapenalties = Babel.intrapenalties or {}
5043     Babel.intrapenalties['\csname bbl@sbcpr@\languagename\endcsname'] = #1
5044     Babel.locale_props[\the\localeid].intrapenalty = #1
5045   }}
5046 \begingroup
5047 \catcode`\%=12
5048 \catcode`\^=14
5049 \catcode`\'=12
5050 \catcode`\~=12
5051 \gdef\bbl@seaintraspace{^
5052   \let\bbl@seaintraspace\relax

```

```

5053 \directlua{
5054   Babel = Babel or {}
5055   Babel.sea_enabled = true
5056   Babel.sea_ranges = Babel.sea_ranges or {}
5057   function Babel.set_chranges (script, chrng)
5058     local c = 0
5059     for s, e in string.gmatch(chrng..' ', '(.-%.%.(-)%s') do
5060       Babel.sea_ranges[script..c]={tonumber(s,16), tonumber(e,16)}
5061       c = c + 1
5062     end
5063   end
5064   function Babel.sea_disc_to_space (head)
5065     local sea_ranges = Babel.sea_ranges
5066     local last_char = nil
5067     local quad = 655360    ^^ 10 pt = 655360 = 10 * 65536
5068     for item in node.traverse(head) do
5069       local i = item.id
5070       if i == node.id'glyph' then
5071         last_char = item
5072       elseif i == 7 and item.subtype == 3 and last_char
5073         and last_char.char > 0x0C99 then
5074         quad = font.getfont(last_char.font).size
5075         for lg, rg in pairs(sea_ranges) do
5076           if last_char.char > rg[1] and last_char.char < rg[2] then
5077             lg = lg:sub(1, 4) ^^ Remove trailing number of, eg, Cyril1
5078             local intraspace = Babel.intraspaces[lg]
5079             local intrapenalty = Babel.intrapenalties[lg]
5080             local n
5081             if intrapenalty ~= 0 then
5082               n = node.new(14, 0) ^^ penalty
5083               n.penalty = intrapenalty
5084               node.insert_before(head, item, n)
5085             end
5086             n = node.new(12, 13) ^^ (glue, spaceskip)
5087             node.setglue(n, intraspace.b * quad,
5088               intraspace.p * quad,
5089               intraspace.m * quad)
5090             node.insert_before(head, item, n)
5091             node.remove(head, item)
5092           end
5093         end
5094       end
5095     end
5096   end
5097 }^^
5098 \bbl@luahyphenate}
5099 \catcode`\%=14
5100 \gdef\bbl@cjkintraspaces{%
5101   \let\bbl@cjkintraspaces\relax
5102   \directlua{
5103     Babel = Babel or {}
5104     require'babel-data-cjk.lua'
5105     Babel.cjk_enabled = true
5106     function Babel.cjk_linebreak(head)
5107       local GLYPH = node.id'glyph'
5108       local last_char = nil
5109       local quad = 655360    % 10 pt = 655360 = 10 * 65536
5110       local last_class = nil
5111       local last_lang = nil

```

```

5112
5113     for item in node.traverse(head) do
5114         if item.id == GLYPH then
5115
5116             local lang = item.lang
5117
5118             local LOCALE = node.get_attribute(item,
5119                 luatexbase.registernumber'bbl@attr@locale')
5120             local props = Babel.locale_props[LOCALE]
5121
5122             local class = Babel.cjk_class[item.char].c
5123
5124             if class == 'cp' then class = 'cl' end % ]) as CL
5125             if class == 'id' then class = 'I' end
5126
5127             local br = 0
5128             if class and last_class and Babel.cjk_breaks[last_class][class] then
5129                 br = Babel.cjk_breaks[last_class][class]
5130             end
5131
5132             if br == 1 and props.linebreak == 'c' and
5133                 lang ~= \the\l@nohyphenation\space and
5134                 last_lang ~= \the\l@nohyphenation then
5135                 local intrapenalty = props.intrapenalty
5136                 if intrapenalty ~= 0 then
5137                     local n = node.new(14, 0)    % penalty
5138                     n.penalty = intrapenalty
5139                     node.insert_before(head, item, n)
5140                 end
5141                 local intraspace = props.intraspace
5142                 local n = node.new(12, 13)      % (glue, spaceskip)
5143                 node.setglue(n, intraspace.b * quad,
5144                     intraspace.p * quad,
5145                     intraspace.m * quad)
5146                 node.insert_before(head, item, n)
5147             end
5148
5149             if font.getfont(item.font) then
5150                 quad = font.getfont(item.font).size
5151             end
5152             last_class = class
5153             last_lang = lang
5154             else % if penalty, glue or anything else
5155                 last_class = nil
5156             end
5157         end
5158         lang.hyphenate(head)
5159     end
5160 }%
5161 \bbl@luahyphenate}
5162 \gdef\bbl@luahyphenate{%
5163     \let\bbl@luahyphenate\relax
5164     \directlua{
5165         luatexbase.add_to_callback('hyphenate',
5166             function (head, tail)
5167                 if Babel.linebreaking.before then
5168                     for k, func in ipairs(Babel.linebreaking.before) do
5169                         func(head)
5170                     end

```

```

5171 end
5172 if Babel.cjk_enabled then
5173     Babel.cjk_linebreak(head)
5174 end
5175 lang.hyphenate(head)
5176 if Babel.linebreaking.after then
5177     for k, func in ipairs(Babel.linebreaking.after) do
5178         func(head)
5179     end
5180 end
5181 if Babel.sea_enabled then
5182     Babel.sea_disc_to_space(head)
5183 end
5184 end,
5185 'Babel.hyphenate')
5186 }
5187 }
5188 \endgroup
5189 \def\bbl@provide@intraspace{%
5190     \bbl@ifunset{\bbl@intsp@{language}}{%
5191         {\expandafter\ifx\csname bbl@intsp@{language}\endcsname\@empty\else
5192             \bbl@xin{\bbl@cl{lncrk}}{c}%
5193             \lfin@{ } cjk
5194             \bbl@cjk_intraspace
5195             \directlua{
5196                 Babel = Babel or {}
5197                 Babel.locale_props = Babel.locale_props or {}
5198                 Babel.locale_props[\the\localeid].linebreak = 'c'
5199             }%
5200             \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}{\bbl@}%
5201             \ifx\bbl@KVP@intrapenalty\@nil
5202                 \bbl@intrapenalty0\@@
5203             \fi
5204         \else % sea
5205             \bbl@sea_intraspace
5206             \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}{\bbl@}%
5207             \directlua{
5208                 Babel = Babel or {}
5209                 Babel.sea_ranges = Babel.sea_ranges or {}
5210                 Babel.set_chranges('\bbl@cl{sbc}}',
5211                                     '\bbl@cl{chrng}}')
5212             }%
5213             \ifx\bbl@KVP@intrapenalty\@nil
5214                 \bbl@intrapenalty0\@@
5215             \fi
5216         \fi
5217     \fi
5218     \ifx\bbl@KVP@intrapenalty\@nil\else
5219         \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
5220     \fi}}

```

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.

Work in progress.

Common stuff.

```
5221 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
5222 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@cckstdfont}
5223 \DisableBabelHook{babel-fontspec}
5224 <<Font selection>>
```

13.6 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.

```
5225% TODO - to a lua file
5226 \directlua{
5227 Babel.script_blocks = {
5228   ['Arab'] = {{0x0600, 0x06FF}, {0x08A0, 0x08FF}, {0x0750, 0x077F},
5229              {0xFE70, 0xFEFF}, {0xFB50, 0xFDFF}, {0x1EE00, 0x1EEFF}},
5230   ['Armn'] = {{0x0530, 0x058F}},
5231   ['Beng'] = {{0x0980, 0x09FF}},
5232   ['Cher'] = {{0x13A0, 0x13FF}, {0xAB70, 0xABBF}},
5233   ['Copt'] = {{0x03E2, 0x03EF}, {0x2C80, 0x2CFF}, {0x102E0, 0x102FF}},
5234   ['Cyr1'] = {{0x0400, 0x04FF}, {0x0500, 0x052F}, {0x1C80, 0x1C8F},
5235              {0x2DE0, 0x2DFF}, {0xA640, 0xA69F}},
5236   ['Deva'] = {{0x0900, 0x097F}, {0xA8E0, 0xA8FF}},
5237   ['Ethi'] = {{0x1200, 0x137F}, {0x1380, 0x139F}, {0x2D80, 0x2DDF},
5238              {0xAB00, 0xAB2F}},
5239   ['Geor'] = {{0x10A0, 0x10FF}, {0x2D00, 0x2D2F}},
5240   % Don't follow strictly Unicode, which places some Coptic letters in
5241   % the 'Greek and Coptic' block
5242   ['Grek'] = {{0x0370, 0x03E1}, {0x03F0, 0x03FF}, {0x1F00, 0x1FFF}},
5243   ['Hans'] = {{0x2E80, 0x2EFF}, {0x3000, 0x303F}, {0x31C0, 0x31EF},
5244              {0x3300, 0x33FF}, {0x3400, 0x4DBF}, {0x4E00, 0x9FFF},
5245              {0xF900, 0xFAFF}, {0xFE30, 0xFE4F}, {0xFF00, 0xFFEF},
5246              {0x20000, 0x2A6DF}, {0x2A700, 0x2B73F},
5247              {0x2B740, 0x2B81F}, {0x2B820, 0x2CEAF},
5248              {0x2CEB0, 0x2EBEF}, {0x2F800, 0x2FA1F}},
5249   ['Hebr'] = {{0x0590, 0x05FF}},
5250   ['Jpan'] = {{0x3000, 0x303F}, {0x3040, 0x309F}, {0x30A0, 0x30FF},
5251              {0x4E00, 0x9FAF}, {0xFF00, 0xFFEF}},
5252   ['Khmr'] = {{0x1780, 0x17FF}, {0x19E0, 0x19FF}},
5253   ['Knda'] = {{0x0C80, 0x0CFF}},
5254   ['Kore'] = {{0x1100, 0x11FF}, {0x3000, 0x303F}, {0x3130, 0x318F},
5255              {0x4E00, 0x9FAF}, {0xA960, 0xA97F}, {0xAC00, 0xD7AF},
5256              {0xD7B0, 0xD7FF}, {0xFF00, 0xFFEF}},
5257   ['Lao'] = {{0x0E80, 0x0EFF}},
5258   ['Latn'] = {{0x0000, 0x007F}, {0x0080, 0x00FF}, {0x0100, 0x017F},
5259              {0x0180, 0x024F}, {0x1E00, 0x1EFF}, {0x2C60, 0x2C7F},
5260              {0xA720, 0xA7FF}, {0xAB30, 0xAB6F}},
5261   ['Mahj'] = {{0x11150, 0x1117F}},
5262   ['Mlym'] = {{0x0D00, 0x0D7F}},
```

```

5263 ['Mymr'] = {{0x1000, 0x109F}, {0xAA60, 0xAA7F}, {0xA9E0, 0xA9FF}},
5264 ['Orya'] = {{0x0B00, 0x0B7F}},
5265 ['Sinh'] = {{0x0D80, 0x0DFF}, {0x111E0, 0x111FF}},
5266 ['Sycr'] = {{0x0700, 0x074F}, {0x0860, 0x086F}},
5267 ['Taml'] = {{0x0B80, 0x0BFF}},
5268 ['Telu'] = {{0x0C00, 0x0C7F}},
5269 ['Tfng'] = {{0x2D30, 0x2D7F}},
5270 ['Thai'] = {{0x0E00, 0x0E7F}},
5271 ['Tibt'] = {{0x0F00, 0x0FFF}},
5272 ['Vaii'] = {{0xA500, 0xA63F}},
5273 ['Yiii'] = {{0xA000, 0xA48F}, {0xA490, 0xA4CF}}
5274 }
5275
5276 Babel.script_blocks.Cyrs = Babel.script_blocks.Cyrl
5277 Babel.script_blocks.Hant = Babel.script_blocks.Hans
5278 Babel.script_blocks.Kana = Babel.script_blocks.Jpan
5279
5280 function Babel.locale_map(head)
5281   if not Babel.locale_mapped then return head end
5282
5283   local LOCALE = luatexbase.registernumber'bbl@attr@locale'
5284   local GLYPH = node.id('glyph')
5285   local inmath = false
5286   local toloc_save
5287   for item in node.traverse(head) do
5288     local toloc
5289     if not inmath and item.id == GLYPH then
5290       % Optimization: build a table with the chars found
5291       if Babel.chr_to_loc[item.char] then
5292         toloc = Babel.chr_to_loc[item.char]
5293       else
5294         for lc, maps in pairs(Babel.loc_to_scr) do
5295           for _, rg in pairs(maps) do
5296             if item.char >= rg[1] and item.char <= rg[2] then
5297               Babel.chr_to_loc[item.char] = lc
5298               toloc = lc
5299               break
5300             end
5301           end
5302         end
5303       end
5304       % Now, take action, but treat composite chars in a different
5305       % fashion, because they 'inherit' the previous locale. Not yet
5306       % optimized.
5307       if not toloc and
5308         (item.char >= 0x0300 and item.char <= 0x036F) or
5309         (item.char >= 0x1AB0 and item.char <= 0x1AFF) or
5310         (item.char >= 0x1DC0 and item.char <= 0x1DFF) then
5311         toloc = toloc_save
5312       end
5313       if toloc and toloc > -1 then
5314         if Babel.locale_props[toloc].lg then
5315           item.lang = Babel.locale_props[toloc].lg
5316           node.set_attribute(item, LOCALE, toloc)
5317         end
5318         if Babel.locale_props[toloc]['/'..item.font] then
5319           item.font = Babel.locale_props[toloc]['/'..item.font]
5320         end
5321         toloc_save = toloc

```

```

5322     end
5323     elseif not inmath and item.id == 7 then
5324         item.replace = item.replace and Babel.locale_map(item.replace)
5325         item.pre      = item.pre and Babel.locale_map(item.pre)
5326         item.post     = item.post and Babel.locale_map(item.post)
5327     elseif item.id == node.id'math' then
5328         inmath = (item.subtype == 0)
5329     end
5330 end
5331 return head
5332 end
5333 }

```

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

```

5334 \newcommand\babelcharproperty[1]{%
5335   \count@=#1\relax
5336   \ifvmode
5337     \expandafter\bbl@chprop
5338   \else
5339     \bbl@error{\string\babelcharproperty\space can be used only in\\%
5340               vertical mode (preamble or between paragraphs)}%
5341     {See the manual for futher info}%
5342   \fi}
5343 \newcommand\bbl@chprop[3][\the\count@]{%
5344   \@tempcnta=#1\relax
5345   \bbl@ifunset{\bbl@chprop@#2}%
5346   {\bbl@error{No property named '#2'. Allowed values are\\%
5347             direction (bc), mirror (bmg), and linebreak (lb)}%
5348    {See the manual for futher info}}%
5349   }%
5350   \loop
5351     \bbl@cs{chprop@#2}{#3}%
5352   \ifnum\count@<\@tempcnta
5353     \advance\count@\@ne
5354   \repeat}
5355 \def\bbl@chprop@direction#1{%
5356   \directlua{
5357     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
5358     Babel.characters[\the\count@]['d'] = '#1'
5359   }}
5360 \let\bbl@chprop@bc\bbl@chprop@direction
5361 \def\bbl@chprop@mirror#1{%
5362   \directlua{
5363     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
5364     Babel.characters[\the\count@]['m'] = '\number#1'
5365   }}
5366 \let\bbl@chprop@bmg\bbl@chprop@mirror
5367 \def\bbl@chprop@linebreak#1{%
5368   \directlua{
5369     Babel.cjk_characters[\the\count@] = Babel.cjk_characters[\the\count@] or {}
5370     Babel.cjk_characters[\the\count@]['c'] = '#1'
5371   }}
5372 \let\bbl@chprop@lb\bbl@chprop@linebreak
5373 \def\bbl@chprop@locale#1{%
5374   \directlua{
5375     Babel.chr_to_loc = Babel.chr_to_loc or {}
5376     Babel.chr_to_loc[\the\count@] =
5377       \bbl@ifblank{#1}{-1000}{\the\bbl@cs{id@#1}}\space

```


5378 }}

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).

After declaring the table containing the patterns with their replacements, we define some auxiliary functions: `str_to_nodes` converts the string returned by a function to a node list, taking the node at base as a model (font, language, etc.); `fetch_word` fetches a series of glyphs and discretionaries, which pattern is matched against (if there is a match, it is called again before trying other patterns, and this is very likely the main bottleneck). `post_hyphenate_replace` is the callback applied after `lang.hyphenate`. This means the automatic hyphenation points are known. As empty captures return a byte position (as explained in the `luatex` manual), we must convert it to a utf8 position. With `first`, the last byte can be the leading byte in a utf8 sequence, so we just remove it and add 1 to the resulting length. With `last` we must take into account the capture position points to the next character. Here `word_head` points to the starting node of the text to be matched.

```
5379 \begingroup % TODO - to a lua file
5380 \catcode`\#=12
5381 \catcode`\%=12
5382 \catcode`\&=14
5383 \directlua{
5384   Babel.linebreaking.post_replacements = {}
5385   Babel.linebreaking.pre_replacements = {}
5386
5387   function Babel.str_to_nodes(fn, matches, base)
5388     local n, head, last
5389     if fn == nil then return nil end
5390     for s in string.utfvalues(fn(matches)) do
5391       if base.id == 7 then
5392         base = base.replace
5393       end
5394       n = node.copy(base)
5395       n.char = s
5396       if not head then
5397         head = n
5398       else
5399         last.next = n
5400       end
5401       last = n
5402     end
5403     return head
5404   end
5405
5406   function Babel.fetch_word(head, mode)
5407     local word_string = ''
5408     local word_nodes = {}
5409     local lang
5410     local item = head
5411     local inmath = false
5412     local mode = 0 && 'word' -- first steps in merging with subtext
5413
5414     while item do
5415
5416       if item.id == 29
5417         and not(item.char == 124) && ie, not |
5418         and not(item.char == 61) && ie, not =
5419         and not inmath
5420         and (item.lang == lang or lang == nil) then
5421         lang = lang or item.lang
```

```

5422     word_string = word_string .. unicode.utf8.char(item.char)
5423     word_nodes[#word_nodes+1] = item
5424
5425     elseif item.id == 7 and item.subtype == 2
5426         and not inmath and mode == 0 then
5427         word_string = word_string .. '='
5428         word_nodes[#word_nodes+1] = item
5429
5430     elseif item.id == 7 and item.subtype == 3
5431         and not inmath and mode == 0 then
5432         word_string = word_string .. '|'
5433         word_nodes[#word_nodes+1] = item
5434
5435     elseif item.id == 11 and item.subtype == 0 then
5436         inmath = true
5437
5438     elseif mode > 0 and item.id == 12 and item.subtype == 13 then
5439         word_string = word_string .. '|'
5440         word_nodes[#word_nodes+1] = item
5441
5442     elseif word_string == '' then
5443         &% pass
5444
5445     else
5446         tex.write_nl(word_string)
5447         return word_string, word_nodes, item, lang
5448     end
5449
5450     item = item.next
5451 end
5452 end
5453
5454 function Babel.post_hyphenate_replace(head)
5455     local u = unicode.utf8
5456     local lbkr = Babel.linebreaking.post_replacements
5457     local word_head = head
5458
5459     while true do
5460         local w, wn, nw, lang = Babel.fetch_word(word_head)
5461         if not lang then return head end
5462
5463         if not lbkr[lang] then
5464             break
5465         end
5466
5467         &% For every pattern
5468         for k=1, #lbkr[lang] do
5469             local p = lbkr[lang][k].pattern
5470             local r = lbkr[lang][k].replace
5471
5472             &% For every match
5473             while true do
5474                 local matches = { u.match(w, p) }
5475                 if #matches < 2 then break end
5476
5477                 local first = table.remove(matches, 1)
5478                 local last = table.remove(matches, #matches)
5479
5480                 &% Fix offsets, from bytes to unicode.

```

```

5481     first = u.len(w:sub(1, first-1)) + 1
5482     last  = u.len(w:sub(1, last-1))
5483
5484     local new  %% used when inserting and removing nodes
5485     local changed = 0
5486
5487     %% This loop traverses the replace list and takes the
5488     %% corresponding actions
5489     for q = first, last do
5490         local crep = r[q-first+1]
5491         local char_node = wn[q]
5492         local char_base = char_node
5493
5494         if crep and crep.data then
5495             char_base = wn[crep.data+first-1]
5496         end
5497
5498         if crep == {} then
5499             break
5500         elseif crep == nil then
5501             changed = changed + 1
5502             node.remove(head, char_node)
5503         elseif crep and (crep.pre or crep.no or crep.post) then
5504             changed = changed + 1
5505             d = node.new(7, 0)  %% (disc, discretionary)
5506             d.pre = Babel.str_to_nodes(crep.pre, matches, char_base)
5507             d.post = Babel.str_to_nodes(crep.post, matches, char_base)
5508             d.replace = Babel.str_to_nodes(crep.no, matches, char_base)
5509             d.attr = char_base.attr
5510             if crep.pre == nil then  %% TeXbook p96
5511                 d.penalty = crep.penalty or tex.hyphenpenalty
5512             else
5513                 d.penalty = crep.penalty or tex.exhyphenpenalty
5514             end
5515             head, new = node.insert_before(head, char_node, d)
5516             node.remove(head, char_node)
5517             if q == 1 then
5518                 word_head = new
5519             end
5520         elseif crep and crep.string then
5521             changed = changed + 1
5522             local str = crep.string(matches)
5523             if str == '' then
5524                 if q == 1 then
5525                     word_head = char_node.next
5526                 end
5527                 head, new = node.remove(head, char_node)
5528             elseif char_node.id == 29 and u.len(str) == 1 then
5529                 char_node.char = string.utfvalue(str)
5530             else
5531                 local n
5532                 for s in string.utfvalues(str) do
5533                     if char_node.id == 7 then
5534                         log('Automatic hyphens cannot be replaced, just removed.')
5535                     else
5536                         n = node.copy(char_base)
5537                     end
5538                     n.char = s
5539                     if q == 1 then

```

```

5540             head, new = node.insert_before(head, char_node, n)
5541             word_head = new
5542         else
5543             node.insert_before(head, char_node, n)
5544         end
5545     end
5546
5547     node.remove(head, char_node)
5548     end %% string length
5549     end %% if char and char.string
5550     end %% for char in match
5551     if changed > 20 then
5552         texio.write('Too many changes. Ignoring the rest.')
5553     elseif changed > 0 then
5554         w, wn, nw = Babel.fetch_word(word_head)
5555     end
5556
5557     end %% for match
5558     end %% for patterns
5559     word_head = nw
5560     end %% for words
5561     return head
5562 end
5563
5564 &%%&
5565 &%% Preliminary code for \babelprehyphenation
5566 &%% TODO. Copypaste pattern. Merge with fetch_word
5567 function Babel.fetch_subtext(head)
5568     local word_string = ''
5569     local word_nodes = {}
5570     local lang
5571     local item = head
5572     local inmath = false
5573
5574     while item do
5575
5576         if item.id == 29 then
5577             local locale = node.get_attribute(item, Babel.attr_locale)
5578
5579             if not(item.char == 124) &%% ie, not | = space
5580                 and not inmath
5581                 and (locale == lang or lang == nil) then
5582                 lang = lang or locale
5583                 word_string = word_string .. unicode.utf8.char(item.char)
5584                 word_nodes[#word_nodes+1] = item
5585             end
5586
5587             if item == node.tail(head) then
5588                 item = nil
5589                 return word_string, word_nodes, item, lang
5590             end
5591
5592             elseif item.id == 12 and item.subtype == 13 and not inmath then
5593                 word_string = word_string .. '|'
5594                 word_nodes[#word_nodes+1] = item
5595
5596                 if item == node.tail(head) then
5597                     item = nil
5598                     return word_string, word_nodes, item, lang

```

```

5599         end
5600
5601     elseif item.id == 11 and item.subtype == 0 then
5602         inmath = true
5603
5604     elseif word_string == '' then
5605         %% pass
5606
5607     else
5608         return word_string, word_nodes, item, lang
5609     end
5610
5611     item = item.next
5612 end
5613 end
5614
5615 %% TODO. Copypaste pattern. Merge with pre_hyphenate_replace
5616 function Babel.pre_hyphenate_replace(head)
5617     local u = unicode.utf8
5618     local lbkr = Babel.linebreaking.pre_replacements
5619     local word_head = head
5620
5621     while true do
5622         local w, wn, nw, lang = Babel.fetch_subtext(word_head)
5623         if not lang then return head end
5624
5625         if not lbkr[lang] then
5626             break
5627         end
5628
5629         for k=1, #lbkr[lang] do
5630             local p = lbkr[lang][k].pattern
5631             local r = lbkr[lang][k].replace
5632
5633             while true do
5634                 local matches = { u.match(w, p) }
5635                 if #matches < 2 then break end
5636
5637                 local first = table.remove(matches, 1)
5638                 local last = table.remove(matches, #matches)
5639
5640                 %% Fix offsets, from bytes to unicode.
5641                 first = u.len(w:sub(1, first-1)) + 1
5642                 last = u.len(w:sub(1, last-1))
5643
5644                 local new %% used when inserting and removing nodes
5645                 local changed = 0
5646
5647                 %% This loop traverses the replace list and takes the
5648                 %% corresponding actions
5649                 for q = first, last do
5650                     local crep = r[q-first+1]
5651                     local char_node = wn[q]
5652                     local char_base = char_node
5653
5654                     if crep and crep.data then
5655                         char_base = wn[crep.data+first-1]
5656                     end
5657

```

```

5658         if crep == {} then
5659             break
5660         elseif crep == nil then
5661             changed = changed + 1
5662             node.remove(head, char_node)
5663         elseif crep and crep.insert then
5664             %% print(crep.insert)
5665         elseif crep and crep.string then
5666             changed = changed + 1
5667             local str = crep.string(matches)
5668             if str == '' then
5669                 if q == 1 then
5670                     word_head = char_node.next
5671                 end
5672                 head, new = node.remove(head, char_node)
5673             elseif char_node.id == 29 and u.len(str) == 1 then
5674                 char_node.char = string.utfvalue(str)
5675             else
5676                 local n
5677                 for s in string.utfvalues(str) do
5678                     if char_node.id == 7 then
5679                         log('Automatic hyphens cannot be replaced, just removed.')
5680                     else
5681                         n = node.copy(char_base)
5682                     end
5683                     n.char = s
5684                     if q == 1 then
5685                         head, new = node.insert_before(head, char_node, n)
5686                         word_head = new
5687                     else
5688                         node.insert_before(head, char_node, n)
5689                     end
5690                 end
5691             end
5692             node.remove(head, char_node)
5693         end %% string length
5694     end %% if char and char.string
5695 end %% for char in match
5696 if changed > 20 then
5697     texio.write('Too many changes. Ignoring the rest.')
5698 elseif changed > 0 then
5699     %% For one-to-one can we modify directly the
5700     %% values without re-fetching? Very likely.
5701     w, wn, nw = Babel.fetch_subtext(word_head)
5702 end
5703
5704     end %% for match
5705 end %% for patterns
5706 word_head = nw
5707 end %% for words
5708 return head
5709 end
5710 %%% end of preliminary code for \babelprehyphenation
5711
5712 %% The following functions belong to the next macro
5713
5714 %% This table stores capture maps, numbered consecutively
5715 Babel.capture_maps = {}
5716

```

```

5717 function Babel.capture_func(key, cap)
5718   local ret = "[" .. cap:gsub('{{([0-9])}}', "]]..m[%1]..[" .. "]"
5719   ret = ret:gsub('{{([0-9])|([^\]|+)|(.-)}}', Babel.capture_func_map)
5720   ret = ret:gsub("%[%[%]%%.%.", '')
5721   ret = ret:gsub("%.%.%[%[%]%%", '')
5722   return key .. "[[=function(m) return ]] .. ret .. [[ end]]
5723 end
5724
5725 function Babel.capt_map(from, mapno)
5726   return Babel.capture_maps[mapno][from] or from
5727 end
5728
5729 &% Handle the {n|abc|ABC} syntax in captures
5730 function Babel.capture_func_map(capno, from, to)
5731   local froms = {}
5732   for s in string.utfcharacters(from) do
5733     table.insert(froms, s)
5734   end
5735   local cnt = 1
5736   table.insert(Babel.capture_maps, {})
5737   local mlen = table.getn(Babel.capture_maps)
5738   for s in string.utfcharacters(to) do
5739     Babel.capture_maps[mlen][froms[cnt]] = s
5740     cnt = cnt + 1
5741   end
5742   return "]]..Babel.capt_map(m[" .. capno .. "], " ..
5743     (mlen) .. ").. " .. "["
5744 end
5745 }

```

Now the \TeX high level interface, which requires the function defined above for converting strings to functions returning a string. These functions handle the $\{n\}$ syntax. For example, $\text{pre}=\{1\}\{1\}$ - becomes `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).

```

5746 \catcode`\#=6
5747 \gdef\babelposthyphenation#1#2#3{&%
5748   \bbl@activateposthyphen
5749   \begingroup
5750     \def\babeltempa{\bbl@add@list\babeltempb}&%
5751     \let\babeltempb\@empty
5752     \bbl@foreach{#3}{&%
5753       \bbl@ifsamestring{##1}{remove}&%
5754       {\bbl@add@list\babeltempb{nil}}&%
5755       {\directlua{
5756         local rep = [[##1]]
5757         rep = rep:gsub(' (no)s*=%s*([^\s,]*)', Babel.capture_func)
5758         rep = rep:gsub(' (pre)s*=%s*([^\s,]*)', Babel.capture_func)
5759         rep = rep:gsub(' (post)s*=%s*([^\s,]*)', Babel.capture_func)
5760         rep = rep:gsub(' (string)s*=%s*([^\s,]*)', Babel.capture_func)
5761         tex.print([[string\babeltempa{}}] .. rep .. [[}}]])
5762       }}&%
5763     \directlua{

```

```

5764     local lbkr = Babel.linebreaking.post_replacements
5765     local u = unicode.utf8
5766     &% Convert pattern:
5767     local patt = string.gsub(#[#2]=, '%s', '')
5768     if not u.find(patt, '()', nil, true) then
5769         patt = '()' .. patt .. '()'
5770     end
5771     patt = string.gsub(patt, '%(%)^', '^()')
5772     patt = string.gsub(patt, '%$(%)', '()$')
5773     patt = u.gsub(patt, '{(.)}',
5774         function (n)
5775             return '%' .. (tonumber(n) and (tonumber(n)+1) or n)
5776         end)
5777     lbkr[\the\csname l@#1\endcsname] = lbkr[\the\csname l@#1\endcsname] or {}
5778     table.insert(lbkr[\the\csname l@#1\endcsname],
5779         { pattern = patt, replace = { \babeltempb } })
5780 }&%
5781 \endgroup}
5782 % TODO. Working !!! Copypaste pattern.
5783 \gdef\babelprehyphenation#1#2#3{&%
5784 \bbl@activateprehyphen
5785 \begin{group}
5786 \def\babeltempa{\bbl@add@list\babeltempb}&%
5787 \let\babeltempb\@empty
5788 \bbl@foreach{#3}{&%
5789 \bbl@ifsamestring{##1}{remove}&%
5790 {\bbl@add@list\babeltempb{nil}}&%
5791 {\directlua{
5792     local rep = {[#1]}
5793     rep = rep:gsub('(string)s*=%s*([^\s,]*)', Babel.capture_func)
5794     tex.print([[string\babeltempa{}}] .. rep .. [[}}]])
5795 }}}&%
5796 \directlua{
5797     local lbkr = Babel.linebreaking.pre_replacements
5798     local u = unicode.utf8
5799     &% Convert pattern:
5800     local patt = string.gsub(#[#2]=, '%s', '')
5801     if not u.find(patt, '()', nil, true) then
5802         patt = '()' .. patt .. '()'
5803     end
5804     patt = u.gsub(patt, '{(.)}',
5805         function (n)
5806             return '%' .. (tonumber(n) and (tonumber(n)+1) or n)
5807         end)
5808     lbkr[\the\csname bbl@id@@#1\endcsname] = lbkr[\the\csname bbl@id@@#1\endcsname] or {}
5809     table.insert(lbkr[\the\csname bbl@id@@#1\endcsname],
5810         { pattern = patt, replace = { \babeltempb } })
5811 }&%
5812 \endgroup}
5813 \endgroup}
5814 \def\bbl@activateposthyphen{%
5815 \let\bbl@activateposthyphen\relax
5816 \directlua{
5817     Babel.linebreaking.add_after(Babel.post_hyphenate_replace)
5818 }}
5819 % TODO. Working !!!
5820 \def\bbl@activateprehyphen{%
5821 \let\bbl@activateprehyphen\relax
5822 \directlua{

```



```

5823   Babel.linebreaking.add_before(Babel.pre_hyphenate_replace)
5824   }}

```

13.7 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 `bidibasic`, 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`, `hline`, `colortbl`, `longtable`, `booktabs`, etc. However, `dcolumn` still fails.

```

5825 \bbl@trace{Redefinitions for bidi layout}
5826 \ifx\@eqnnum\undefined\else
5827   \ifx\bbl@attr@dir\undefined\else
5828     \edef\@eqnnum{%
5829       \unexpanded{\ifcase\bbl@attr@dir\else\bbl@textdir\@ne\fi}%
5830       \unexpanded\expandafter{\@eqnnum}}
5831   \fi
5832 \fi
5833 \ifx\bbl@opt@layout\@nnil\endinput\fi % if no layout
5834 \ifnum\bbl@bidimode>\z@
5835   \def\bbl@nextfake#1{% non-local changes, use always inside a group!
5836     \bbl@exp{%
5837       \mathdir\the\bodydir
5838       #1%           Once entered in math, set boxes to restore values
5839       \<ifmmode>%
5840         \everyvbox{%
5841           \the\everyvbox
5842           \bodydir\the\bodydir
5843           \mathdir\the\mathdir
5844           \everyhbox{\the\everyhbox}%
5845           \everyvbox{\the\everyvbox}}%
5846         \everyhbox{%
5847           \the\everyhbox
5848           \bodydir\the\bodydir
5849           \mathdir\the\mathdir
5850           \everyhbox{\the\everyhbox}%
5851           \everyvbox{\the\everyvbox}}%
5852       \<fi>}}%
5853   \def\@hangfrom#1{%
5854     \setbox\@tempboxa\hbox{{#1}}%
5855     \hangindent\wd\@tempboxa
5856     \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
5857       \shapemode\@ne
5858     \fi
5859     \noindent\box\@tempboxa}
5860 \fi
5861 \IfBabelLayout{tabular}
5862   {\let\bbl@OL@tabular\@tabular
5863     \bbl@replace\@tabular{$}{\bbl@nextfake$}%
5864     \let\bbl@NL@tabular\@tabular

```

```

5865 \AtBeginDocument{%
5866   \ifx\bb1@NL@@tabular\@tabular\else
5867     \bb1@replace\@tabular{$}\bb1@nextfake$}%
5868   \let\bb1@NL@@tabular\@tabular
5869   \fi}}
5870 {}
5871 \IfBabelLayout{lists}
5872 {\let\bb1@OL@list\list
5873   \bb1@sreplace\list{\parshape}\bb1@listparshape}%
5874   \let\bb1@NL@list\list
5875   \def\bb1@listparshape#1#2#3{%
5876     \parshape #1 #2 #3 %
5877     \ifnum\bb1@getluadir{page}=\bb1@getluadir{par}\else
5878       \shapemode\tw@
5879     \fi}}
5880 {}
5881 \IfBabelLayout{graphics}
5882 {\let\bb1@pictresetdir\relax
5883   \let\bb1@pictunsetdir\relax
5884   \def\bb1@pictsetdir{%
5885     \ifcase\bb1@thetextdir
5886       \let\bb1@pictresetdir\relax
5887       \let\bb1@pictunsetdir\relax
5888     \else
5889       \textdir TLT\relax
5890       \def\bb1@pictunsetdir{\textdir TLT\relax}%
5891       \def\bb1@pictresetdir{\everypar{\textdir TRT}\relax}%
5892     \fi}%
5893   % \let\bb1@OL@picture\@picture %%% Modificar \babeladjust
5894   \AddToHook{env/picture/begin}{\bb1@pictsetdir}%
5895   \let\bb1@OL@put\put
5896   \def\put(#1,#2)#3{% Not easy to patch. Better redefine.
5897     \@killglue
5898     \raise#2\unitlength
5899     \hb@xt@#1\z@{\kern#1\unitlength{\bb1@pictresetdir#3}\hss}}%
5900 \AtBeginDocument
5901 {\ifx\tikz@atbegin@node\undefined\else
5902   \let\bb1@OL@pgfpicture\pgfpicture
5903   \bb1@sreplace\pgfpicture{\pgfpicturetrue}%
5904   {\bb1@pictsetdir\pgfpicturetrue}%
5905   \bb1@add\pgfsys@beginpicture{\bb1@pictsetdir}%
5906   \bb1@add\tikz@atbegin@node{\bb1@pictresetdir}%
5907   \fi}}
5908 {}

```

Implicitly reverses sectioning labels in bidi=basic-r, because the full stop is not in contact with L numbers any more. I think there must be a better way. Assumes bidi=basic, but there are some additional readjustments for bidi=default.

```

5909 \IfBabelLayout{counters}%
5910 {\let\bb1@OL@@textsuperscript\textsuperscript
5911   \bb1@sreplace\textsuperscript{\m@th}\m@th\mathdir\pagedir}%
5912   \let\bb1@latinarabic=\@arabic
5913   \let\bb1@OL@@arabic\@arabic
5914   \def\@arabic#1{\babelsublr{\bb1@latinarabic#1}}%
5915   \@ifpackagewith{babel}{bidi=default}%
5916   {\let\bb1@asciroman=\@roman
5917     \let\bb1@OL@@roman\@roman
5918     \def\@roman#1{\babelsublr{\ensureascii{\bb1@asciroman#1}}}%
5919     \let\bb1@asciiRoman=\@Roman

```

Some \LaTeX macros use internally the math mode for text formatting. They have very little in common and are grouped here, as a single option.

13.8 Auto bidi with basic and basic-r

```
[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'},
```

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):

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.

```

5943 (*basic-r)
5944 Babel = Babel or {}
5945
5946 Babel.bidi_enabled = true
5947
5948 require('babel-data-bidi.lua')
5949
5950 local characters = Babel.characters
5951 local ranges = Babel.ranges
5952
5953 local DIR = node.id("dir")
5954
5955 local function dir_mark(head, from, to, outer)
5956   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
5957   local d = node.new(DIR)
5958   d.dir = '+' .. dir
5959   node.insert_before(head, from, d)
5960   d = node.new(DIR)
5961   d.dir = '-' .. dir
5962   node.insert_after(head, to, d)
5963 end
5964
5965 function Babel.bidi(head, ispar)
5966   local first_n, last_n      -- first and last char with nums
5967   local last_es             -- an auxiliary 'last' used with nums
5968   local first_d, last_d     -- first and last char in L/R block
5969   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):

```

5970   local strong = ('TRT' == tex.pardir) and 'r' or 'l'
5971   local strong_lr = (strong == 'l') and 'l' or 'r'
5972   local outer = strong
5973
5974   local new_dir = false
5975   local first_dir = false
5976   local inmath = false
5977
5978   local last_lr
5979
5980   local type_n = ''
5981
5982   for item in node.traverse(head) do

```

```

5983
5984 -- three cases: glyph, dir, otherwise
5985 if item.id == node.id'glyph'
5986   or (item.id == 7 and item.subtype == 2) then
5987
5988     local itemchar
5989     if item.id == 7 and item.subtype == 2 then
5990       itemchar = item.replace.char
5991     else
5992       itemchar = item.char
5993     end
5994     local chardata = characters[itemchar]
5995     dir = chardata and chardata.d or nil
5996     if not dir then
5997       for nn, et in ipairs(ranges) do
5998         if itemchar < et[1] then
5999           break
6000         elseif itemchar <= et[2] then
6001           dir = et[3]
6002           break
6003         end
6004       end
6005     end
6006     dir = dir or 'l'
6007     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).

```

6008   if new_dir then
6009     attr_dir = 0
6010     for at in node.traverse(item.attr) do
6011       if at.number == luatexbase.registernumber'bbl@attr@dir' then
6012         attr_dir = at.value % 3
6013       end
6014     end
6015     if attr_dir == 1 then
6016       strong = 'r'
6017     elseif attr_dir == 2 then
6018       strong = 'al'
6019     else
6020       strong = 'l'
6021     end
6022     strong_lr = (strong == 'l') and 'l' or 'r'
6023     outer = strong_lr
6024     new_dir = false
6025   end
6026
6027   if dir == 'nsm' then dir = strong end -- W1

```

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

```

6028   dir_real = dir -- We need dir_real to set strong below
6029   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:

```

6030   if strong == 'al' then

```

```

6031         if dir == 'en' then dir = 'an' end -- W2
6032         if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
6033         strong_lr = 'r' -- W3
6034     end

```

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

```

6035     elseif item.id == node.id'dir' and not inmath then
6036         new_dir = true
6037         dir = nil
6038     elseif item.id == node.id'math' then
6039         inmath = (item.subtype == 0)
6040     else
6041         dir = nil -- Not a char
6042     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>.

```

6043     if dir == 'en' or dir == 'an' or dir == 'et' then
6044         if dir ~= 'et' then
6045             type_n = dir
6046         end
6047         first_n = first_n or item
6048         last_n = last_es or item
6049         last_es = nil
6050     elseif dir == 'es' and last_n then -- W3+W6
6051         last_es = item
6052     elseif dir == 'cs' then -- it's right - do nothing
6053     elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
6054         if strong_lr == 'r' and type_n ~= '' then
6055             dir_mark(head, first_n, last_n, 'r')
6056         elseif strong_lr == 'l' and first_d and type_n == 'an' then
6057             dir_mark(head, first_n, last_n, 'r')
6058             dir_mark(head, first_d, last_d, outer)
6059             first_d, last_d = nil, nil
6060         elseif strong_lr == 'l' and type_n ~= '' then
6061             last_d = last_n
6062         end
6063         type_n = ''
6064         first_n, last_n = nil, nil
6065     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:

```

6066     if dir == 'l' or dir == 'r' then
6067         if dir ~= outer then
6068             first_d = first_d or item
6069             last_d = item
6070         elseif first_d and dir ~= strong_lr then
6071             dir_mark(head, first_d, last_d, outer)
6072             first_d, last_d = nil, nil
6073         end
6074     end

```

Mirroring. Each chunk of text in a certain language is considered a “closed” sequence. If <r on r> and <l on l>, it’s clearly <r> and <l>, resp’tly, but with other combinations depends on outer. From all these, we select only those resolving <on> → <r>. At the beginning (when last_lr is nil) of an R text, they are mirrored directly.

TODO - numbers in R mode are processed. It doesn’t hurt, but should not be done.

```

6075   if dir and not last_lr and dir ~= 'l' and outer == 'r' then
6076       item.char = characters[item.char] and
6077           characters[item.char].m or item.char
6078   elseif (dir or new_dir) and last_lr ~= item then
6079       local mir = outer .. strong_lr .. (dir or outer)
6080       if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
6081           for ch in node.traverse(node.next(last_lr)) do
6082               if ch == item then break end
6083               if ch.id == node.id'glyph' and characters[ch.char] then
6084                   ch.char = characters[ch.char].m or ch.char
6085               end
6086           end
6087       end
6088   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).

```

6089   if dir == 'l' or dir == 'r' then
6090       last_lr = item
6091       strong = dir_real           -- Don't search back - best save now
6092       strong_lr = (strong == 'l') and 'l' or 'r'
6093   elseif new_dir then
6094       last_lr = nil
6095   end
6096 end

```

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

```

6097   if last_lr and outer == 'r' then
6098       for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
6099           if characters[ch.char] then
6100               ch.char = characters[ch.char].m or ch.char
6101           end
6102       end
6103   end
6104   if first_n then
6105       dir_mark(head, first_n, last_n, outer)
6106   end
6107   if first_d then
6108       dir_mark(head, first_d, last_d, outer)
6109   end

```

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

```

6110   return node.prev(head) or head
6111 end
6112 </basic-r>

```

And here the Lua code for bidi=basic:

```

6113 <(*basic)
6114 Babel = Babel or {}
6115
6116 -- eg, Babel.fontmap[1][<prefontid>]=<dirfontid>
6117

```

```

6118 Babel.fontmap = Babel.fontmap or {}
6119 Babel.fontmap[0] = {}      -- l
6120 Babel.fontmap[1] = {}      -- r
6121 Babel.fontmap[2] = {}      -- al/an
6122
6123 Babel.bidi_enabled = true
6124 Babel.mirroring_enabled = true
6125
6126 require('babel-data-bidi.lua')
6127
6128 local characters = Babel.characters
6129 local ranges = Babel.ranges
6130
6131 local DIR = node.id('dir')
6132 local GLYPH = node.id('glyph')
6133
6134 local function insert_implicit(head, state, outer)
6135   local new_state = state
6136   if state.sim and state.eim and state.sim ~= state.eim then
6137     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
6138     local d = node.new(DIR)
6139     d.dir = '+' .. dir
6140     node.insert_before(head, state.sim, d)
6141     local d = node.new(DIR)
6142     d.dir = '-' .. dir
6143     node.insert_after(head, state.eim, d)
6144   end
6145   new_state.sim, new_state.eim = nil, nil
6146   return head, new_state
6147 end
6148
6149 local function insert_numeric(head, state)
6150   local new
6151   local new_state = state
6152   if state.san and state.ean and state.san ~= state.ean then
6153     local d = node.new(DIR)
6154     d.dir = '+TLT'
6155     _, new = node.insert_before(head, state.san, d)
6156     if state.san == state.sim then state.sim = new end
6157     local d = node.new(DIR)
6158     d.dir = '-TLT'
6159     _, new = node.insert_after(head, state.ean, d)
6160     if state.ean == state.eim then state.eim = new end
6161   end
6162   new_state.san, new_state.ean = nil, nil
6163   return head, new_state
6164 end
6165
6166 -- TODO - \hbox with an explicit dir can lead to wrong results
6167 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>. A small attempt
6168 -- was s made to improve the situation, but the problem is the 3-dir
6169 -- model in babel/Unicode and the 2-dir model in LuaTeX don't fit
6170 -- well.
6171
6172 function Babel.bidi(head, ispar, hdir)
6173   local d -- d is used mainly for computations in a loop
6174   local prev_d = ''
6175   local new_d = false
6176

```



```

6177 local nodes = {}
6178 local outer_first = nil
6179 local inmath = false
6180
6181 local glue_d = nil
6182 local glue_i = nil
6183
6184 local has_en = false
6185 local first_et = nil
6186
6187 local ATDIR = luatexbase.registernumber'bbl@attr@dir'
6188
6189 local save_outer
6190 local temp = node.get_attribute(head, ATDIR)
6191 if temp then
6192     temp = temp % 3
6193     save_outer = (temp == 0 and 'l') or
6194                 (temp == 1 and 'r') or
6195                 (temp == 2 and 'al')
6196 elseif ispar then -- Or error? Shouldn't happen
6197     save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
6198 else -- Or error? Shouldn't happen
6199     save_outer = ('TRT' == hdir) and 'r' or 'l'
6200 end
6201 -- when the callback is called, we are just _after_ the box,
6202 -- and the textdir is that of the surrounding text
6203 -- if not ispar and hdir ~= tex.textdir then
6204 --     save_outer = ('TRT' == hdir) and 'r' or 'l'
6205 -- end
6206 local outer = save_outer
6207 local last = outer
6208 -- 'al' is only taken into account in the first, current loop
6209 if save_outer == 'al' then save_outer = 'r' end
6210
6211 local fontmap = Babel.fontmap
6212
6213 for item in node.traverse(head) do
6214
6215     -- In what follows, #node is the last (previous) node, because the
6216     -- current one is not added until we start processing the neutrals.
6217
6218     -- three cases: glyph, dir, otherwise
6219     if item.id == GLYPH
6220         or (item.id == 7 and item.subtype == 2) then
6221
6222         local d_font = nil
6223         local item_r
6224         if item.id == 7 and item.subtype == 2 then
6225             item_r = item.replace -- automatic discs have just 1 glyph
6226         else
6227             item_r = item
6228         end
6229         local chardata = characters[item_r.char]
6230         d = chardata and chardata.d or nil
6231         if not d or d == 'nsm' then
6232             for nn, et in ipairs(ranges) do
6233                 if item_r.char < et[1] then
6234                     break
6235                 elseif item_r.char <= et[2] then

```

```

6236         if not d then d = et[3]
6237         elseif d == 'nsm' then d_font = et[3]
6238         end
6239         break
6240     end
6241 end
6242 end
6243 d = d or 'l'
6244
6245 -- A short 'pause' in bidi for mapfont
6246 d_font = d_font or d
6247 d_font = (d_font == 'l' and 0) or
6248           (d_font == 'nsm' and 0) or
6249           (d_font == 'r' and 1) or
6250           (d_font == 'al' and 2) or
6251           (d_font == 'an' and 2) or nil
6252 if d_font and fontmap and fontmap[d_font][item_r.font] then
6253     item_r.font = fontmap[d_font][item_r.font]
6254 end
6255
6256 if new_d then
6257     table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
6258     if inmath then
6259         attr_d = 0
6260     else
6261         attr_d = node.get_attribute(item, ATDIR)
6262         attr_d = attr_d % 3
6263     end
6264     if attr_d == 1 then
6265         outer_first = 'r'
6266         last = 'r'
6267     elseif attr_d == 2 then
6268         outer_first = 'r'
6269         last = 'al'
6270     else
6271         outer_first = 'l'
6272         last = 'l'
6273     end
6274     outer = last
6275     has_en = false
6276     first_et = nil
6277     new_d = false
6278 end
6279
6280 if glue_d then
6281     if (d == 'l' and 'l' or 'r') ~= glue_d then
6282         table.insert(nodes, {glue_i, 'on', nil})
6283     end
6284     glue_d = nil
6285     glue_i = nil
6286 end
6287
6288 elseif item.id == DIR then
6289     d = nil
6290     new_d = true
6291
6292 elseif item.id == node.id'glue' and item.subtype == 13 then
6293     glue_d = d
6294     glue_i = item

```

```

6295     d = nil
6296
6297 elseif item.id == node.id'math' then
6298     inmath = (item.subtype == 0)
6299
6300 else
6301     d = nil
6302 end
6303
6304 -- AL <= EN/ET/ES      -- W2 + W3 + W6
6305 if last == 'al' and d == 'en' then
6306     d = 'an'           -- W3
6307 elseif last == 'al' and (d == 'et' or d == 'es') then
6308     d = 'on'           -- W6
6309 end
6310
6311 -- EN + CS/ES + EN      -- W4
6312 if d == 'en' and #nodes >= 2 then
6313     if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
6314         and nodes[#nodes-1][2] == 'en' then
6315         nodes[#nodes][2] = 'en'
6316     end
6317 end
6318
6319 -- AN + CS + AN         -- W4 too, because uax9 mixes both cases
6320 if d == 'an' and #nodes >= 2 then
6321     if (nodes[#nodes][2] == 'cs')
6322         and nodes[#nodes-1][2] == 'an' then
6323         nodes[#nodes][2] = 'an'
6324     end
6325 end
6326
6327 -- ET/EN                -- W5 + W7->1 / W6->on
6328 if d == 'et' then
6329     first_et = first_et or (#nodes + 1)
6330 elseif d == 'en' then
6331     has_en = true
6332     first_et = first_et or (#nodes + 1)
6333 elseif first_et then    -- d may be nil here !
6334     if has_en then
6335         if last == 'l' then
6336             temp = 'l'    -- W7
6337         else
6338             temp = 'en'   -- W5
6339         end
6340     else
6341         temp = 'on'       -- W6
6342     end
6343     for e = first_et, #nodes do
6344         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
6345     end
6346     first_et = nil
6347     has_en = false
6348 end
6349
6350 if d then
6351     if d == 'al' then
6352         d = 'r'
6353         last = 'al'

```

```

6354     elseif d == 'l' or d == 'r' then
6355         last = d
6356     end
6357     prev_d = d
6358     table.insert(nodes, {item, d, outer_first})
6359 end
6360
6361 outer_first = nil
6362
6363 end
6364
6365 -- TODO -- repeated here in case EN/ET is the last node. Find a
6366 -- better way of doing things:
6367 if first_et then      -- dir may be nil here !
6368     if has_en then
6369         if last == 'l' then
6370             temp = 'l'    -- W7
6371         else
6372             temp = 'en'   -- W5
6373         end
6374     else
6375         temp = 'on'      -- W6
6376     end
6377     for e = first_et, #nodes do
6378         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
6379     end
6380 end
6381
6382 -- dummy node, to close things
6383 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
6384
6385 ----- NEUTRAL -----
6386
6387 outer = save_outer
6388 last = outer
6389
6390 local first_on = nil
6391
6392 for q = 1, #nodes do
6393     local item
6394
6395     local outer_first = nodes[q][3]
6396     outer = outer_first or outer
6397     last = outer_first or last
6398
6399     local d = nodes[q][2]
6400     if d == 'an' or d == 'en' then d = 'r' end
6401     if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
6402
6403     if d == 'on' then
6404         first_on = first_on or q
6405     elseif first_on then
6406         if last == d then
6407             temp = d
6408         else
6409             temp = outer
6410         end
6411         for r = first_on, q - 1 do
6412             nodes[r][2] = temp

```

```

6413         item = nodes[r][1]    -- MIRRORING
6414         if Babel.mirroring_enabled and item.id == GLYPH
6415             and temp == 'r' and characters[item.char] then
6416             local font_mode = font.fonts[item.font].properties.mode
6417             if font_mode ~= 'harf' and font_mode ~= 'plug' then
6418                 item.char = characters[item.char].m or item.char
6419             end
6420         end
6421     end
6422     first_on = nil
6423 end
6424
6425     if d == 'r' or d == 'l' then last = d end
6426 end
6427
6428 ----- IMPLICIT, REORDER -----
6429
6430 outer = save_outer
6431 last = outer
6432
6433 local state = {}
6434 state.has_r = false
6435
6436 for q = 1, #nodes do
6437     local item = nodes[q][1]
6438
6439     outer = nodes[q][3] or outer
6440
6441     local d = nodes[q][2]
6442
6443     if d == 'nsm' then d = last end          -- W1
6444     if d == 'en' then d = 'an' end
6445     local isdir = (d == 'r' or d == 'l')
6446
6447     if outer == 'l' and d == 'an' then
6448         state.san = state.san or item
6449         state.ean = item
6450     elseif state.san then
6451         head, state = insert_numeric(head, state)
6452     end
6453
6454     if outer == 'l' then
6455         if d == 'an' or d == 'r' then      -- im -> implicit
6456             if d == 'r' then state.has_r = true end
6457             state.sim = state.sim or item
6458             state.eim = item
6459         elseif d == 'l' and state.sim and state.has_r then
6460             head, state = insert_implicit(head, state, outer)
6461         elseif d == 'l' then
6462             state.sim, state.eim, state.has_r = nil, nil, false
6463         end
6464     else
6465         if d == 'an' or d == 'l' then
6466             if nodes[q][3] then -- nil except after an explicit dir
6467                 state.sim = item -- so we move sim 'inside' the group
6468             else
6469                 state.sim = state.sim or item
6470             end
6471         end

```

```

6472     state.eim = item
6473     elseif d == 'r' and state.sim then
6474         head, state = insert_implicit(head, state, outer)
6475     elseif d == 'r' then
6476         state.sim, state.eim = nil, nil
6477     end
6478 end
6479
6480 if isdir then
6481     last = d          -- Don't search back - best save now
6482 elseif d == 'on' and state.san then
6483     state.san = state.san or item
6484     state.ean = item
6485 end
6486
6487 end
6488
6489 return node.prev(head) or head
6490 end
6491 </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.

```

6492 <nil>
6493 \ProvidesLanguage{nil}[<<date>>] <<version>> Nil language]
6494 \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.

```

6495 \ifx\l@nil\@undefined
6496   \newlanguage\l@nil
6497   \@namedef{bbl@hyphendata@the\l@nil}{\{}}% Remove warning
6498   \let\bbl@elt\relax
6499   \edef\bbl@languages{% Add it to the list of languages
6500     \bbl@languages\bbl@elt{nil}{the\l@nil}{\{}}
6501 \fi

```

6502 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}

```
\captionnil
\datenil 6503 \let\captionnil\@empty
6504 \let\datenil\@empty
```

```
6505 \ldf@finish{nil}
6506 \</nil>
```

```

6518 \let\@undefined
6519 }
6520 \fi
6521 </bplain | bplain>

```

Now that we have made sure that `hyphen.cfg` will be loaded at the right moment it is time to load `plain.tex`.

```

6522 <bplain>\a plain.tex
6523 <bplain>\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.

```

6524 <bplain>\def\fmtname{babel-plain}
6525 <bplain>\def\fmtname{babel-lplain}

```

When you are using a different format, based on `plain.tex` you can make a copy of `blplain.tex`, rename it and replace `plain.tex` with the name of your format file.

16.2 Emulating some \LaTeX features

The following code duplicates or emulates parts of $\text{\LaTeX} 2_{\epsilon}$ that are needed for `babel`.

```

6526 <<*Emulate LaTeX>> ≡
6527 % == Code for plain ==
6528 \def\@empty{}
6529 \def\loadlocalcfg#1{%
6530   \openin0#1.cfg
6531   \ifeof0
6532     \closein0
6533   \else
6534     \closein0
6535     {\immediate\write16{*****}%
6536       \immediate\write16{* Local config file #1.cfg used}%
6537       \immediate\write16{*}%
6538     }
6539     \input #1.cfg\relax
6540   \fi
6541   \@endofldf}

```

16.3 General tools

A number of \LaTeX macro's that are needed later on.

```

6542 \long\def\@firstofone#1{#1}
6543 \long\def\@firstoftwo#1#2{#1}
6544 \long\def\@secondoftwo#1#2{#2}
6545 \def\@nnil{\@nil}
6546 \def\@gobbletwo#1#2{}
6547 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
6548 \def\@star@or@long#1{%
6549   \@ifstar
6550   {\let\l@ngrel@x\relax#1}%
6551   {\let\l@ngrel@x\long#1}}
6552 \let\l@ngrel@x\relax
6553 \def\@car#1#2\@nil{#1}
6554 \def\@cdr#1#2\@nil{#2}
6555 \let\@typeset@protect\relax
6556 \let\protected@edef\edef
6557 \long\def\@gobble#1{}

```



```

6558 \edef\@backslashchar{\expandafter\@gobble\string\}
6559 \def\strip@prefix#1>{}
6560 \def\g@addto@macro#1#2{%
6561     \toks@\expandafter{#1#2}%
6562     \xdef#1{\the\toks@}}
6563 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
6564 \def\@nameuse#1{\csname #1\endcsname}
6565 \def\@ifundefined#1{%
6566     \expandafter\ifx\csname#1\endcsname\relax
6567     \expandafter\@firstoftwo
6568     \else
6569     \expandafter\@secondoftwo
6570     \fi}
6571 \def\@expandtwoargs#1#2#3{%
6572     \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
6573 \def\zap@space#1 #2{%
6574     #1%
6575     \ifx#2\@empty\else\expandafter\zap@space\fi
6576     #2}
6577 \let\bbl@trace\@gobble

```

$\text{\LaTeX} 2_{\epsilon}$ has the command `\@onlypreamble` which adds commands to a list of commands that are no longer needed after `\begin{document}`.

```

6578 \ifx\@preamblecmds\@undefined
6579     \def\@preamblecmds{}
6580 \fi
6581 \def\@onlypreamble#1{%
6582     \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
6583         \@preamblecmds\do#1}}
6584 \@onlypreamble\@onlypreamble

```

Mimick \LaTeX 's `\AtBeginDocument`; for this to work the user needs to add `\begindocument` to his file.

```

6585 \def\begindocument{%
6586     \@begindocumenthook
6587     \global\let\@begindocumenthook\@undefined
6588     \def\do##1{\global\let##1\@undefined}%
6589     \@preamblecmds
6590     \global\let\do\noexpand}
6591 \ifx\@begindocumenthook\@undefined
6592     \def\@begindocumenthook{}
6593 \fi
6594 \@onlypreamble\@begindocumenthook
6595 \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 `\@endoflfd`.

```

6596 \def\AtEndOfPackage#1{\g@addto@macro\@endoflfd{#1}}
6597 \@onlypreamble\AtEndOfPackage
6598 \def\@endoflfd{}
6599 \@onlypreamble\@endoflfd
6600 \let\bbl@afterlang\@empty
6601 \chardef\bbl@opt@hyphenmap\z@

```

\LaTeX needs to be able to switch off writing to its auxiliary files; plain doesn't have them by default. There is a trick to hide some conditional commands from the outer `\ifx`. The same trick is applied below.

```

6602 \catcode`\&=\z@

```

```

6603 \ifx@if@filesw\@undefined
6604 \expandafter\let\csname if@filesw\expandafter\endcsname
6605 \csname iffalse\endcsname
6606 \fi
6607 \catcode\&=4

```

Mimick L^AT_EX's commands to define control sequences.

```

6608 \def\newcommand{\@star@or@long\new@command}
6609 \def\new@command#1{%
6610 \@testopt{\@newcommand#1}0}
6611 \def\@newcommand#1[#2]{%
6612 \@ifnextchar [{\@xargdef#1[#2]}%
6613 {\@argdef#1[#2]}}
6614 \long\def\@argdef#1[#2]#3{%
6615 \@yargdef#1\@ne{#2}{#3}}
6616 \long\def\@xargdef#1[#2][#3]#4{%
6617 \expandafter\def\expandafter#1\expandafter{%
6618 \expandafter\@protected@testopt\expandafter #1%
6619 \csname\string#1\expandafter\endcsname{#3}}%
6620 \expandafter\@yargdef \csname\string#1\endcsname
6621 \tw@{#2}{#4}}
6622 \long\def\@yargdef#1#2#3{%
6623 \@tempcnta#3\relax
6624 \advance \@tempcnta \@ne
6625 \let\@hash@\relax
6626 \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
6627 \@tempcntb #2%
6628 \@whilenum \@tempcntb <\@tempcnta
6629 \do{%
6630 \edef\reserved@a{\reserved@a\@hash@\the\@tempcntb}%
6631 \advance\@tempcntb \@ne}%
6632 \let\@hash@###
6633 \l@ngrel@x\expandafter\def\expandafter#1\reserved@a}
6634 \def\providecommand{\@star@or@long\provide@command}
6635 \def\provide@command#1{%
6636 \begingroup
6637 \escapechar\m@ne\xdef\@gtempa{\string#1}%
6638 \endgroup
6639 \expandafter\@ifundefined\@gtempa
6640 {\def\reserved@a{\new@command#1}}%
6641 {\let\reserved@a\relax
6642 \def\reserved@a{\new@command\reserved@a}}%
6643 \reserved@a}%
6644 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
6645 \def\declare@robustcommand#1{%
6646 \edef\reserved@a{\string#1}%
6647 \def\reserved@b{#1}%
6648 \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
6649 \edef#1{%
6650 \ifx\reserved@a\reserved@b
6651 \noexpand\x@protect
6652 \noexpand#1%
6653 \fi
6654 \noexpand\protect
6655 \expandafter\noexpand\csname
6656 \expandafter\@gobble\string#1 \endcsname
6657 }%
6658 \expandafter\new@command\csname
6659 \expandafter\@gobble\string#1 \endcsname

```

```

6660 }
6661 \def\x@protect#1{%
6662   \ifx\protect\@typeset@protect\else
6663     \@x@protect#1%
6664   \fi
6665 }
6666 \catcode`\&=\z@ % Trick to hide conditionals
6667 \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`.

```

6668 \def\bbl@tempa{\csname newif\endcsname&ifin@}
6669 \catcode`\&=4
6670 \ifx\in@\undefined
6671   \def\in@#1#2{%
6672     \def\in@##1#1##2##3\in@{%
6673       \ifx\in@##2\in@false\else\in@true\fi}%
6674     \in@##2#1\in@\in@}
6675 \else
6676   \let\bbl@tempa\empty
6677 \fi
6678 \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).

```

6679 \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.

```

6680 \def\@ifl@aded#1#2#3#4{}

```

For the following code we need to make sure that the commands `\newcommand` and `\providecommand` exist with some sensible definition. They are not fully equivalent to their \LaTeX 2_ε versions; just enough to make things work in plain \TeX environments.

```

6681 \ifx\@tempcnta\undefined
6682   \csname newcount\endcsname\@tempcnta\relax
6683 \fi
6684 \ifx\@tempcntb\undefined
6685   \csname newcount\endcsname\@tempcntb\relax
6686 \fi

```

To prevent wasting two counters in \LaTeX 2.09 (because counters with the same name are allocated later by it) we reset the counter that holds the next free counter (`\count10`).

```

6687 \ifx\bye\undefined
6688   \advance\count10 by -2\relax
6689 \fi
6690 \ifx\@ifnextchar\undefined
6691   \def\@ifnextchar#1#2#3{%
6692     \let\reserved@d=#1%
6693     \def\reserved@a{#2}\def\reserved@b{#3}%
6694     \futurelet\@let@token\@ifnch}
6695   \def\@ifnch{%

```

```

6696 \ifx\@let@token\@sptoken
6697 \let\reserved@c\@xifnch
6698 \else
6699 \ifx\@let@token\reserved@
6700 \let\reserved@c\reserved@a
6701 \else
6702 \let\reserved@c\reserved@b
6703 \fi
6704 \fi
6705 \reserved@c}
6706 \def\:{\let\@sptoken= } \: % this makes \@sptoken a space token
6707 \def\:{\@xifnch} \expandafter\def\:{\futurelet\@let@token\@ifnch}
6708 \fi
6709 \def\@testopt#1#2{%
6710 \@ifnextchar[#{1}{#1[#2]}}
6711 \def\@protected@testopt#1{%
6712 \ifx\protect\@typeset@protect
6713 \expandafter\@testopt
6714 \else
6715 \@x@protect#1%
6716 \fi}
6717 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
6718 #2\relax}\fi}
6719 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
6720 \else\expandafter\@gobble\fi{#1}}

```

16.4 Encoding related macros

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

```

6721 \def\DeclareTextCommand{%
6722 \@dec@text@cmd\providecommand
6723 }
6724 \def\ProvideTextCommand{%
6725 \@dec@text@cmd\providecommand
6726 }
6727 \def\DeclareTextSymbol#1#2#3{%
6728 \@dec@text@cmd\chardef#1{#2}#3\relax
6729 }
6730 \def\@dec@text@cmd#1#2#3{%
6731 \expandafter\def\expandafter#2%
6732 \expandafter{%
6733 \csname#3-cmd\expandafter\endcsname
6734 \expandafter#2%
6735 \csname#3\string#2\endcsname
6736 }%
6737 % \let\@ifdefinable\@rc@ifdefinable
6738 \expandafter#1\csname#3\string#2\endcsname
6739 }
6740 \def\@current@cmd#1{%
6741 \ifx\protect\@typeset@protect\else
6742 \noexpand#1\expandafter\@gobble
6743 \fi
6744 }
6745 \def\@changed@cmd#1#2{%
6746 \ifx\protect\@typeset@protect
6747 \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
6748 \expandafter\ifx\csname ?\string#1\endcsname\relax
6749 \expandafter\def\csname ?\string#1\endcsname{%

```

```

6750         \@changed@x@err{#1}%
6751     }%
6752 \fi
6753 \global\expandafter\let
6754 \csname\cf@encoding\string#1\expandafter\endcsname
6755 \csname ?\string#1\endcsname
6756 \fi
6757 \csname\cf@encoding\string#1%
6758 \expandafter\endcsname
6759 \else
6760 \noexpand#1%
6761 \fi
6762 }
6763 \def\@changed@x@err#1{%
6764 \errhelp{Your command will be ignored, type <return> to proceed}%
6765 \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
6766 \def\DeclareTextCommandDefault#1{%
6767 \DeclareTextCommand#1?%
6768 }
6769 \def\ProvideTextCommandDefault#1{%
6770 \ProvideTextCommand#1?%
6771 }
6772 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
6773 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
6774 \def\DeclareTextAccent#1#2#3{%
6775 \DeclareTextCommand#1{#2}[1]{\accent#3 #1}
6776 }
6777 \def\DeclareTextCompositeCommand#1#2#3#4{%
6778 \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
6779 \edef\reserved@b{\string#1}%
6780 \edef\reserved@c{%
6781 \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
6782 \ifx\reserved@b\reserved@c
6783 \expandafter\expandafter\expandafter\ifx
6784 \expandafter\@car\reserved@a\relax\relax\@nil
6785 \@text@composite
6786 \else
6787 \edef\reserved@b##1{%
6788 \def\expandafter\noexpand
6789 \csname#2\string#1\endcsname####1{%
6790 \noexpand\@text@composite
6791 \expandafter\noexpand\csname#2\string#1\endcsname
6792 ####1\noexpand\@empty\noexpand\@text@composite
6793 {##1}%
6794 }%
6795 }%
6796 \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
6797 \fi
6798 \expandafter\def\csname\expandafter\string\csname
6799 #2\endcsname\string#1-\string#3\endcsname{#4}
6800 \else
6801 \errhelp{Your command will be ignored, type <return> to proceed}%
6802 \errmessage{\string\DeclareTextCompositeCommand\space used on
6803 inappropriate command \protect#1}
6804 \fi
6805 }
6806 \def\@text@composite#1#2#3\@text@composite{%
6807 \expandafter\@text@composite@x
6808 \csname\string#1-\string#2\endcsname

```

```

6809 }
6810 \def\@text@composite@x#1#2{%
6811     \ifx#1\relax
6812         #2%
6813     \else
6814         #1%
6815     \fi
6816 }
6817 %
6818 \def\@strip@args#1:#2-#3\@strip@args{#2}
6819 \def\DeclareTextComposite#1#2#3#4{%
6820     \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
6821     \bgroup
6822         \lccode`\@=#4%
6823         \lowercase{%
6824     \egroup
6825         \reserved@a @%
6826     }%
6827 }
6828 %
6829 \def\UseTextSymbol#1#2{#2}
6830 \def\UseTextAccent#1#2#3{}
6831 \def\@use@text@encoding#1{}
6832 \def\DeclareTextSymbolDefault#1#2{%
6833     \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
6834 }
6835 \def\DeclareTextAccentDefault#1#2{%
6836     \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
6837 }
6838 \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.

```

6839 \DeclareTextAccent{"}{OT1}{127}
6840 \DeclareTextAccent{'}{OT1}{19}
6841 \DeclareTextAccent{^}{OT1}{94}
6842 \DeclareTextAccent{`}{OT1}{18}
6843 \DeclareTextAccent{~}{OT1}{126}

```

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

```

6844 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
6845 \DeclareTextSymbol{\textquotedblright}{OT1}{`\"}
6846 \DeclareTextSymbol{\textquoteleft}{OT1}{`\'}
6847 \DeclareTextSymbol{\textquoteright}{OT1}{`\' }
6848 \DeclareTextSymbol{\i}{OT1}{16}
6849 \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`.

```

6850 \ifx\scriptsize\@undefined
6851     \let\scriptsize\sevenrm
6852 \fi
6853 % End of code for plain
6854 <</Emulate LaTeX>>

```

A proxy file:

```

6855 < *plain>
6856 \input babel.def
6857 </plain>

```

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References

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