

Babel

Version 3.36
2019/11/14

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

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

Current development is focused on Unicode engines (Xe \TeX and Lua \TeX) and the so-called *complex scripts*. New features related to font selection, bidi writing, line breaking and so on are being added incrementally.

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

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Part I

User guide

- This user guide focuses on \LaTeX . There are also some notes on its use with Plain \TeX .
- Changes and new features with relation to version 3.8 are highlighted with **New X.XX**. The most recent features could be still unstable. Please, report any issues you find in <https://github.com/latex3/babel/issues>, which is better than just complaining on an e-mail list or a web forum.
- If you are interested in the \TeX multilingual support, please join the kadingira list on <http://tug.org/mailman/listinfo/kadingira>. You can follow the development of babel in <https://github.com/latex3/babel> (which provides some sample files, too).
- See section 3.1 for contributing a language.
- The first sections describe the traditional way of loading a language (with ldf files). The alternative way based on ini files, which complements the previous one (it will *not* replace it), is described below.

1 The user interface

1.1 Monolingual documents

In most cases, a single language is required, and then all you need in \LaTeX is to load the package using its 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.

EXAMPLE Here is a simple full example for “traditional” \TeX engines (see below for xetex and luatex). The packages fontenc and inputenc do not belong to babel, but they are included in the example because typically you will need them (however, the package inputenc may be omitted with $\LaTeX \geq 2018-04-01$ if the encoding is UTF-8):

```
\documentclass{article}

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

\usepackage[french]{babel}

\begin{document}

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

\end{document}
```

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

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

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

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

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

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

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

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

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

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

1.2 Multilingual documents

In multilingual documents, just use 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 could 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.

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

1.3 Modifiers

New 3.9c The basic behavior of some languages can be modified when loading babel by means of *modifiers*. They are set after the language name, and are prefixed with a dot (only when the language is set as package option – neither global options nor the `main` key 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.

1.4 xelatex and luatex

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

The Latin script is covered by default in current \LaTeX (provided the document encoding is UTF-8), because the font loader is preloaded and the font is switched to `lrmroman`. Other scripts require loading `fontspec`. You may want to set the font attributes with `fontspec`, too.

EXAMPLE The following bilingual, single script document in UTF-8 encoding just prints a couple of ‘captions’ and `\today` in Danish and Vietnamese. No additional packages are required.

```
\documentclass{article}

\usepackage[vietnamese,danish]{babel}

\begin{document}

\prefacename{}_\alsoname{}_\today

\selectlanguage{vietnamese}

\prefacename{}_\alsoname{}_\today

\end{document}
```

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

```
\documentclass{article}

\usepackage[russian]{babel}

\babelfont{rm}{DejaVuSerif}

\begin{document}

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

\end{document}
```


1.5 Troubleshooting

- Loading directly sty files in 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:

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.

```
\selectlanguage{german}
```

This command can be used as environment, too.

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

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

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

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).

1.8 Auxiliary language selectors

`\begin{otherlanguage}` $\langle language \rangle$... `\end{otherlanguage}`

The environment `otherlanguage` does basically the same as `\selectlanguage`, except that language change is (mostly) local to the environment. Actually, there might be some non-local changes, as this environment is roughly equivalent to:

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

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

`\begin{otherlanguage*}` $\langle language \rangle$... `\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
```

and

```
text
\begin{de}
  German
\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, T_EX 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 T_EX code. Shorthands can be used for different kinds of things, for example: (1) in some languages shorthands such as "a are defined to be able to hyphenate the word if the encoding is OT1; (2) in some languages shorthands such as ! are used to insert the right amount of white space; (3) several kinds of discretionary and breaks can be inserted easily with "-", "=", etc. The package `inputenc` as well as `xetex` and `luatex` have alleviated entering non-ASCII characters, but minority languages and some kinds of text can still require characters not directly available on the keyboards (and sometimes not even as separated or precomposed Unicode characters). As to the point 2, now pdfT_EX 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`).

⁵With it encoded string may not work as expected.

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` $\langle shorthands-list \rangle$
`\shorthandoff` $*\langle shorthands-list \rangle$

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.

`\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` $[\langle language \rangle, \langle language \rangle, \dots]\langle shorthand \rangle\langle code \rangle$

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 discretionaries (languages do not define shorthands consistently, and `"`, `\-`, `"=` have different meanings). You could start with, say:

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

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

```
\defineshortand[*polish,*portugese]{"-"}{\babelhyphen{repeat}}
```

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

`\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{/}`.

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 `\defineshortand` nothing happens.

`\languageshortands` $\langle language \rangle$

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

```
\addto\extrasenglish{\languageshortands{ngerman}}
```

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.

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

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

`\babelshorthand` $\langle shorthand \rangle$

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

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

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

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

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.

⁷Thanks to Enrico Gregorio

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

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= $\langle char \rangle \langle char \rangle \dots$ | 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 `safe=bib` only `\nocite`, `\bibcite` and `\bibitem` are redefined. With `safe=ref` only `\newlabel`, `\ref` and `\pageref` are redefined (as well as a few macros from `varioref` and `ifthen`). With `safe=none` no macro is redefined. This option is strongly recommended, because a good deal of incompatibilities and errors are related to these redefinitions. As of **New 3.34**, in $\epsilon\TeX$ based engines (ie, almost every engine except the oldest ones) shorthands can be used in these macros (formerly you could not).

math= active | normal

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

config= $\langle file \rangle$

Load $\langle file \rangle.cfg$ instead of the default config file `bblopts.cfg` (the file is loaded even with `noconfigs`).

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 spoiled by an unexpected `.cfg` file. However, if the key config is set, this file is loaded.
- showlanguages** Prints to the log the list of languages loaded when the format was created: number (remember dialects can share it), name, hyphenation file and exceptions file.
- nocase** **New 3.9l** Language settings for uppercase and lowercase mapping (as set by `\SetCase`) are ignored. Use only if there are incompatibilities with other packages.
- silent** **New 3.9l** No warnings and no *infos* are written to the log file.⁹
- strings=** `generic` | `unicode` | `encoded` | `<label>` | ``
 Selects the encoding of strings in languages supporting this feature. Predefined labels are `generic` (for traditional TeX, LICR and ASCII strings), `unicode` (for engines like xetex and luatex) and `encoded` (for special cases requiring mixed encodings). Other allowed values are font encoding codes (T1, T2A, LGR, L7X...), but only in languages supporting them. Be aware with encoded captions are protected, but they work in `\MakeUpper case` and the like (this feature misuses some internal L^AT_EX tools, so use it only as a last resort).
- hyphenmap=** `off` | `main` | `select` | `other` | `other*`
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 `other language`;
other* also sets it at `other language*` as well as in heads and foots (if the option `headfoot` is used) and in auxiliary files (ie, at `\select@language`), and it's the default if several language options have been stated. The option `first` can be regarded as an optimized version of `other*` for monolingual documents.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. 1.21.
- layout=** **New 3.16** Selects which layout elements are adapted in bidi documents. See sec. 1.21.

1.12 The base option

With this package option `babel` just loads some basic macros (those in `switch.def`), defines `\AfterBabelLanguage` and exits. It also selects the hyphenation patterns for the

⁹You can use alternatively the package `silence`.

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.

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` $\langle option-name \rangle \{ \langle code \rangle \}$

This command is currently the only provided by `base`. Executes $\langle code \rangle$ 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 $\langle option-name \rangle$ is the same as `\CurrentOption` (which could not be the same as the option name as set in `\usepackage!`).

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

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

1.13 ini files

An alternative approach to define a language is by means of an `ini` file. Currently `babel` provides about 200 of these files containing the basic data required for a language. Most of them set the date, and many also the captions (Unicode and LICR). They will be evolving with the time to add more features (something to keep in mind if backward compatibility is important). The following section shows how to make use of them currently (by means of `\babelprovide`), but a higher interface, based on package options, is under development (in other words, `\babelprovide` is mainly intended for auxiliary tasks).

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

```
\documentclass{book}

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

\babelfont{rm}{DejaVuSans}

\begin{document}

\tableofcontents

\chapter{სამზარეულოდასუფრისტრადიციები}

ქართულიტრადიციულისამზარეულოცენტ - ერთიკუმიდრესიამთვედამსოფლიოში.
```

```
\end{document}
```

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 follows:

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 seems better, but still problematic).

Devanagari In luatex many fonts work, but some others do not, the main issue being the ‘ra’. It is advisable to set explicitly the script to either deva or dev2, eg:

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

Other Indic scripts are still under development in luatex. On the other hand, xetex is better.

Southeast scripts Thai works in both luatex and xetex, but line breaking differs (rules can be modified in luatex; they are hardcoded in xetex). Lao seems to work, too, but there are no patterns for the latter in luatex. Some quick patterns could help, with something similar to:

```
\babelprovide[import,hyphenrules=+]{lao}  
\babelpatterns[lao]{10_11_12_13_14_15_16_17_18_19}_%_Random
```

Khemer clusters are rendered wrongly.

East Asia scripts Settings for either Simplified or Tradicional should work out of the box. luatex does basic line breaking, but currently xetex does not (you may load zhspacing). Although for a few words and shorts texts the ini files should be fine, CJK texts are best set with a dedicated framework (CJK, luatexja, kotex, CTeX, etc.). Actually, this is what the ldf does in japanese with luatex, because the following piece of code loads luatexja:

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

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

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

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

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

xog	Soga	zh-Hans-MO	Chinese
yav	Yangben	zh-Hans-SG	Chinese
yi	Yiddish	zh-Hans	Chinese
yo	Yoruba	zh-Hant-HK	Chinese
yue	Cantonese	zh-Hant-MO	Chinese
zgh	Standard Moroccan Tamazight	zh-Hant	Chinese
zh-Hans-HK	Chinese	zh	Chinese
		zu	Zulu

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

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

english-au
english-australia
english-ca
english-canada
english-gb
english-newzealand
english-nz
english-unitedkingdom
english-unitedstates
english-us
english
esperanto
estonian
ewe
ewondo
faroese
filipino
finnish
french-be
french-belgium
french-ca
french-canada
french-ch
french-lu
french-luxembourg
french-switzerland
french
friulian
fulah
galician
ganda
georgian
german-at
german-austria
german-ch
german-switzerland
german
greek
gujarati
gusii
hausa-gh
hausa-ghana
hausa-ne
hausa-niger
hausa
hawaiian
hebrew
hindi
hungarian
icelandic
igbo
inarisami
indonesian
interlingua

irish
italian
japanese
jolafonyi
kabuverdianu
kabyle
kako
kalaallisut
kalenjin
kamba
kannada
kashmiri
kazakh
khmer
kikuyu
kinyarwanda
konkani
korean
koyraborosenni
koyrachiini
kwasio
kyrgyz
lakota
langi
lao
latvian
lingala
lithuanian
lowersorbian
lsorbian
lubakatanga
luo
luxembourgish
luyia
macedonian
machame
makhuwameetto
makonde
malagasy
malay-bn
malay-brunei
malay-sg
malay-singapore
malay
malayalam
maltese
manx
marathi
masai
mazanderani
meru
meta
mexican
mongolian

morisyen
mundang
nama
nepali
newzealand
ngiemboon
ngomba
norsk
northernluri
northernsami
northndebele
norwegianbokmal
norwegiannynorsk
nswissgerman
nuer
nyankole
nynorsk
occitan
oriya
oromo
ossetic
pashto
persian
piedmontese
polish
portuguese-br
portuguese-brazil
portuguese-portugal
portuguese-pt
portuguese
punjabi-arab
punjabi-arabic
punjabi-gurmukhi
punjabi-guru
punjabi
quechua
romanian
romansh
rombo
rundi
russian
rwa
sakha
samburu
samin
sango
sangu
sanskrit-beng
sanskrit-bengali
sanskrit-deva
sanskrit-devanagari
sanskrit-gujarati
sanskrit-gujr
sanskrit-kannada

sanskrit-knda
sanskrit-malayalam
sanskrit-mlym
sanskrit-telu
sanskrit-telugu
sanskrit
scottishgaelic
sena
serbian-cyrillic-bosniaherzegovina
serbian-cyrillic-kosovo
serbian-cyrillic-montenegro
serbian-cyrillic
serbian-cyrl-ba
serbian-cyrl-me
serbian-cyrl-xk
serbian-cyrl
serbian-latin-bosniaherzegovina
serbian-latin-kosovo
serbian-latin-montenegro
serbian-latin
serbian-latn-ba
serbian-latn-me
serbian-latn-xk
serbian-latn
serbian
shambala
shona
sichuanyi
sinhala
slovak
slovene
slovenian
soga
somal
spanish-mexico
spanish-mx
spanish
standardmoroccantamazight
swahili
swedish
swissgerman
tachelhit-latin
tachelhit-latn
tachelhit-tfng
tachelhit-tifinagh
tachelhit
taita
tamil
tasawaq
telugu
teso
thai
tibetan
tigrinya

tongan	vai-latin
turkish	vai-latn
turkmen	vai-vai
ukenglish	vai-vaii
ukrainian	vai
uppertsorbian	vietnam
urdu	vietnamese
usenglish	vunjo
usorbian	walser
uyghur	welsh
uzbek-arab	westernfrisian
uzbek-arabic	yangben
uzbek-cyrillic	yiddish
uzbek-cyrl	yoruba
uzbek-latin	zarma
uzbek-latn	zulu afrikaans
uzbek	

1.14 Selecting fonts

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

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

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

If no language is given, then it is considered the default font for the family, activated when a language is selected. On the other hand, if there is one or more languages in the optional argument, the font will be assigned to them, overriding the default. Alternatively, you may set a font for a script – just precede its name (lowercase) with a star (eg, `*devanagari`).

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

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

```
\documentclass{article}

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

\babelprovide[import]{hebrew}

\babelfont{rm}{FreeSerif}

\begin{document}

Svenska␣\foreignlanguage{hebrew}{עִבְרִית}␣svenska.

\end{document}
```

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

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

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

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

EXAMPLE Here is how to do it:

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

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

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

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

This makes sure the OpenType script for Devanagari is `deva` and not `dev2` (luatex does not detect automatically the correct script¹⁴). 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 (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 could be problematic, and also a “lower-level” font selection is useful).

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

WARNING Do not use `\setxxxxfont` and `\babelfont` at the same time. `\babelfont` follows the standard \LaTeX conventions to set the basic families – define `\xxdefault`, and activate it with `\xxfamily`. On the other hand, `\setxxxxfont` in `fontspec` takes a different approach, because `\xxfamily` is redefined with the family name hardcoded (so that `\xxdefault` becomes no-op). Of course, both methods are incompatible, and if you use `\setxxxxfont`, font switching with `\babelfont` just does *not* work (nor the standard `\xxdefault`, for that matter). As of [New 3.34](#) there is an attempt to make them compatible, but the language system will not be set by `babeland` and should be set with `fontspec` if necessary.

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

TROUBLESHOOTING *Package fontspec Warning: 'Language 'LANG' not available for font 'FONT' with script 'SCRIPT' 'Default' language used instead'.* This warning is shown by fontspec, not by babel. It could 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.

1.15 Modifying a language

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

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

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

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

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

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

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

```
\addto\extrasrussian{\mymacro}
```

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

NOTE 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.

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 relevant because in such a case the hyphenation rules 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
(babel)_____it_in_the_preamble_with_something_like:
(babel)_____renewcommand\maylangchaptername{.}
(babel)_____Reported_on_input_line_18.
```

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

EXAMPLE If you need a language named arhinish:

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

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

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

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

`import=` *language-tag*

New 3.13 Imports data from an ini file, including captions, date, and hyphenmins. For example:

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

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

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

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

There are about 200 ini files, with data taken from the ldf files and the CLDR provided by Unicode. Not all languages in the latter are complete, and therefore neither are the ini files. A few languages will show a warning about the current lack of suitability of the date format (hindi, french, breton, and occitan).

Besides `\today`, 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}`.

captions= *<language-tag>*

Loads only the strings. For example:

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

hyphenrules= *<language-list>*

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

```
\babelprovide[hyphenrules=chavacano_{}_spanish_{}_italian]{chavacano}
```

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

A special value is `+`, which allocates a new language (in the T_EX 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. Only in newly defined languages.

script= *<script-name>*

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

language= *<language-name>*

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

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.

mapfont= *direction*

Assigns the font for the writing direction of this language (only with `bidi=basic`).¹⁵ 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.¹⁶ So, there should be at most 3 directives of this kind.

intraspace= *<base> <shrink> <stretch>*

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 scrips, like Thai, and CJK. Requires `import`.

intrapenalty= *<penalty>*

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

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

1.17 Digits

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

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

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

¹⁵There will be another value, `language`, not yet implemented.

¹⁶In future releases a new value (`script`) will be added.

math, PDF bookmarks, etc.) before bidi and fonts are processed (ie, to the node list as generated by the T_EX code). This means the local digits have the correct bidirectional behavior (unlike `Numbers=Arabic` in `fontspec`, which is not recommended).

1.18 Getting the current language name

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

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

`\iflanguage` `{\language}{\true}{\false}`

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

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

1.19 Hyphenation and line breaking

`\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 \LaTeX : (1) the character used is that set for the current font, while in \LaTeX it is hardwired to `-` (a typical value); (2) the hyphen to be used in fonts with a negative `\hyphenchar` is `-`, like in \LaTeX , but it can be changed to another value by redefining `\babelnu1lhyphen`; (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` [*$\langle language \rangle$* , *$\langle language \rangle$* , ...]{ *$\langle exceptions \rangle$* }

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 $\langle lang \rangle$` 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` [*$\langle language \rangle$* , *$\langle language \rangle$* , ...]{ *$\langle patterns \rangle$* }

New 3.9m *In `luatex` only*,¹⁷ 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 $\langle lang \rangle$` 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`).

¹⁷With `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.

1.20 Selecting scripts

Currently babel provides no standard interface to select scripts, because they are best selected with either `\fontencoding` (low-level) or a language name (high-level). Even the Latin script may require different encodings (ie, sets of glyphs) depending on the language, and therefore such a switch would be in a sense incomplete.¹⁸

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.¹⁹

`\ensureascii` $\langle text \rangle$

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

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

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

1.21 Selecting directions

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

WARNING The current code for `text` in `luatex` should be considered essentially stable, but, of course, it is not bug-free and there could 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).

There are some package options controlling bidi writing.

¹⁸The 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.

¹⁹But still defined for backwards compatibility.

`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.

New 3.32 There is some experimental support for `harftex`. Since it is based on `luatex`, the option `basic` mostly works. You may need to deactivate the `rtlm` or the `rtla` font features (besides loading `harfload` before `babel` and activating `mode=harf`; there is a sample in the GitHub repository).

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

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

```
\documentclass{article}

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

\babelprovide[import,main]{arabic}

\babelfont{rm}{FreeSerif}

\begin{document}

    وقد عرفنا شبه جزيرة العرب طيلة العصر الهليني (الآريقي) بـ
    Arabia أو Aravia (بالآريقية  $\text{Αραβία}$ )، استخدم الرومان ثلاث
    بادئات بـ "Arabia" على ثلاث مناطق من شبه الجزيرة العربية، إلا أنها
    حقيقةً كانت أكبر مما نعرف 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[mapfont=direction]{arabic}

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

```

\begin{document}

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

\end{document}

```

In this example, and thanks to `mapfont=direction`, 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 `\text` must be defined to select the main language):

```

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

```

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

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

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

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

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

With `counters`, `\arabic` is not only considered L text always (with `\babelsublr`, see below), but also an “isolated” block which does not interact with the surrounding chars. 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.²⁰

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

²⁰Next on the roadmap are counters and numeral systems in general. Expect some minor readjustments.

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 (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. It attempts to do the same for pgf/tikz. Somewhat experimental. **New 3.32** .
- extras** is used for miscellaneous readjustments which do not fit into the previous groups. Currently redefines in luatex `\underline` and `\LaTeXe` **New 3.19** .

EXAMPLE Typically, in an Arabic document you would need:

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

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

Digits in pdftex must be marked up explicitly (unlike luatex with `bidi=basic` or `bidi=basic-r` and, usually, xetex). This command is provided to set `{\langle lr-text \rangle}` in L mode if necessary. It's intended for what Unicode calls weak characters, because words are best set with the corresponding language. For this reason, there is no `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-name \rangle}`

Mainly for bidi text, but it could be useful in other cases. `\BabelPatchSection` and the corresponding option `layout=sectioning` takes a more logical approach (at least in many

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

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

New 3.17 Something like:

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

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

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

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

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

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

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

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

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

1.22 Language attributes

`\languageattribute` This is a user-level command, to be used in the preamble of a document (after `\usepackage[...]{babel}`), that declares which attributes are to be used for a given language. It takes two arguments: the first is the name of the language; the second, a (list of) attribute(s) to be used. Attributes must be set in the preamble and only once – they cannot be turned on and off. The command checks whether the language is known in this document and whether the attribute(s) are known for this language. Very often, using a *modifier* in a package option is better. Several language definition files use their own methods to set options. For example, french uses `\frenchsetup`, magyar (1.5) uses `\magyarOptions`; modifiers provided by spanish have no attribute counterparts. Macros setting options are also used (eg, `\ProsodicMarksOn` in latin).

1.23 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 `TEX` parameters (`#1`, `#2`, `#3`), with the meaning given:

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

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

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

defaultcommands Used (locally) in `\StartBabelCommands`.

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

stopcommands Used to reset the above, if necessary.

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

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

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

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

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

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

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

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

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

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

loadkernel (file) By default loads `switch.def`. It can be used to load a different version of this file or to load nothing.

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

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

1.24 Languages supported by babel with ldf files

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

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

Turkish turkish
Ukrainian ukrainian
Upper Sorbian 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}
```

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

1.25 Unicode character properties in luatex

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

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

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

```
\babelcharproperty{`z}{mirror}{`?}
\babelcharproperty{`-}{direction}{l}\u%or\ual,\ur,\uen,\uan,\uon,\uet,\ucs
\babelcharproperty{`)}{linebreak}{cl}\u%or\uid,\uop,\ucl,\uns,\uex,\uin,\uhy
```

This command is allowed only in vertical mode (the preamble or between paragraphs).

1.26 Tweaking some features

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

New 3.36 Sometimes you might need to disable some babel features. Currently this macro understands the following keys (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 $\backslash\text{babeladjust}\{\text{bidi.text}=\text{off}\}$ if you are using an alternative algorithm or with large sections not requiring it. With luahtex you may need $\text{bidi.mirroring}=\text{off}$. Use with care, because these options do not deactivate other related options (like paragraph direction with bidi.text).

1.27 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`), \TeX will keep complaining about an undefined label. To prevent such problems, you could revert to using uppercase labels, you can use `\lowercase{\ref{foo}}` inside the argument of `\chapter`, or, if you will not use shorthands in labels, set the `safe` option to `none` or `bib`.
- Both `ltxdoc` and `babel` use `\AtBeginDocument` to change some catcodes, and `babel` reloads `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 \TeX only takes into account the values when the paragraph is hyphenated, i.e., when it has been finished.²¹ So, if you write a chunk of French text with `\foreignlanguage`, the apostrophes might not be taken into account. This is a limitation of \TeX , not of `babel`. Alternatively, you may use `\usesshorthands` to activate `'` and `\defineshorthand`, or redefine `\textquoteright` (the latter is called by the non-ASCII right quote).
- `\bibitem` is out of sync with `\selectlanguage` in the `.aux` file. The reason is `\bibitem` uses `\immediate` (and others, in fact), while `\selectlanguage` doesn't. There is no known workaround.
- `Babel` does not take into account `\normalsfcodes` and (non-)French spacing is not always properly (un)set by languages. However, problems are unlikely to happen and therefore this part remains untouched in version 3.9 (but it is in the 'to do' list).
- Using a character mathematically active (ie, with math code "8000) as a shorthand can make \TeX enter in an infinite loop in some rare cases. (Another issue in the 'to do' list, although there is a partial solution.)

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

csquotes Logical markup for quotes.

iflang Tests correctly the current language.

hyphsubst Selects a different set of patterns for a language.

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

siunitx Typesetting of numbers and physical quantities.

²¹This explains why \TeX assumes the lowercase mapping of T1 and does not provide a tool for multiple mappings. Unfortunately, `\savingshyphcodes` is not a solution either, because `lccodes` for hyphenation are frozen in the format and cannot be changed.

biblatex Programmable bibliographies and citations.
bicaption Bilingual captions.
babelbib Multilingual bibliographies.
microtype Adjusts the typesetting according to some languages (kerning and spacing).
 Ligatures can be disabled.
substitutefont Combines fonts in several encodings.
mkpattern Generates hyphenation patterns.
tracklang Tracks which languages have been requested.
ucharclasses (xetex) Switches fonts when you switch from one Unicode block to another.
zhspacing Spacing for CJK documents in xetex.

1.28 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.²² 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)-ból”, but “from (3)” is “(3)-ból”, in Spanish an item labelled “3.” 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).

1.29 Tentative and experimental code

See the code section for \foreignlanguage* (a new starred version of \foreignlanguage).

Old stuff

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

- \babelFSstore{*babel-language*} sets the current three basic families (rm, sf, tt) as the default for the language given.
- \babelFSdefault{*babel-language*}{*fontspec-features*} patches \fontspec so that the given features are always passed as the optional argument or added to it (not an ideal solution).

So, for example:

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

²²See 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.

Modifying values of ini files

New 3.36 There is a way to modify the values of ini files when they get loaded with `\babelprovide`. To set, say, `digits.native` in the `numbers` section, use something like `numbers.digits.native=abcdefghijkl` (note the double dot between the section and the key name). The syntax may change, and currently it only redefines existing keys.

2 Loading languages with `language.dat`

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

New 3.9q With luatex, however, patterns are loaded on the fly when requested by the language (except the “0th” language, typically english, which is preloaded always).²³ 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).²⁴

2.1 Format

In that file the person who maintains a \TeX environment has to record for which languages he has hyphenation patterns *and* in which files these are stored²⁵. When hyphenation exceptions are stored in a separate file this can be indicated by naming that file *after* the file with the hyphenation patterns.

The file can contain empty lines and comments, as well as lines which start with an equals (=) sign. Such a line will instruct \LaTeX that the hyphenation patterns just processed have to be known under an alternative name. Here is an example:

```
%_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.²⁶ 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 could be set in `\extras<lang>`).

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

²⁴The 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`.

²⁵This is because different operating systems sometimes use *very* different file-naming conventions.

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

A typical error when using babel is the following:

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

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

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

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

The following assumptions are made:

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

Some recommendations:

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

- Captions should not contain shorthands or encoding-dependent commands (the latter is not always possible, but should be clearly documented). They should be defined using the LICR. You may also use the new tools for encoded strings, described below.
- Avoid adding things to `\noextras⟨lang⟩` except for `umlauthigh` and friends, `\bbl@deactivate`, `\bbl@(non)frenchspacing`, and language-specific macros. Use always, if possible, `\bbl@save` and `\bbl@savevariable` (except if you still want to have access to the previous value). Do not reset a macro or a setting to a hardcoded value. Never. Instead save its value in `\extras⟨lang⟩`.
- Do not switch scripts. If you want to make sure a set of glyphs is used, switch either the font encoding (low-level) or the language (high-level, which in turn may switch the font encoding). Usage of things like `\lating` is deprecated.²⁷
- Please, for “private” internal macros do not use the `\bbl@` prefix. It is used by babel and it can lead to incompatibilities.

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

3.1 Guidelines for contributed languages

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

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

The following page provides a starting point: <http://www.texnia.com/incubator.html>. If 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. For older versions of `plain.tex` and `lplain.tex` a substitute definition is used. Here “language” is used in the TeX sense of set of hyphenation patterns.

<code>\adddialect</code>	The macro <code>\adddialect</code> can be used when two languages can (or must) use the same hyphenation patterns. This can also be useful for languages for which no patterns are preloaded in the format. In such cases the default behavior of the babel system is to define this language as a ‘dialect’ of the language for which the patterns were loaded as <code>\language0</code> . Here “language” is used in the T _E X sense of set of hyphenation patterns.
<code>\<lang>hyphenmins</code>	The macro <code>\<lang>hyphenmins</code> is used to store the values of the <code>\lefthyphenmin</code> and <code>\righthyphenmin</code> . Redefine this macro to set your own values, with two numbers corresponding to these two parameters. For example:
	<pre>\renewcommand\spanishhyphenmins{34}</pre>
	(Assigning <code>\lefthyphenmin</code> and <code>\righthyphenmin</code> directly in <code>\extras<lang></code> has no effect.)
<code>\providehyphenmins</code>	The macro <code>\providehyphenmins</code> should be used in the language definition files to set <code>\lefthyphenmin</code> and <code>\righthyphenmin</code> . This macro will check whether these parameters were provided by the hyphenation file before it takes any action. If these values have been already set, this command is ignored (currently, default pattern files do <i>not</i> set them).
<code>\captions<lang></code>	The macro <code>\captions<lang></code> defines the macros that hold the texts to replace the original hard-wired texts.
<code>\date<lang></code>	The macro <code>\date<lang></code> defines <code>\today</code> .
<code>\extras<lang></code>	The macro <code>\extras<lang></code> contains all the extra definitions needed for a specific language. This macro, like the following, is a hook – you can add things to it, but it must not be used directly.
<code>\noextras<lang></code>	Because we want to let the user switch between languages, but we do not know what state T _E X might be in after the execution of <code>\extras<lang></code> , a macro that brings T _E X into a predefined state is needed. It will be no surprise that the name of this macro is <code>\noextras<lang></code> .
<code>\bbl@declare@tribute</code>	This is a command to be used in the language definition files for declaring a language attribute. It takes three arguments: the name of the language, the attribute to be defined, and the code to be executed when the attribute is to be used.
<code>\main@language</code>	To postpone the activation of the definitions needed for a language until the beginning of a document, all language definition files should use <code>\main@language</code> instead of <code>\selectlanguage</code> . This will just store the name of the language, and the proper language will be activated at the start of the document.
<code>\ProvidesLanguage</code>	The macro <code>\ProvidesLanguage</code> should be used to identify the language definition files. Its syntax is similar to the syntax of the L ^A T _E X command <code>\ProvidesPackage</code> .
<code>\LdfInit</code>	The macro <code>\LdfInit</code> performs a couple of standard checks that must be made at the beginning of a language definition file, such as checking the category code of the @-sign, preventing the .ldf file from being processed twice, etc.
<code>\ldf@quit</code>	The macro <code>\ldf@quit</code> 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 <code>\begin{document}</code> time, and ending the input stream.
<code>\ldf@finish</code>	The macro <code>\ldf@finish</code> does work needed at the end of each .ldf file. This includes resetting the category code of the @-sign, loading a local configuration file, and preparing the language to be activated at <code>\begin{document}</code> time.
<code>\loadlocalcfg</code>	After processing a language definition file, L ^A T _E X can be instructed to load a local configuration file. This file can, for instance, be used to add strings to <code>\captions<lang></code> to support local document classes. The user will be informed that this configuration file has been loaded. This macro is called by <code>\ldf@finish</code> .
<code>\substitutefontfamily</code>	(Deprecated.) This command takes three arguments, a font encoding and two font family names. It creates a font description file for the first font in the given encoding. This .fd file

²⁷ But not removed, for backward compatibility.

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

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

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

\bbld@declare@ttribute{<language>}{<attrib>}{%
\l\expandafter\addto\expandafter\extras<language>
\l\expandafter{\extras<attrib><language>}%
\l\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
  \savebox{\myeye}{\eye}%And direct usage
  \newsavebox{\myeye}
  \newcommand\myanchor{\anchor}%But OK inside command
}

```

3.4 Support for active characters

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

`\initiate@active@char`

The internal macro `\initiate@active@char` is used in language definition files to instruct \TeX to give a character the category code ‘active’. When a character has been made active it will remain that way until the end of the document. Its definition may vary.

`\bbl@activate`

The command `\bbl@activate` is used to change the way an active character expands.

`\bbl@deactivate`

`\bbl@activate` ‘switches on’ the active behavior of the character. `\bbl@deactivate` lets the active character expand to its former (mostly) non-active self.

`\declare@shorthand`

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

`\bbl@add@special`

The \TeX book states: “Plain \TeX includes a macro called `\dospecials` that is essentially a set macro, representing the set of all characters that have a special category code.” [2, p. 380]

`\bbl@remove@special`

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

3.5 Support for saving macro definitions

Language definition files may want to *redefine* macros that already exist. Therefore a mechanism for saving (and restoring) the original definition of those macros is provided. We provide two macros for this²⁸.

`\babel@save`

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

`\babel@savevariable`

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

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

3.6 Support for extending macros

`\addto`

The macro `\addto{⟨control sequence⟩}{⟨ \TeX code⟩}` can be used to extend the definition of a macro. The macro need not be defined (ie, it can be undefined or `\relax`). This macro can, for instance, be used in adding instructions to a macro like `\extrasenglish`.

Be careful when using this macro, because depending on the case the assignment could be either global (usually) or local (sometimes). That does not seem very consistent, but this

²⁸This mechanism was introduced by Bernd Raichle.

behavior is preserved for backward compatibility. If you are using `etoolbox`, by Philipp Lehman, consider using the tools provided by this package instead of `\addto`.

3.7 Macros common to a number of languages

<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 discretionaries) 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.²⁹ It may be empty, too, but in such a case using `\SetString` is an error (but not `\SetCase`).

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

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

\EndBabelCommands
```

A real example is:

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

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

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

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

\StartBabelCommands{german,austrian}{date}
  \SetString\monthiiiname{Februar}
  \SetString\monthiiiname{M\"a}rz}
  \SetString\monthivname{April}
  \SetString\monthvname{Mai}
  \SetString\monthviname{Juni}
  \SetString\monthviiname{Juli}
  \SetString\monthviiiname{August}
```

²⁹In future releases further categories may be added.

```

\SetString\monthixname{September}
\SetString\monthxname{Oktober}
\SetString\monthxiname{November}
\SetString\monthxiiname{Dezenber}
\SetString\today{\number\day.~%
\csname\month\romannumeral\month_name\endcsname\space
\number\year}

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

\EndBabelCommands

```

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

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

The starred version just forces strings to take a value – if not set as package option, then the default for the engine is used. This is not done by default to prevent backward incompatibilities, but if you are creating a new language this version is better. It's up to the maintainers of the current languages to decide if using it is appropriate.³⁰

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

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

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

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

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.

$\backslash SetStringLoop$ $\{ \langle macro-name \rangle \} \{ \langle string-list \rangle \}$

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

```

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

```

#1 is replaced by the roman numeral.

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

³⁰This replaces in 3.9g a short-lived $\backslash UseStrings$ which has been removed because it did not work.

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

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

\StartBabelCommands{turkish}{}[unicode,fontenc=TU_EU1_EU2,charset=utf8]
\SetCase
\uccode`i=`I\relax
\uccode`ı=`I\relax}
\lccode`İ=`i\relax
\lccode`I=`ı\relax}

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

\EndBabelCommands
```

(Note the mapping for OT1 is not complete.)

`\SetHyphenMap` *{(to-lower-macros)}*

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

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

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

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

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

4 Changes

4.1 Changes in babel version 3.9

Most of 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 `\languagename`. This meant the language in force when auxiliary files were loaded was the one used in, for example, shorthands – if the language was `german`, a `\select@language{spanish}` had no effect.
- `\foreignlanguage` and `otherlanguage*` messed up `\extras<language>`. Scripts, encodings and many other things were not switched correctly.
- The `:ENC` mechanism for hyphenation patterns used the encoding of the *previous* language, not that of the language being selected.
- `'` (with `activeacute`) had the original value when writing to an auxiliary file, and things like an infinite loop could happen. It worked incorrectly with `^` (if activated) and also if deactivated.
- Active chars 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 `babel` package after unpacking consists of the following files:

switch.def defines macros to set and switch languages.

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

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

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

hyphen.cfg is the file to be used when generating the formats to load hyphenation patterns. By default it also loads `switch.def`.

The babel installer extends `docstrip` with a few “pseudo-guards” to set “variables” used at installation time. They are used with `<@name@>` at the 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 (all lowercase).

7 Tools

```
1 <<version=3.36>>
2 <<date=2019/11/14>>
```

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@strip@slash{\expandafter\@gobble\string}
6 \def\bbl@add#1#2{%
```

```

7 \bbl@ifunset{\bbl@stripslash#1}%
8   {\def#1{#2}}%
9   {\expandafter\def\expandafter#1\expandafter{#1#2}}
10 \def\bbl@xin@{\@expandtwoargs\in@}
11 \def\bbl@csarg#1#2{\expandafter#1\csname bbl@#2\endcsname}%
12 \def\bbl@cs#1{\csname bbl@#1\endcsname}
13 \def\bbl@loop#1#2#3{\bbl@loop#1{#3}#2,\@nnil,}
14 \def\bbl@loopx#1#2{\expandafter\bbl@loop\expandafter#1\expandafter{#2}}
15 \def\bbl@loop#1#2#3,{%
16   \ifx\@nnil#3\relax\else
17     \def#1{#3}#2\bbl@afterfi\bbl@loop#1{#2}%
18   \fi}
19 \def\bbl@for#1#2#3{\bbl@loopx#1{#2}{\ifx#1\@empty\else#3\fi}}

```

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

```

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

```

`\bbl@afterelse` `\bbl@afterfi` Because the code that is used in the handling of active characters may need to look ahead, we take extra care to ‘throw’ it over the `\else` and `\fi` parts of an `\if`-statement³¹. These macros will break if another `\if... \fi` statement appears in one of the arguments and it is not enclosed in braces.

```

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

```

`\bbl@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.

```

28 \def\bbl@exp#1{%
29   \begingroup
30   \let\ \noexpand
31   \def\<##1>{\expandafter\noexpand\csname##1\endcsname}%
32   \edef\bbl@exp@aux{\endgroup#1}%
33   \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.

```

34 \def\bbl@tempa#1{%
35   \long\def\bbl@trim##1##2{%
36     \futurelet\bbl@trim@a\bbl@trim@c##2\@nil\@nil#1\@nil\relax{##1}}%
37   \def\bbl@trim@c{%
38     \ifx\bbl@trim@a@sptoken
39       \expandafter\bbl@trim@b
40     \else

```

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

```

41 \expandafter\bb1@trim@b\expandafter#1%
42 \fi}%
43 \long\def\bb1@trim@b#1##1 \@nil{\bb1@trim@i##1}}
44 \bb1@tempa{ }
45 \long\def\bb1@trim@i#1\@nil#2\relax#3{#3{#1}}
46 \long\def\bb1@trim@def#1{\bb1@trim{\def#1}}

```

`\bb1@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.

```

47 \beginingroup
48 \gdef\bb1@ifunset#1{%
49 \expandafter\ifx\csname#1\endcsname\relax
50 \expandafter\@firstoftwo
51 \else
52 \expandafter\@secondoftwo
53 \fi}
54 \bb1@ifunset{ifcsname}%
55 {}%
56 {\gdef\bb1@ifunset#1{%
57 \ifcsname#1\endcsname
58 \expandafter\ifx\csname#1\endcsname\relax
59 \bb1@afterelse\expandafter\@firstoftwo
60 \else
61 \bb1@afterfi\expandafter\@secondoftwo
62 \fi
63 \else
64 \expandafter\@firstoftwo
65 \fi}}
66 \endgroup

```

`\bb1@ifblank` A tool from url, by Donald Arseneau, which tests if a string is empty or space.

```

67 \def\bb1@ifblank#1{%
68 \bb1@ifblank@i#1\@nil\@nil\@secondoftwo\@firstoftwo\@nil}
69 \long\def\bb1@ifblank@i#1#2\@nil#3#4#5\@nil{#4}

```

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

```

70 \def\bb1@forkv#1#2{%
71 \def\bb1@kvcmd##1##2##3{#2}%
72 \bb1@kvnext#1,\@nil,}
73 \def\bb1@kvnext#1,{%
74 \ifx\@nil#1\relax\else
75 \bb1@ifblank{#1}{\bb1@forkv@eq#1=\@empty=\@nil{#1}}%
76 \expandafter\bb1@kvnext
77 \fi}
78 \def\bb1@forkv@eq#1=#2=#3\@nil#4{%
79 \bb1@trim@def\bb1@forkv@a{#1}%
80 \bb1@trim{\expandafter\bb1@kvcmd\expandafter{\bb1@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).

```

81 \def\bb1@vforeach#1#2{%
82 \def\bb1@forcmd##1{#2}%
83 \bb1@fornext#1,\@nil,}
84 \def\bb1@fornext#1,{%
85 \ifx\@nil#1\relax\else

```



```

86 \bbl@ifblank{#1}{\bbl@trim\bbl@forcmd{#1}}%
87 \expandafter\bbl@fornext
88 \fi}
89 \def\bbl@foreach#1{\expandafter\bbl@vforeach\expandafter{#1}}

```

\bbl@replace

```

90 \def\bbl@replace#1#2#3{% in #1 -> repl #2 by #3
91 \toks@{}}%
92 \def\bbl@replace@aux##1#2##2#2{%
93 \ifx\bbl@nil##2%
94 \toks@\expandafter{\the\toks@##1}%
95 \else
96 \toks@\expandafter{\the\toks@##1#3}%
97 \bbl@afterfi
98 \bbl@replace@aux##2#2%
99 \fi}%
100 \expandafter\bbl@replace@aux#1#2\bbl@nil#2%
101 \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 retokenized). It may change! (or even merged with \bbl@replace; I'm not sure ckecking the replacement is really necessary or just paranoia).

```

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

```

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

```

127 \def\bbl@ifsamestring#1#2{%
128 \begingroup
129 \protected@edef\bbl@tempb{#1}%

```

```

130 \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
131 \protected@edef\bbl@tempc{#2}%
132 \edef\bbl@tempc{\expandafter\strip@prefix\meaning\bbl@tempc}%
133 \ifx\bbl@tempb\bbl@tempc
134 \aftergroup\@firstoftwo
135 \else
136 \aftergroup\@secondoftwo
137 \fi
138 \endgroup}
139 \chardef\bbl@engine=%
140 \ifx\directlua\@undefined
141 \ifx\XeTeXinputencoding\@undefined
142 \z@
143 \else
144 \tw@
145 \fi
146 \else
147 \@ne
148 \fi
149 <</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 .

```

150 <<{*Make sure ProvidesFile is defined}>> ≡
151 \ifx\ProvidesFile\@undefined
152 \def\ProvidesFile#1[#2 #3 #4]{%
153 \wlog{File: #1 #4 #3 <#2>}%
154 \let\ProvidesFile\@undefined}
155 \fi
156 <</Make sure ProvidesFile is defined>>

```

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

```

157 <<{*Load patterns in luatex}>> ≡
158 \ifx\directlua\@undefined\else
159 \ifx\bbl@luapatterns\@undefined
160 \input luababel.def
161 \fi
162 \fi
163 <</Load patterns in luatex>>

```

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

```

164 <<{*Load macros for plain if not LaTeX}>> ≡
165 \ifx\AtBeginDocument\@undefined
166 \input plain.def\relax
167 \fi
168 <</Load macros for plain if not LaTeX>>

```

7.1 Multiple languages

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

```

169 <<{*Define core switching macros}>> ≡
170 \ifx\language\@undefined
171 \csname newcount\endcsname\language

```

```
172 \fi
173 <</Define core switching macros>>
```

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

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

```
174 <<*Define core switching macros>> ≡
175 \ifx\newlanguage\undefined
176   \csname newcount\endcsname\last@language
177   \def\addlanguage#1{%
178     \global\advance\last@language\@e
179     \ifnum\last@language<\@cclvi
180       \else
181         \errmessage{No room for a new \string\language!}%
182       \fi
183     \global\chardef#1\last@language
184     \wlog{\string#1 = \string\language\the\last@language}}
185   \else
186     \countdef\last@language=19
187     \def\addlanguage{\alloc@9\language\chardef\@cclvi}
188   \fi
189 <</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 L^AT_EX 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.

8 The Package File (L^AT_EX, `babel.sty`)

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

8.1 base

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

```
190 (*package)
191 \NeedsTeXFormat{LaTeX2e}[2005/12/01]
192 \ProvidesPackage{babel}[\langle\date\rangle \langle\version\rangle The Babel package]
193 \@ifpackagewith{babel}{debug}
194   {\providecommand\bbl@trace[1]{\message{^^J[ #1 ]}}%
195    \let\bbl@debug\@firstofone}
196   {\providecommand\bbl@trace[1]{}%
197    \let\bbl@debug\@gobble}
198 \ifx\bbl@switchflag\undefined % Prevent double input
199   \let\bbl@switchflag\relax
200   \input switch.def\relax
201 \fi
202 \langle\Load patterns in luatex\rangle
203 \langle\Basic macros\rangle
204 \def\AfterBabelLanguage#1{%
205   \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.

```
206 \ifx\bbl@languages\undefined\else
207   \begingroup
208     \catcode`\^^I=12
209     \@ifpackagewith{babel}{showlanguages}{%
210       \begingroup
211         \def\bbl@elt#1#2#3#4{\wlog{#2^^I#1^^I#3^^I#4}}%
212         \wlog{<*languages>}%
213         \bbl@languages
214         \wlog{</languages>}%
215       \endgroup}{%
216     \endgroup
217     \def\bbl@elt#1#2#3#4{%
218       \ifnum#2=\z@
219         \gdef\bbl@nulllanguage{#1}%
220         \def\bbl@elt##1##2##3##4{}%
221       \fi}%
222     \bbl@languages
223 \fi
224 \ifodd\bbl@engine
225   % Harftex is evolving, so the callback is not hardcoded, just in case
226   \def\bbl@harfprefline{Harf pre_linebreak_filter callback}%
227   \def\bbl@activate@preotf{%
228     \let\bbl@activate@preotf\relax % only once
229     \directlua{
230       Babel = Babel or {}
231       %
232       function Babel.pre_otfload_v(head)
233         if Babel.numbers and Babel.digits_mapped then
234           head = Babel.numbers(head)
235         end
236         if Babel.bidi_enabled then
237           head = Babel.bidi(head, false, dir)
238         end
239         return head
240       end
```

```

241 %
242 function Babel.pre_otfload_h(head, gc, sz, pt, dir)
243   if Babel.numbers and Babel.digits_mapped then
244     head = Babel.numbers(head)
245   end
246   if Babel.fixboxdirs then           % Temporary!
247     head = Babel.fixboxdirs(head)
248   end
249   if Babel.bidi_enabled then
250     head = Babel.bidi(head, false, dir)
251   end
252   return head
253 end
254 %
255 luatexbase.add_to_callback('pre_linebreak_filter',
256   Babel.pre_otfload_v,
257   'Babel.pre_otfload_v',
258   luatexbase.priority_in_callback('pre_linebreak_filter',
259     '\bbl@harfpreline')
260   or luatexbase.priority_in_callback('pre_linebreak_filter',
261     'luaotfload.node_processor')
262   or nil)
263 %
264 luatexbase.add_to_callback('hpack_filter',
265   Babel.pre_otfload_h,
266   'Babel.pre_otfload_h',
267   luatexbase.priority_in_callback('hpack_filter',
268     '\bbl@harfpreline')
269   or luatexbase.priority_in_callback('hpack_filter',
270     'luaotfload.node_processor')
271   or nil)
272 }%
273 \@ifpackageloaded{harfload}%
274   {\directlua{ Babel.mirroring_enabled = false }}%
275   {}}
276 \let\bbl@tempa\relax
277 \@ifpackagewith{babel}{bidi=basic}%
278   {\def\bbl@tempa{basic}}%
279   {\@ifpackagewith{babel}{bidi=basic-r}%
280     {\def\bbl@tempa{basic-r}}%
281     {}}
282 \ifx\bbl@tempa\relax\else
283   \let\bbl@beforeforeign\leavevmode
284   \AtEndOfPackage{\EnableBabelHook{babel-bidi}}%
285   \RequirePackage{luatexbase}%
286   \directlua{
287     require('babel-data-bidi.lua')
288     require('babel-bidi-\bbl@tempa.lua')
289   }
290   \bbl@activate@preotf
291 \fi
292 \fi

```

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. Useful for old versions of polyglossia, too.

```

293 \bbl@trace{Defining option 'base'}
294 \@ifpackagewith{babel}{base}{%
295   \ifx\directlua\undefined
296     \DeclareOption*{\bbl@patterns{\CurrentOption}}%

```

```

297 \else
298   \DeclareOption*{\bbl@patterns@lua{\CurrentOption}}%
299 \fi
300 \DeclareOption{base}{}%
301 \DeclareOption{showlanguages}{}%
302 \ProcessOptions
303 \global\expandafter\let\csname opt@babel.sty\endcsname\relax
304 \global\expandafter\let\csname ver@babel.sty\endcsname\relax
305 \global\let@ifl@ter@@\ifl@ter
306 \def@ifl@ter#1#2#3#4#5{\global\let@ifl@ter\ifl@ter@@}%
307 \endinput}{}%

```

8.2 key=value options and other general option

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

```

308 \bbl@trace{key=value and another general options}
309 \bbl@csarg\let{tempa\expandafter}\csname opt@babel.sty\endcsname
310 \def\bbl@tempb#1.#2{%
311   #1\ifx\@empty#2\else,\bbl@afterfi\bbl@tempb#2\fi}%
312 \def\bbl@tempd#1.#2@nnil{%
313   \ifx\@empty#2%
314     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
315   \else
316     \in@{=}{#1}\ifin@
317     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.#2}%
318   \else
319     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
320   \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}%
321   \fi
322 \fi}
323 \let\bbl@tempc\@empty
324 \bbl@foreach\bbl@tempa{\bbl@tempd#1.\@empty\@nnil}
325 \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.

```

326 \DeclareOption{KeepShorthandsActive}{}
327 \DeclareOption{activeacute}{}
328 \DeclareOption{activegrave}{}
329 \DeclareOption{debug}{}
330 \DeclareOption{noconfigs}{}
331 \DeclareOption{showlanguages}{}
332 \DeclareOption{silent}{}
333 \DeclareOption{mono}{}
334 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
335 % Don't use. Experimental:
336 \newif\ifbbl@single
337 \DeclareOption{selectors=off}{\bbl@singletrue}
338 <<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.

```
339 \let\bbl@opt@shorthands\@nnil
340 \let\bbl@opt@config\@nnil
341 \let\bbl@opt@main\@nnil
342 \let\bbl@opt@headfoot\@nnil
343 \let\bbl@opt@layout\@nnil
```

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

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

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

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

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

```
362 \ProcessOptions*
```

8.3 Conditional loading of shorthands

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

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

```
363 \bbl@trace{Conditional loading of shorthands}
364 \def\bbl@sh@string#1{%
365   \ifx#1\@empty\else
366     \ifx#1t\string-%
367     \else\ifx#1c\string,%
368     \else\string#1%
369   \fi\fi
370   \expandafter\bbl@sh@string
371   \fi}
372 \ifx\bbl@opt@shorthands\@nnil
373   \def\bbl@ifshorthand#1#2#3{#2}%
374 \else\ifx\bbl@opt@shorthands\@empty
375   \def\bbl@ifshorthand#1#2#3{#3}%
376 \else
```

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

```
377 \def\bbl@ifshorthand#1{%
378   \bbl@xin@{\string#1}{\bbl@opt@shorthands}%
379   \ifin@
380     \expandafter\@firstoftwo
381   \else
382     \expandafter\@secondoftwo
383   \fi}
```

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

```
384 \edef\bbl@opt@shorthands{%
385   \expandafter\bbl@sh@string\bbl@opt@shorthands\@empty}%
```

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

```
386 \bbl@ifshorthand{'}%
387   {\PassOptionsToPackage{activeacute}{babel}}{}
388 \bbl@ifshorthand{`}%
389   {\PassOptionsToPackage{activegrave}{babel}}{}
390 \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.

```
391 \ifx\bbl@opt@headfoot\@nnil\else
392   \g@addto@macro\@resetactivechars{%
393     \set@typeset@protect
394     \expandafter\select@language@x\expandafter{\bbl@opt@headfoot}%
395     \let\protect\noexpand}
396 \fi
```

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

```
397 \ifx\bbl@opt@safe\@undefined
398   \def\bbl@opt@safe{BR}
399 \fi
400 \ifx\bbl@opt@main\@nnil\else
401   \edef\bbl@language@opts{%
402     \ifx\bbl@language@opts\@empty\else\bbl@language@opts,\fi
403     \bbl@opt@main}
404 \fi
```

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

```
405 \bbl@trace{Defining IfBabelLayout}
406 \ifx\bbl@opt@layout\@nnil
407   \newcommand\IfBabelLayout[3]{#3}%
408 \else
409   \newcommand\IfBabelLayout[1]{%
410     \@expandtwoargs\in@{.#1.}{.\bbl@opt@layout.}%
411     \ifin@
412       \expandafter\@firstoftwo
413     \else
414       \expandafter\@secondoftwo
415     \fi}
416 \fi
```


8.4 Language options

Languages are loaded when processing the corresponding option *except* if a main language has been set. In such a case, it is not loaded until all options has been processed. The following macro inputs the ldf file and does some additional checks (\input works, too, but possible errors are not caught).

```
417 \bbl@trace{Language options}
418 \let\bbl@afterlang\relax
419 \let\BabelModifiers\relax
420 \let\bbl@loaded@empty
421 \def\bbl@load@language#1{%
422   \InputIfFileExists{#1.ldf}%
423   {\edef\bbl@loaded{\CurrentOption
424     \ifx\bbl@loaded@empty\else,\bbl@loaded\fi}%
425     \expandafter\let\expandafter\bbl@afterlang
426       \csname\CurrentOption.ldf-h@k\endcsname
427     \expandafter\let\expandafter\BabelModifiers
428       \csname bbl@mod@\CurrentOption\endcsname}%
429   {\bbl@error{%
430     Unknown option '\CurrentOption'. Either you misspelled it\\%
431     or the language definition file \CurrentOption.ldf was not found}{%
432     Valid options are: shorthands=, KeepShorthandsActive,\\%
433     activeacute, activegrave, noconfigs, safe=, main=, math=\\%
434     headfoot=, strings=, config=, hyphenmap=, or a language name.}}}
```

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

```
435 \def\bbl@try@load@lang#1#2#3{%
436   \IfFileExists{\CurrentOption.ldf}%
437   {\bbl@load@language{\CurrentOption}}%
438   {#1\bbl@load@language{#2}#3}}
439 \DeclareOption{afrikaans}{\bbl@try@load@lang{}{dutch}{}}
440 \DeclareOption{brazil}{\bbl@try@load@lang{}{portuges}{}}
441 \DeclareOption{brazilian}{\bbl@try@load@lang{}{portuges}{}}
442 \DeclareOption{hebrew}{%
443   \input{rlbabel.def}%
444   \bbl@load@language{hebrew}}
445 \DeclareOption{hungarian}{\bbl@try@load@lang{}{magyar}{}}
446 \DeclareOption{lowersorbian}{\bbl@try@load@lang{}{lsorbian}{}}
447 \DeclareOption{nynorsk}{\bbl@try@load@lang{}{norsk}{}}
448 \DeclareOption{polutonikogreek}{%
449   \bbl@try@load@lang{}{greek}{\languageattribute{greek}{polutoniko}}}
450 \DeclareOption{portuguese}{\bbl@try@load@lang{}{portuges}{}}
451 \DeclareOption{russian}{\bbl@try@load@lang{}{russianb}{}}
452 \DeclareOption{ukrainian}{\bbl@try@load@lang{}{ukraineb}{}}
453 \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.

```
454 \ifx\bbl@opt@config@nnil
455   \ifpackagewith{babel}{noconfigs}{}%
456   {\InputIfFileExists{bblopts.cfg}%
457     {\typeout{*****^^J%
458               * Local config file bblopts.cfg used^^J%
459               *}}%
460     {}}%
```

```

461 \else
462   \InputIfFileExists{\bbl@opt@config.cfg}%
463   {\typeout{*****^J%
464             * Local config file \bbl@opt@config.cfg used^^J%
465             *}}%
466   {\bbl@error{%
467     Local config file '\bbl@opt@config.cfg' not found}{%
468     Perhaps you misspelled it.}}%
469 \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.

```

470 \bbl@for\bbl@tempa\bbl@language@opts{%
471   \bbl@ifunset{ds@\bbl@tempa}%
472   {\edef\bbl@tempb{%
473     \noexpand\DeclareOption
474     {\bbl@tempa}%
475     {\noexpand\bbl@load@language{\bbl@tempa}}}%
476   \bbl@tempb}%
477   \@empty}

```

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

```

478 \bbl@foreach\@classoptionslist{%
479   \bbl@ifunset{ds@#1}%
480   {\IfFileExists{#1.ldf}%
481     {\DeclareOption{#1}{\bbl@load@language{#1}}}%
482     {}}%
483   {}}

```

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

```

484 \ifx\bbl@opt@main\@nnil\else
485   \expandafter
486   \let\expandafter\bbl@loadmain\csname ds@\bbl@opt@main\endcsname
487   \DeclareOption{\bbl@opt@main}{}
488 \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):

```

489 \def\AfterBabelLanguage#1{%
490   \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang}{}}
491 \DeclareOption*{}
492 \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`.

```

493 \ifx\bbl@opt@main\@nnil
494   \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
495   \let\bbl@tempc\@empty

```

```

496 \bbl@for\bbl@tempb\bbl@tempa{%
497   \bbl@xin@{,\bbl@tempb,}{,\bbl@loaded,}%
498   \ifin@v\edef\bbl@tempc{\bbl@tempb}\fi}
499 \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
500 \expandafter\bbl@tempa\bbl@loaded,\@nnil
501 \ifx\bbl@tempb\bbl@tempc\else
502   \bbl@warning{%
503     Last declared language option is `bbl@tempc',\%
504     but the last processed one was `bbl@tempb'.\%
505     The main language cannot be set as both a global\%
506     and a package option. Use `main=bbl@tempc' as\%
507     option. Reported}%
508   \fi
509 \else
510   \DeclareOption{\bbl@opt@main}{\bbl@loadmain}
511   \ExecuteOptions{\bbl@opt@main}
512   \DeclareOption*{}
513   \ProcessOptions*
514 \fi
515 \def\AfterBabelLanguage{%
516   \bbl@error
517   {Too late for \string\AfterBabelLanguage}%
518   {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.

```

519 \ifx\bbl@main@language\@undefined
520   \bbl@info{%
521     You haven't specified a language. I'll use 'nil'\%
522     as the main language. Reported}
523   \bbl@load@language{nil}
524 \fi
525 \</package>
526 \*core)

```

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

The kernel of the babel system is stored in either `hyphen.cfg` or `switch.def` and `babel.def`. The file `babel.def` contains most of the code, while `switch.def` defines the language-switching commands; both can be read at run time. The file `hyphen.cfg` is a file that can be loaded into the format, which is necessary when you want to be able to switch hyphenation patterns (by default, it also inputs `switch.def`, for “historical reasons”, but it is not necessary). When `babel.def` is loaded it checks if the current version of `switch.def` is in the format; if not, it is loaded. A further file, `babel.sty`, contains \LaTeX -specific stuff. Because plain \TeX users might want to use some of the features of the babel system too, care has to be taken that plain \TeX can process the files. For this reason the current format will have to be checked in a number of places. Some of the code below is common to plain \TeX and \LaTeX , some of it is for the \LaTeX case only.

Plain formats based on `etex` (`etex`, `xetex`, `luatex`) don’t load `hyphen.cfg` but `etex.src`, which follows a different naming convention, so we need to define the babel names. It presumes `language.def` exists and it is the same file used when formats were created.

9.1 Tools

```

527 \ifx\ldf@quit\@undefined

```

```

528 \else
529 \expandafter\endinput
530 \fi
531 <<Make sure ProvidesFile is defined>>
532 \ProvidesFile{babel.def}[<<date>>] <<version>> Babel common definitions]
533 <<Load macros for plain if not LaTeX>>

```

The file `babel.def` expects some definitions made in the $\text{\LaTeX}2_{\epsilon}$ style file. So, In $\text{\LaTeX}2.09$ 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 in no package options, and therefore and alternative mechanism is provided. For the moment, only `\babeloptionstrings` and `\babeloptionmath` are provided, which can be defined before loading babel.

`\BabelModifiers` can be set too (but not sure it works).

```

534 \ifx\bbbl@ifshorthand\@undefined
535 \let\bbbl@opt@shorthands\@nnil
536 \def\bbbl@ifshorthand#1#2#3{#2}%
537 \let\bbbl@language@opts\@empty
538 \ifx\babeloptionstrings\@undefined
539 \let\bbbl@opt@strings\@nnil
540 \else
541 \let\bbbl@opt@strings\babeloptionstrings
542 \fi
543 \def\BabelStringsDefault{generic}
544 \def\bbbl@tempa{normal}
545 \ifx\babeloptionmath\bbbl@tempa
546 \def\bbbl@mathnormal{\noexpand\textormath}
547 \fi
548 \def\AfterBabelLanguage#1#2{}
549 \ifx\BabelModifiers\@undefined\let\BabelModifiers\relax\fi
550 \let\bbbl@afterlang\relax
551 \def\bbbl@opt@safe{BR}
552 \ifx\@uclclist\@undefined\let\@uclclist\@empty\fi
553 \ifx\bbbl@trace\@undefined\def\bbbl@trace#1{}\fi
554 \expandafter\newif\csname ifbbl@single\endcsname
555 \fi

```

And continue.

```

556 \ifx\bbbl@switchflag\@undefined % Prevent double input
557 \let\bbbl@switchflag\relax
558 \input switch.def\relax
559 \fi
560 \bbbl@trace{Compatibility with language.def}
561 \ifx\bbbl@languages\@undefined
562 \ifx\directlua\@undefined
563 \openin1 = language.def
564 \ifeof1
565 \closein1
566 \message{I couldn't find the file language.def}
567 \else
568 \closein1
569 \begingroup
570 \def\addlanguage#1#2#3#4#5{%
571 \expandafter\ifx\csname lang@#1\endcsname\relax\else
572 \global\expandafter\let\csname l@#1\endcsname
573 \csname lang@#1\endcsname
574 \fi}%
575 \def\uselanguage#1{%
576 \input language.def
577 \endgroup

```

```

578 \fi
579 \fi
580 \chardef\l@english\z@
581 \fi
582 <<Load patterns in luatex>>
583 <<Basic macros>>

```

`\addto` For each language four control sequences have to be defined that control the language-specific definitions. To be able to add something to these macro once they have been defined the macro `\addto` is introduced. It takes two arguments, a *<control sequence>* and T_EX-code to be added to the *<control sequence>*.

If the *<control sequence>* has not been defined before it is defined now. The control sequence could also expand to `\relax`, in which case a circular definition results. The net result is a stack overflow. Otherwise the replacement text for the *<control sequence>* is expanded and stored in a token register, together with the T_EX-code to be added. Finally the *<control sequence>* is redefined, using the contents of the token register.

```

584 \def\addto#1#2{%
585 \ifx#1\@undefined
586 \def#1{#2}%
587 \else
588 \ifx#1\relax
589 \def#1{#2}%
590 \else
591 {\toks@\expandafter{#1#2}%
592 \xdef#1{\the\toks@}}%
593 \fi
594 \fi}

```

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

```

595 \def\bbl@withactive#1#2{%
596 \begingroup
597 \lccode`~=#2\relax
598 \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).

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

```

599 \def\bbl@redefine#1{%
600 \edef\bbl@tempa{\bbl@stripslash#1}%
601 \expandafter\let\csname org@\bbl@tempa\endcsname#1%
602 \expandafter\def\csname\bbl@tempa\endcsname}

```

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

```
603 \@onlypreamble\bbl@redefine
```

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

```

604 \def\bbl@redefine@long#1{%
605 \edef\bbl@tempa{\bbl@stripslash#1}%
606 \expandafter\let\csname org@\bbl@tempa\endcsname#1%
607 \expandafter\long\expandafter\def\csname\bbl@tempa\endcsname}
608 \@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_`.

```
609 \def\bbl@redefineroobust#1{%
610   \edef\bbl@tempa{\bbl@stripslash#1}%
611   \bbl@ifunset{\bbl@tempa\space}%
612   {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
613     \bbl@exp{\def\#1{\protect\<\bbl@tempa\space>}}}%
614   {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}%
615   \@namedef{\bbl@tempa\space}}
```

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

```
616 \@onlypreamble\bbl@redefineroobust
```

9.2 Hooks

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

```
617 \bbl@trace{Hooks}
618 \newcommand\AddBabelHook[3][[]{%
619   \bbl@ifunset{bbl@hk@#2}{\EnableBabelHook{#2}}}%
620   \def\bbl@tempa##1,#3=##2,##3\@empty{\def\bbl@tempb{##2}}%
621   \expandafter\bbl@tempa\bbl@evargs,#3=,\@empty
622   \bbl@ifunset{bbl@ev@#2@#3@#1}%
623     {\bbl@csarg\bbl@add{ev@#3@#1}{\bbl@elt{#2}}}%
624     {\bbl@csarg\let{ev@#2@#3@#1}\relax}%
625   \bbl@csarg\newcommand{ev@#2@#3@#1}[\bbl@tempb]}
626 \newcommand\EnableBabelHook[1]{\bbl@csarg\let{hk@#1}\@firstofone}
627 \newcommand\DisableBabelHook[1]{\bbl@csarg\let{hk@#1}\@gobble}
628 \def\bbl@usehooks#1#2{%
629   \def\bbl@elt##1{%
630     \@nameuse{bbl@hk@##1}{\@nameuse{bbl@ev@##1@#1@#2}}}%
631   \@nameuse{bbl@ev@#1@}%
632   \ifx\language\@undefined\else % Test required for Plain (?)
633     \def\bbl@elt##1{%
634       \@nameuse{bbl@hk@##1}{\@nameuse{bbl@ev@##1@#1@\language}#2}}%
635     \@nameuse{bbl@ev@#1@\language}%
636   \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).

```
637 \def\bbl@evargs{,% <- don't delete this comma
638   everylanguage=1,loadkernel=1,loadpatterns=1,loadexceptions=1,%
639   adddialect=2,patterns=2,defaultcommands=0,encodedcommands=2,write=0,%
640   beforeextras=0,afterextras=0,stopcommands=0,stringprocess=0,%
641   hyphenation=2,initiateactive=3,afterreset=0,foreign=0,foreign*=0,%
642   beforestart=0}
```

`\babelensure` The user command just parses the optional argument and creates a new macro named `\bbl@e@<language>`. We register a hook at the `afterextras` event which just executes this macro in a “complete” selection (which, if undefined, is `\relax` and does nothing). This

part is somewhat involved because we have to make sure things are expanded the correct number of times.

The macro `\bbl@e@{language}` contains `\bbl@ensure{<include>}{<exclude>}{<fontenc>}`, which in 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.

```

643 \bbl@trace{Defining babelensure}
644 \newcommand\babelensure[2][{}% TODO - revise test files
645   \AddBabelHook{babel-ensure}{afterextras}{%
646     \ifcase\bbl@select@type
647       \@nameuse{\bbl@e@\languagename}%
648     \fi}%
649 \begingroup
650   \let\bbl@ens@include\@empty
651   \let\bbl@ens@exclude\@empty
652   \def\bbl@ens@fontenc{\relax}%
653   \def\bbl@tempb##1{%
654     \ifx\@empty##1\else\noexpand##1\expandafter\bbl@tempb\fi}%
655   \edef\bbl@tempa{\bbl@tempb#1\@empty}%
656   \def\bbl@tempb##1=##2\@{\@namedef{\bbl@ens@##1}{##2}}%
657   \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
658   \def\bbl@tempc{\bbl@ensure}%
659   \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
660     \expandafter{\bbl@ens@include}}%
661   \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
662     \expandafter{\bbl@ens@exclude}}%
663   \toks@\expandafter{\bbl@tempc}%
664   \bbl@exp{%
665     \endgroup
666     \def<\bbl@e@#2>{\the\toks@{\bbl@ens@fontenc}}}}
667 \def\bbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
668   \def\bbl@tempb##1{% elt for (excluding) \bbl@captionslist list
669     \ifx##1\@undefined % 3.32 - Don't assume the macros exists
670       \edef##1{\noexpand\bbl@nocaption
671         {\bbl@stripslash##1}{\languagename\bbl@stripslash##1}}%
672       \fi
673       \ifx##1\@empty\else
674         \in@{##1}{#2}%
675       \ifin\@else
676         \bbl@ifunset{\bbl@ensure@\languagename}%
677         {\bbl@exp{%
678           \\DeclareRobustCommand<\bbl@ensure@\languagename>[1]{%
679             \\foreignlanguage{\languagename}%
680             {\ifx\relax#3\else
681               \\fontencoding{#3}\\selectfont
682               \fi
683               #####1}}}}%
684         {}}%
685         \toks@\expandafter{##1}%
686         \edef##1{%
687           \bbl@csarg\noexpand{ensure@\languagename}%
688           {\the\toks@}}%
689         \fi
690         \expandafter\bbl@tempb
691       \fi}%
692   \expandafter\bbl@tempb\bbl@captionslist\today\@empty

```

```

693 \def\bb1@tempa##1{% elt for include list
694   \ifx##1\@empty\else
695     \bb1@csarg\in@{ensure@\language\expandafter}\expandafter{##1}%
696     \ifin\else
697       \bb1@tempb##1\@empty
698       \fi
699     \expandafter\bb1@tempa
700     \fi}%
701 \bb1@tempa#1\@empty}
702 \def\bb1@captionslist{%
703 \prefacename\refname\abstractname\bibname\chaptername\appendixname
704 \contentsname\listfigurename\listtablename\indexname\figurename
705 \tablename\partname\enc1name\ccname\headtoname\pagename\seename
706 \alsoname\proofname\glossaryname}

```

9.3 Setting up language files

`\LdfInit` The second version of `\LdfInit` macro takes two arguments. The first argument is the name of the language that will be defined in the language definition file; the second argument is either a control sequence or a string from which a control sequence should be constructed. The existence of the control sequence indicates that the file has been processed before.

At the start of processing a language definition file we always check the category code of the at-sign. We make sure that it is a ‘letter’ during the processing of the file. We also save its name as the last called option, even if not loaded.

Another character that needs to have the correct category code during processing of language definition files is the equals sign, ‘=’, because it is sometimes used in constructions with the `\let` primitive. Therefore we store its current catcode and restore it later on. Now we check whether we should perhaps stop the processing of this file. To do this we first need to check whether the second argument that is passed to `\LdfInit` is a control sequence. We do that by looking at the first token after passing #2 through `string`. When it is equal to `\@backslashchar` we are dealing with a control sequence which we can compare with `\@undefined`.

If so, we call `\ldf@quit` to set the main language, restore the category code of the @-sign and call `\endinput`

When #2 was *not* a control sequence we construct one and compare it with `\relax`.

Finally we check `\originalTeX`.

```

707 \bb1@trace{Macros for setting language files up}
708 \def\bb1@ldfinit{%
709   \let\bb1@sreset\@empty
710   \let\BabelStrings\bb1@opt@string
711   \let\BabelOptions\@empty
712   \let\BabelLanguages\relax
713   \ifx\originalTeX\@undefined
714     \let\originalTeX\@empty
715   \else
716     \originalTeX
717   \fi}
718 \def\LdfInit#1#2{%
719   \chardef\atcatcode=\catcode`\@
720   \catcode`\@=11\relax
721   \chardef\eqcatcode=\catcode`\=
722   \catcode`\==12\relax
723   \expandafter\if\expandafter\@backslashchar
724     \expandafter\@car\string#2\@nil
725   \ifx#2\@undefined\else

```



```

726     \ldf@quit{#1}%
727     \fi
728 \else
729     \expandafter\ifx\curname#2\endcurname\relax\else
730     \ldf@quit{#1}%
731     \fi
732 \fi
733 \bbl@ldfinit}

```

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

```

734 \def\ldf@quit#1{%
735 \expandafter\main@language\expandafter{#1}%
736 \catcode\@=\atcatcode \let\atcatcode\relax
737 \catcode\==\eqcatcode \let\eqcatcode\relax
738 \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.

```

739 \def\bbl@afterldf#1{%
740 \bbl@afterlang
741 \let\bbl@afterlang\relax
742 \let\BabelModifiers\relax
743 \let\bbl@screset\relax}%
744 \def\ldf@finish#1{%
745 \loadlocalcfg{#1}%
746 \bbl@afterldf{#1}%
747 \expandafter\main@language\expandafter{#1}%
748 \catcode\@=\atcatcode \let\atcatcode\relax
749 \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 .

```

750 \@onlypreamble\LdfInit
751 \@onlypreamble\ldf@quit
752 \@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.

```

753 \def\main@language#1{%
754 \def\bbl@main@language{#1}%
755 \let\languagename\bbl@main@language
756 \bbl@id@assign
757 \chardef\localeid\@nameuse{\bbl@id@\languagename}%
758 \bbl@patterns{\languagename}}

```

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

```

759 \def\bbl@beforestart{%
760 \bbl@usehooks{beforestart}{}%
761 \global\let\bbl@beforestart\relax}
762 \AtBeginDocument{%
763 \@nameuse{\bbl@beforestart}%

```

```

764 \if@filesw
765   \immediate\write\@mainaux{\string\@nameuse{bbl@beforestart}}%
766 \fi
767 \expandafter\selectlanguage\expandafter{\bbl@main@language}%
768 \ifbbl@single % must go after the line above
769   \renewcommand\selectlanguage[1]{}%
770   \renewcommand\foreignlanguage[2]{#2}%
771   \global\let\babel@aux\@gobbletwo % Also as flag
772 \fi
773 \ifcase\bbl@engine\or\pagedir\bodydir\fi} % TODO - a better place

```

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

```

774 \def\select@language@x#1{%
775   \ifcase\bbl@select@type
776     \bbl@ifsamestring\languagename{#1}{\select@language{#1}}%
777   \else
778     \select@language{#1}%
779   \fi}

```

9.4 Shorthands

`\bbl@add@special` The macro `\bbl@add@special` is used to add a new character (or single character control sequence) to the macro `\dospecials` (and `\@sanitize` if \LaTeX is used). It is used only at one place, namely when `\initiate@active@char` is called (which is ignored if the char has been made active before). Because `\@sanitize` can be undefined, we put the definition inside a conditional.

Items are added to the lists without checking its existence or the original catcode. It does not hurt, but should be fixed. It's already done with `\nfss@catcodes`, added in 3.10.

```

780 \bbl@trace{Shorhands}
781 \def\bbl@add@special#1{% 1:a macro like "\, \?, etc.
782   \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
783   \bbl@ifunset{@sanitize}{\bbl@add\@sanitize{\@makeother#1}}%
784   \ifx\nfss@catcodes\@undefined\else % TODO - same for above
785     \begingroup
786       \catcode`#1\active
787       \nfss@catcodes
788       \ifnum\catcode`#1=\active
789         \endgroup
790       \bbl@add\nfss@catcodes{\@makeother#1}%
791     \else
792       \endgroup
793   \fi
794 \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.

```

795 \def\bbl@remove@special#1{%
796   \begingroup
797     \def\x##1##2{\ifnum`#1=`##2\noexpand\@empty
798       \else\noexpand##1\noexpand##2\fi}%
799     \def\do{\x\do}%
800     \def\@makeother{\x\@makeother}%
801   \edef\x{\endgroup
802     \def\noexpand\dospecials{\dospecials}%
803     \expandafter\ifx\cname @sanitize\endcname\relax\else
804       \def\noexpand\@sanitize{\@sanitize}%
805     \fi}%

```

806 \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).

```
807 \def\bbl@active@def#1#2#3#4{%
808   \@namedef{#3#1}{%
809     \expandafter\ifx\csname#2@sh@#1@endcsname\relax
810       \bbl@afterelse\bbl@sh@select#2#1{#3@arg#1}{#4#1}%
811     \else
812       \bbl@afterfi\csname#2@sh@#1@endcsname
813     \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.

```
814 \long\@namedef{#3@arg#1}##1{%
815   \expandafter\ifx\csname#2@sh@#1@string##1@endcsname\relax
816     \bbl@afterelse\csname#4#1@endcsname##1%
817   \else
818     \bbl@afterfi\csname#2@sh@#1@string##1@endcsname
819   \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.

```
820 \def\initiate@active@char#1{%
821   \bbl@ifunset{active@char\string#1}%
822   {\bbl@withactive
823     {\expandafter\@initiate@active@char\expandafter}#1\string#1#1}%
824   {}}
```

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`).

```
825 \def\@initiate@active@char#1#2#3{%
826   \bbl@csarg\edef{oricat@#2}{\catcode`#2=\the\catcode`#2\relax}%
827   \ifx#1\undefined
828     \bbl@csarg\edef{oridef@#2}{\let\noexpand#1\noexpand\undefined}%
829   \else
```

```

830 \bbl@csarg\let{oridef@@#2}#1%
831 \bbl@csarg\edef{oridef@#2}{%
832 \let\noexpand#1%
833 \expandafter\noexpand\csname bbl@oridef@@#2\endcsname}%
834 \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*").

```

835 \ifx#1#3\relax
836 \expandafter\let\csname normal@char#2\endcsname#3%
837 \else
838 \bbl@info{Making #2 an active character}%
839 \ifnum\mathcode`#2=\ifodd\bbl@engine"1000000 \else"8000 \fi
840 \@namedef{normal@char#2}{%
841 \textormath{#3}{\csname bbl@oridef@@#2\endcsname}}%
842 \else
843 \@namedef{normal@char#2}{#3}%
844 \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).

```

845 \bbl@restoreactive{#2}%
846 \AtBeginDocument{%
847 \catcode`#2\active
848 \if@filesw
849 \immediate\write\@mainaux{\catcode`\string#2\active}%
850 \fi}%
851 \expandafter\bbl@add@special\csname#2\endcsname
852 \catcode`#2\active
853 \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⟩`).

```

854 \let\bbl@tempa\@firstoftwo
855 \if\string^#2%
856 \def\bbl@tempa{\noexpand\textormath}%
857 \else
858 \ifx\bbl@mathnormal\@undefined\else
859 \let\bbl@tempa\bbl@mathnormal
860 \fi
861 \fi
862 \expandafter\edef\csname active@char#2\endcsname{%
863 \bbl@tempa
864 {\noexpand\if@safe@actives
865 \noexpand\expandafter
866 \expandafter\noexpand\csname normal@char#2\endcsname

```

```

867     \noexpand\else
868     \noexpand\expandafter
869     \expandafter\noexpand\csname bbl@doactive#2\endcsname
870     \noexpand\fi}%
871     {\expandafter\noexpand\csname normal@char#2\endcsname}}%
872 \bbl@csarg\edef{doactive#2}{%
873 \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

$$\backslash\text{active@prefix}\langle\text{char}\rangle\backslash\text{normal@char}\langle\text{char}\rangle$$

(where $\backslash\text{active@char}\langle\text{char}\rangle$ is *one* control sequence!).

```

874 \bbl@csarg\edef{active@#2}{%
875 \noexpand\active@prefix\noexpand#1%
876 \expandafter\noexpand\csname active@char#2\endcsname}%
877 \bbl@csarg\edef{normal@#2}{%
878 \noexpand\active@prefix\noexpand#1%
879 \expandafter\noexpand\csname normal@char#2\endcsname}%
880 \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.

```

881 \bbl@active@def#2\user@group{user@active}{language@active}%
882 \bbl@active@def#2\language@group{language@active}{system@active}%
883 \bbl@active@def#2\system@group{system@active}{normal@char}%

```

In order to do the right thing when a shorthand with an argument is used by itself at the end of the line we provide a definition for the case of an empty argument. For that case we let the shorthand character expand to its non-active self. Also, When a shorthand combination such as ' ' ends up in a heading T_EX would see $\backslash\text{protect}'\backslash\text{protect}'$. To prevent this from happening a couple of shorthand needs to be defined at user level.

```

884 \expandafter\edef\csname\user@group @sh#2@@\endcsname
885 {\expandafter\noexpand\csname normal@char#2\endcsname}%
886 \expandafter\edef\csname\user@group @sh#2@\string\protect@\endcsname
887 {\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 $\backslash\text{pr@m@s}$ 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.

```

888 \if\string'#2%
889 \let\prim@s\bbl@prim@s
890 \let\active@math@prime#1%
891 \fi
892 \bbl@usehooks{initiateactive}{{#1}{#2}{#3}}

```

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

```

893 <<(*More package options)>> ≡
894 \DeclareOption{math=active}{}
895 \DeclareOption{math=normal}{{\def\bbl@mathnormal{\noexpand\textormath}}}
896 <</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.

```

897 \@ifpackagewith{babel}{KeepShorthandsActive}%
898   {\let\bbl@restoreactive\@gobble}%
899   {\def\bbl@restoreactive#1{%
900     \bbl@exp{%
901       \\AfterBabelLanguage\\CurrentOption
902       {\catcode`#1=\the\catcode`#1\relax}%
903       \\AtEndOfPackage
904       {\catcode`#1=\the\catcode`#1\relax}}}%
905   \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.

```

906 \def\bbl@sh@select#1#2{%
907   \expandafter\ifx\csname#1@sh@#2@sel\endcsname\relax
908     \bbl@afterelse\bbl@scndcs
909   \else
910     \bbl@afterfi\csname#1@sh@#2@sel\endcsname
911   \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.

```

912 \begingroup
913 \bbl@ifunset{ifincsname}%
914 {\gdef\active@prefix#1{%
915   \ifx\protect\@typeset@protect
916     \else
917       \ifx\protect\@unexpandable@protect
918         \noexpand#1%
919       \else
920         \protect#1%
921       \fi
922       \expandafter\@gobble
923     \fi}}
924 {\gdef\active@prefix#1{%
925   \ifincsname
926     \string#1%
927     \expandafter\@gobble
928   \else
929     \ifx\protect\@typeset@protect
930     \else
931       \ifx\protect\@unexpandable@protect
932         \noexpand#1%
933       \else
934         \protect#1%
935       \fi
936       \expandafter\expandafter\expandafter\@gobble
937     \fi
938   \fi}}
939 \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⟩`.

```
940 \newif\if@safe@actives
941 \@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.

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

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

```
943 \def\bbl@activate#1{%
944   \bbl@withactive{\expandafter\let\expandafter}#1%
945   \csname bbl@active@\string#1\endcsname}
946 \def\bbl@deactivate#1{%
947   \bbl@withactive{\expandafter\let\expandafter}#1%
948   \csname bbl@normal@\string#1\endcsname}
```

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

```
949 \def\bbl@firstcs#1#2{\csname#1\endcsname}
950 \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.

```
951 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
952 \def\@decl@short#1#2#3\@nil#4{%
953   \def\bbl@tempa{#3}%
954   \ifx\bbl@tempa\@empty
955     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
956     \bbl@ifunset{#1@sh@\string#2@}{}%
957     {\def\bbl@tempa{#4}%
958       \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbl@tempa
959       \else
960         \bbl@info
961           {Redefining #1 shorthand \string#2\%
962            in language \CurrentOption}%
963       \fi}%
964     \@namedef{#1@sh@\string#2@}{#4}%
965   \else
966     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@firstcs
967     \bbl@ifunset{#1@sh@\string#2@\string#3@}{}%
968     {\def\bbl@tempa{#4}%
969       \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bbl@tempa
970       \else
971         \bbl@info
972           {Redefining #1 shorthand \string#2\string#3\%
973            in language \CurrentOption}%
```

```

974     \fi}%
975     \@namedef{#1@sh@\string#2@\string#3@}{#4}%
976     \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.

```

977 \def\textormath{%
978   \ifmmode
979     \expandafter\@secondoftwo
980   \else
981     \expandafter\@firstoftwo
982   \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’.

`\language@group`
`\system@group`

```

983 \def\user@group{user}
984 \def\language@group{english}
985 \def\system@group{system}

```

`\usesshorthands` This is the user level command to tell \LaTeX that user level shorthands will be used in the document. It takes one argument, the character that starts a shorthand. First note that this is user level, and then initialize and activate the character for use as a shorthand character (ie, it’s active in the preamble). Languages can deactivate shorthands, so a starred version is also provided which activates them always after the language has been switched.

```

986 \def\usesshorthands{%
987   \@ifstar\bb1@usesh@s{\bb1@usesh@x{}}
988   \def\bb1@usesh@s#1{%
989     \bb1@usesh@x
990     {\AddBabelHook{babel-sh-\string#1}{afterextras}{\bb1@activate{#1}}}%
991     {#1}}
992   \def\bb1@usesh@x#1#2{%
993     \bb1@ifshorthand{#2}%
994     {\def\user@group{user}%
995       \initiate@active@char{#2}%
996       #1%
997       \bb1@activate{#2}}%
998     {\bb1@error
999       {Cannot declare a shorthand turned off (\string#2)}
1000      {Sorry, but you cannot use shorthands which have been\\%
1001       turned off in the package options}}}

```

`\defineshorthand` Currently we only support two groups of user level shorthands, named internally user and user@<lang> (language-dependent user shorthands). By default, only the first one is taken into account, but if the former is also used (in the optional argument of `\defineshorthand`) a new level is inserted for it (user@generic, done by `\bb1@set@user@generic`); we make also sure `{}` and `\protect` are taken into account in this new top level.

```

1002 \def\user@language@group{user@\language@group}
1003 \def\bb1@set@user@generic#1#2{%
1004   \bb1@ifunset{user@generic@active#1}%
1005   {\bb1@active@def#1\user@language@group{user@active}{user@generic@active}%
1006     \bb1@active@def#1\user@group{user@generic@active}{\language@active}%
1007     \expandafter\edef\csname#2@sh#1@\endcsname{%
1008       \expandafter\noexpand\csname normal@char#1\endcsname}%
1009     \expandafter\edef\csname#2@sh#1@\string\protect@\endcsname{%
1010       \expandafter\noexpand\csname user@active#1\endcsname}}%

```



```

1011 \@empty}
1012 \newcommand\defineshorthand[3][user]{%
1013 \edef\bbl@tempa{\zap@space#1 \@empty}%
1014 \bbl@for\bbl@tempb\bbl@tempa{%
1015 \if*\expandafter\@car\bbl@tempb\@nil
1016 \edef\bbl@tempb{user\expandafter@gobble\bbl@tempb}%
1017 \@expandtwoargs
1018 \bbl@set@user@generic{\expandafter\string\@car#2\@nil}\bbl@tempb
1019 \fi
1020 \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.

```

1021 \def\languageshorthands#1{\def\language@group{#1}}

```

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

```

1022 \def\aliasshorthand#1#2{%
1023 \bbl@ifshorthand{#2}%
1024 {\expandafter\ifx\csname active@char\string#2\endcsname\relax
1025 \ifx\document\@notprerr
1026 \@notshorthand{#2}%
1027 \else
1028 \initiate@active@char{#2}%

```

Then, we define the new shorthand in terms of the original one, but note with `\aliasshorthands{"}{/}` is `\active@prefix /\active@char/`, so we still need to let the latest to `\active@char`.

```

1029 \expandafter\let\csname active@char\string#2\expandafter\endcsname
1030 \csname active@char\string#1\endcsname
1031 \expandafter\let\csname normal@char\string#2\expandafter\endcsname
1032 \csname normal@char\string#1\endcsname
1033 \bbl@activate{#2}%
1034 \fi
1035 \fi}%
1036 {\bbl@error
1037 {Cannot declare a shorthand turned off (\string#2)}
1038 {Sorry, but you cannot use shorthands which have been\\%
1039 turned off in the package options}}

```

`\@notshorthand`

```

1040 \def\@notshorthand#1{%
1041 \bbl@error{%
1042 The character '\string #1' should be made a shorthand character;\\%
1043 add the command \string\usesshorthands\string{#1\string} to
1044 the preamble.\\%
1045 I will ignore your instruction}%
1046 {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.

```

1047 \newcommand*\shorthandon[1]{\bbl@switch@sh\@ne#1\@nnil}
1048 \DeclareRobustCommand*\shorthandoff{%
1049 \@ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
1050 \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.

```

1051 \def\bbl@switch@sh#1#2{%
1052   \ifx#2\@nnil\else
1053     \bbl@ifunset{bbl@active@\string#2}%
1054     {\bbl@error
1055      {I cannot switch '\string#2' on or off--not a shorthand}%
1056      {This character is not a shorthand. Maybe you made\\%
1057       a typing mistake? I will ignore your instruction}}%
1058     {\ifcase#1%
1059      \catcode`#2\relax
1060      \or
1061      \catcode`#2\active
1062      \or
1063      \csname bbl@oricat@\string#2\endcsname
1064      \csname bbl@oridef@\string#2\endcsname
1065      \fi}%
1066     \bbl@afterfi\bbl@switch@sh#1%
1067   \fi}

```

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

```

1068 \def\babelshorthand{\active@prefix\babelshorthand\bbl@putsh}
1069 \def\bbl@putsh#1{%
1070   \bbl@ifunset{bbl@active@\string#1}%
1071   {\bbl@putsh@i#1\@empty\@nnil}%
1072   {\csname bbl@active@\string#1\endcsname}}
1073 \def\bbl@putsh@i#1#2\@nnil{%
1074   \csname\languagenam @sh@\string#1@%
1075   \ifx\@empty#2\else\string#2\fi\endcsname}
1076 \ifx\bbl@opt@shorthands\@nnil\else
1077   \let\bbl@s@initiate@active@char\initiate@active@char
1078   \def\initiate@active@char#1{%
1079     \bbl@ifshorthand{#1}{\bbl@s@initiate@active@char{#1}}{}}
1080   \let\bbl@s@switch@sh\bbl@switch@sh
1081   \def\bbl@switch@sh#1#2{%
1082     \ifx#2\@nnil\else
1083       \bbl@afterfi
1084       \bbl@ifshorthand{#2}{\bbl@s@switch@sh#1{#2}}{\bbl@switch@sh#1}%
1085     \fi}
1086   \let\bbl@s@activate\bbl@activate
1087   \def\bbl@activate#1{%
1088     \bbl@ifshorthand{#1}{\bbl@s@activate{#1}}{}}
1089   \let\bbl@s@deactivate\bbl@deactivate
1090   \def\bbl@deactivate#1{%
1091     \bbl@ifshorthand{#1}{\bbl@s@deactivate{#1}}{}}
1092 \fi

```

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

```

1093 \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.

```

1094 \def\bbl@prim@s{%
1095   \prime\futurelet\@let@token\bbl@pr@m@s}
1096 \def\bbl@if@primes#1#2{%
1097   \ifx#1\@let@token
1098     \expandafter\@firstoftwo
1099   \else\ifx#2\@let@token
1100     \bbl@afterelse\expandafter\@firstoftwo
1101   \else
1102     \bbl@afterfi\expandafter\@secondoftwo
1103   \fi\fi}
1104 \begingroup
1105 \catcode`\^=7 \catcode`\*=\active \lccode`\*='^^
1106 \catcode`\'=12 \catcode`\"=\active \lccode`\"='\'
1107 \lowercase{%
1108   \gdef\bbl@pr@m@s{%
1109     \bbl@if@primes" "%
1110     \pr@@@s
1111     {\bbl@if@primes*\pr@@@t\egroup}}
1112 \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).

```

1113 \initiate@active@char{~}
1114 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }
1115 \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.

```

1116 \expandafter\def\csname OT1dqpos\endcsname{127}
1117 \expandafter\def\csname T1dqpos\endcsname{4}

```

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

```

1118 \ifx\f@encoding\@undefined
1119   \def\f@encoding{OT1}
1120 \fi

```

9.5 Language attributes

Language attributes provide a means to give the user control over which features of the
language definition files he wants to enable.

`\languageattribute` The macro `\languageattribute` checks whether its arguments are valid and then
activates the selected language attribute. First check whether the language is known, and
then process each attribute in the list.

```

1121 \bbl@trace{Language attributes}
1122 \newcommand\languageattribute[2]{%

```

```

1123 \def\bbl@tempc{#1}%
1124 \bbl@fixname\bbl@tempc
1125 \bbl@iflanguage\bbl@tempc{%
1126   \bbl@vforeach{#2}{%

```

We want to make sure that each attribute is selected only once; therefore we store the already selected attributes in `\bbl@known@attribs`. When that control sequence is not yet defined this attribute is certainly not selected before.

```

1127   \ifx\bbl@known@attribs\@undefined
1128     \in@false
1129   \else

```

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

```

1130     \bbl@xin@{,\bbl@tempc-##1,}{,\bbl@known@attribs,}%
1131   \fi

```

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

```

1132   \ifin@
1133     \bbl@warning{%
1134       You have more than once selected the attribute '##1'\%
1135       for language #1. Reported}%
1136   \else

```

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

```

1137     \bbl@exp{%
1138       \\bbl@add@list\\bbl@known@attribs{\bbl@tempc-##1}}%
1139     \edef\bbl@tempa{\bbl@tempc-##1}%
1140     \expandafter\bbl@ifknown@trib\expandafter{\bbl@tempa}\bbl@attributes%
1141     {\csname\bbl@tempc @attr##1\endcsname}%
1142     {\@attrerr{\bbl@tempc}{##1}}%
1143   \fi}}

```

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

```

1144 \@onlypreamble\languageattribute

```

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

```

1145 \newcommand*{\@attrerr}[2]{%
1146   \bbl@error
1147   {The attribute #2 is unknown for language #1.}%
1148   {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}`.

```

1149 \def\bbl@declare@ttribute#1#2#3{%
1150   \bbl@xin@{,#2,}{,\BabelModifiers,}%
1151   \ifin@
1152     \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
1153   \fi
1154   \bbl@add@list\bbl@attributes{#1-#2}%
1155   \expandafter\def\csname#1@attr@#2\endcsname{#3}}

```

`\bbl@ifattributeset` This internal macro has 4 arguments. It can be used to interpret T_EX 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.

```
1156 \def\bbl@ifattributeset#1#2#3#4{%
```

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

```
1157 \ifx\bbl@known@attrs\@undefined
```

```
1158 \in@false
```

```
1159 \else
```

The we need to check the list of known attributes.

```
1160 \bbl@xin@{,#1-#2,}{,\bbl@known@attrs,}%
```

```
1161 \fi
```

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

```
1162 \ifin@
```

```
1163 \bbl@afterelse#3%
```

```
1164 \else
```

```
1165 \bbl@afterfi#4%
```

```
1166 \fi
```

```
1167 }
```

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

```
1168 \def\bbl@ifknown@ttrib#1#2{%
```

We first assume the attribute is unknown.

```
1169 \let\bbl@tempa\@secondoftwo
```

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

```
1170 \bbl@loopx\bbl@tempb{#2}{%
```

```
1171 \expandafter\in\expandafter{\expandafter,\bbl@tempb,}{,#1,}%
```

```
1172 \ifin@
```

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

```
1173 \let\bbl@tempa\@firstoftwo
```

```
1174 \else
```

```
1175 \fi}%
```

Finally we execute `\bbl@tempa`.

```
1176 \bbl@tempa
```

```
1177 }
```

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

```
1178 \def\bbl@clear@ttribs{%
```

```
1179 \ifx\bbl@attributes\@undefined\else
```

```
1180 \bbl@loopx\bbl@tempa{\bbl@attributes}{%
```

```
1181 \expandafter\bbl@clear@ttrib\bbl@tempa.
```

```
1182 }%
```

```
1183 \let\bbl@attributes\@undefined
```

```
1184 \fi}
```

```
1185 \def\bbl@clear@ttrib#1-#2.{%
```

```
1186 \expandafter\let\csname#1@attr@#2\endcsname\@undefined}
```

```
1187 \AtBeginDocument{\bbl@clear@ttribs}
```

9.6 Support for saving macro definitions

To save the meaning of control sequences using `\babel@save`, we use temporary control sequences. To save hash table entries for these control sequences, we don't use the name of the control sequence to be saved to construct the temporary name. Instead we simply use the value of a counter, which is reset to zero each time we begin to save new values. This works well because we release the saved meanings before we begin to save a new set of control sequence meanings (see `\selectlanguage` and `\originalTeX`). Note undefined macros are not undefined any more when saved – they are `\relax`'ed.

`\babel@savecnt` The initialization of a new save cycle: reset the counter to zero.
`\babel@beginsave` 1188 `\bbl@trace{Macros for saving definitions}`
1189 `\def\babel@beginsave{\babel@savecnt\z@}`

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

```
1190 \newcount\babel@savecnt
1191 \babel@beginsave
```

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

```
1192 \def\babel@save#1{%
1193   \expandafter\let\csname babel@\number\babel@savecnt\endcsname#1\relax
1194   \toks@\expandafter{\originalTeX\let#1=}%
1195   \bbl@exp{%
1196     \def\originalTeX{\the\toks@<\babel@\number\babel@savecnt>\relax}}%
1197   \advance\babel@savecnt@ne}
```

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

```
1198 \def\babel@savevariable#1{%
1199   \toks@\expandafter{\originalTeX #1}%
1200   \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.

```
1201 \def\bbl@frenchspacing{%
1202   \ifnum\the\sffcode`.=\@m
1203     \let\bbl@nonfrenchspacing\relax
1204   \else
1205     \frenchspacing
1206     \let\bbl@nonfrenchspacing\nonfrenchspacing
1207   \fi}
1208 \let\bbl@nonfrenchspacing\nonfrenchspacing
```

9.7 Short tags

`\babeltags` This macro is straightforward. After zapping spaces, we loop over the list and define the macros `\text⟨tag⟩` and `\⟨tag⟩`. Definitions are first expanded so that they don't contain `\csname` but the actual macro.

```
1209 \bbl@trace{Short tags}
1210 \def\babeltags#1{%
```

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

```

1211 \edef\bbl@tempa{\zap@space#1 \@empty}%
1212 \def\bbl@tempb##1=##2\@@{%
1213   \edef\bbl@tempc{%
1214     \noexpand\newcommand
1215     \expandafter\noexpand\csname ##1\endcsname{%
1216       \noexpand\protect
1217       \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
1218     \noexpand\newcommand
1219     \expandafter\noexpand\csname text##1\endcsname{%
1220       \noexpand\foreignlanguage{##2}}
1221     \bbl@tempc}%
1222 \bbl@for\bbl@tempa\bbl@tempa{%
1223   \expandafter\bbl@tempb\bbl@tempa\@@}}

```

9.8 Hyphens

`\babelhyphenation` This macro saves hyphenation exceptions. Two macros are used to store them: `\bbl@hyphenation@` for the global ones and `\bbl@hyphenation<lang>` for language ones. See `\bbl@patterns` above for further details. We make sure there is a space between words when multiple commands are used.

```

1224 \bbl@trace{Hyphens}
1225 \@onlypreamble\babelhyphenation
1226 \AtEndOfPackage{%
1227   \newcommand\babelhyphenation[2][\@empty]{%
1228     \ifx\bbl@hyphenation@relax
1229       \let\bbl@hyphenation@\@empty
1230     \fi
1231     \ifx\bbl@hyphlist\@empty\else
1232       \bbl@warning{%
1233         You must not intermingle \string\selectlanguage\space and\%
1234         \string\babelhyphenation\space or some exceptions will not\%
1235         be taken into account. Reported}%
1236     \fi
1237     \ifx\@empty#1%
1238       \protected@edef\bbl@hyphenation@\bbl@hyphenation@\space#2}%
1239     \else
1240       \bbl@vforeach{#1}{%
1241         \def\bbl@tempa{##1}%
1242         \bbl@fixname\bbl@tempa
1243         \bbl@iflanguage\bbl@tempa{%
1244           \bbl@csarg\protected@edef{hyphenation@\bbl@tempa}{%
1245             \bbl@ifunset{bbl@hyphenation@\bbl@tempa}%
1246             \@empty
1247             {\csname bbl@hyphenation@\bbl@tempa\endcsname\space}%
1248             #2}}}%
1249     \fi}}

```

`\bbl@allowhyphens` This macro makes hyphenation possible. Basically its definition is nothing more than `\nobreak \hskip Opt plus Opt`³³.

```

1250 \def\bbl@allowhyphens{\ifvmode\else\nobreak\hskip\zskip\fi}
1251 \def\bbl@t@one{T1}
1252 \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.

³³ \TeX begins and ends a word for hyphenation at a glue node. The penalty prevents a linebreak at this glue node.

```

1253 \newcommand\babelnullhyphen{\char\hyphenchar\font}
1254 \def\babelhyphen{\active@prefix\babelhyphen\babel@hyphen}
1255 \def\babel@hyphen{%
1256   \ifstar{\babel@hyphen@i @}{\babel@hyphen@i \empty}}
1257 \def\babel@hyphen@i#1#2{%
1258   \babel@ifunset{\babel@hy@#1#2\empty}%
1259   {\csname babel@#1usehyphen\endcsname{\discretionary{#2}{#2}}}%
1260   {\csname babel@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.

```

1261 \def\babel@usehyphen#1{%
1262   \leavevmode
1263   \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
1264   \nobreak\hskip\z@skip}
1265 \def\babel@@usehyphen#1{%
1266   \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}

```

The following macro inserts the hyphen char.

```

1267 \def\babel@hyphenchar{%
1268   \ifnum\hyphenchar\font=\m@ne
1269     \babelnullhyphen
1270   \else
1271     \char\hyphenchar\font
1272   \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 \babel@hy@nobreak is redundant.

```

1273 \def\babel@hy@soft{\babel@usehyphen{\discretionary{\babel@hyphenchar}{}}{}}
1274 \def\babel@hy@soft{\babel@usehyphen{\discretionary{\babel@hyphenchar}{}}{}}
1275 \def\babel@hy@hard{\babel@usehyphen\babel@hyphenchar}
1276 \def\babel@hy@@hard{\babel@usehyphen\babel@hyphenchar}
1277 \def\babel@hy@nobreak{\babel@usehyphen{\mbox{\babel@hyphenchar}}}
1278 \def\babel@hy@@nobreak{\mbox{\babel@hyphenchar}}
1279 \def\babel@hy@repeat{%
1280   \babel@usehyphen{%
1281     \discretionary{\babel@hyphenchar}{\babel@hyphenchar}{\babel@hyphenchar}}}
1282 \def\babel@hy@@repeat{%
1283   \babel@usehyphen{%
1284     \discretionary{\babel@hyphenchar}{\babel@hyphenchar}{\babel@hyphenchar}}}
1285 \def\babel@hy@empty{\hskip\z@skip}
1286 \def\babel@hy@@empty{\discretionary{}{}{}}

```

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

```

1287 \def\babel@disc#1#2{\nobreak\discretionary{#2-}{#1}\babel@allowhyphens}

```

9.9 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.

```

1288 \bbl@trace{Multiencoding strings}
1289 \def\bbl@tglobal#1{\global\let#1#1}
1290 \def\bbl@recatcode#1{%
1291   \@tempcnta="7F
1292   \def\bbl@tempa{%
1293     \ifnum\@tempcnta>"FF\else
1294       \catcode\@tempcnta=#1\relax
1295       \advance\@tempcnta\@ne
1296       \expandafter\bbl@tempa
1297     \fi}%
1298   \bbl@tempa}

```

The second one. We need to patch `\@uclclist`, but it is done once and only if `\SetCase` is used or if strings are encoded. The code is far from satisfactory for several reasons, including the fact `\@uclclist` is not a list any more. Therefore a package option is added to ignore it. Instead of gobbling the macro getting the next two elements (usually `\reserved@a`), we pass it as argument to `\bbl@uclc`. The parser is restarted inside `\<lang>\bbl@uclc` because we do not know how many expansions are necessary (depends on whether strings are encoded). The last part is tricky – when uppercasing, we have:

```
\let\bbl@tolower\@empty\bbl@toupper\@empty
```

and starts over (and similarly when lowercasing).

```

1299 \@ifpackagewith{babel}{nocase}%
1300   {\let\bbl@patchuclc\relax}%
1301   {\def\bbl@patchuclc{%
1302     \global\let\bbl@patchuclc\relax
1303     \g@addto@macro\@uclclist{\reserved@b{\reserved@b\bbl@uclc}}%
1304     \gdef\bbl@uclc##1{%
1305       \let\bbl@encoded\bbl@encoded@uclc
1306       \bbl@ifunset{\languagename @bbl@uclc}% and resumes it
1307       {##1}%
1308       {\let\bbl@tempa##1\relax % Used by LANG@bbl@uclc
1309         \csname\languagename @bbl@uclc\endcsname}%
1310       {\bbl@tolower\@empty}{\bbl@toupper\@empty}}}%
1311     \gdef\bbl@tolower{\csname\languagename @bbl@lc\endcsname}%
1312     \gdef\bbl@toupper{\csname\languagename @bbl@uc\endcsname}}%
1313 <<(*More package options)>> ≡
1314 \DeclareOption{nocase}{}
1315 <</More package options>>

```

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

```

1316 <<(*More package options)>> ≡
1317 \let\bbl@opt@strings\@nnil % accept strings=value
1318 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
1319 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
1320 \def\BabelStringsDefault{generic}
1321 <</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.

```
1322 \@onlypreamble\StartBabelCommands
```

```

1323 \def\StartBabelCommands{%
1324 \begingroup
1325 \bbl@recatcode{11}%
1326 <<Macros local to BabelCommands>>
1327 \def\bbl@provstring##1##2{%
1328 \providecommand##1{##2}%
1329 \bbl@toglobal##1}%
1330 \global\let\bbl@scafter\@empty
1331 \let\StartBabelCommands\bbl@startcmds
1332 \ifx\BabelLanguages\relax
1333 \let\BabelLanguages\CurrentOption
1334 \fi
1335 \begingroup
1336 \let\bbl@screset\@nnil % local flag - disable 1st stopcommands
1337 \StartBabelCommands}
1338 \def\bbl@startcmds{%
1339 \ifx\bbl@screset\@nnil\else
1340 \bbl@usehooks{stopcommands}{}%
1341 \fi
1342 \endgroup
1343 \begingroup
1344 \@ifstar
1345 {\ifx\bbl@opt@strings\@nnil
1346 \let\bbl@opt@strings\BabelStringsDefault
1347 \fi
1348 \bbl@startcmds@i}%
1349 \bbl@startcmds@i}
1350 \def\bbl@startcmds@i#1#2{%
1351 \edef\bbl@L{\zap@space#1 \@empty}%
1352 \edef\bbl@G{\zap@space#2 \@empty}%
1353 \bbl@startcmds@ii}

```

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.

```

1354 \newcommand\bbl@startcmds@ii[1][\@empty]{%
1355 \let\SetString@gobbletwo
1356 \let\bbl@stringdef@gobbletwo
1357 \let\AfterBabelCommands@gobble
1358 \ifx\@empty#1%
1359 \def\bbl@sc@label{generic}%
1360 \def\bbl@encstring##1##2{%
1361 \ProvideTextCommandDefault##1{##2}%
1362 \bbl@toglobal##1%
1363 \expandafter\bbl@toglobal\csname\string?\string##1\endcsname}%
1364 \let\bbl@sctest\in@true
1365 \else
1366 \let\bbl@sc@charset\space % <- zapped below
1367 \let\bbl@sc@fontenc\space % <- " "
1368 \def\bbl@tempa##1=##2\@nil{%
1369 \bbl@csarg\edef{sc@\zap@space##1 \@empty}{##2 }}%

```

```

1370 \bbl@vforeach{label=#1}{\bbl@tempa##1\@nil}%
1371 \def\bbl@tempa##1 ##2{% space -> comma
1372   ##1%
1373   \ifx\@empty##2\else\ifx,##1,\else,\fi\bbl@afterfi\bbl@tempa##2\fi}%
1374 \edef\bbl@sc@fontenc{\expandafter\bbl@tempa\bbl@sc@fontenc\@empty}%
1375 \edef\bbl@sc@label{\expandafter\zap@space\bbl@sc@label\@empty}%
1376 \edef\bbl@sc@charset{\expandafter\zap@space\bbl@sc@charset\@empty}%
1377 \def\bbl@encstring##1##2{%
1378   \bbl@foreach\bbl@sc@fontenc{%
1379     \bbl@ifunset{T#####1}%
1380     {}}%
1381     {\ProvideTextCommand##1{#####1}{##2}%
1382     \bbl@tglobal##1%
1383     \expandafter
1384     \bbl@tglobal\csname#####1\string##1\endcsname}}}%
1385 \def\bbl@sctest{%
1386   \bbl@xin@{\bbl@opt@strings,}{,\bbl@sc@label,\bbl@sc@fontenc,}}%
1387 \fi
1388 \ifx\bbl@opt@strings\@nil % ie, no strings key -> defaults
1389 \else\ifx\bbl@opt@strings\relax % ie, strings=encoded
1390   \let\AfterBabelCommands\bbl@aftercmds
1391   \let\SetString\bbl@setstring
1392   \let\bbl@stringdef\bbl@encstring
1393 \else % ie, strings=value
1394 \bbl@sctest
1395 \ifin@
1396   \let\AfterBabelCommands\bbl@aftercmds
1397   \let\SetString\bbl@setstring
1398   \let\bbl@stringdef\bbl@provstring
1399 \fi\fi\fi
1400 \bbl@scswitch
1401 \ifx\bbl@G\@empty
1402   \def\SetString##1##2{%
1403     \bbl@error{Missing group for string \string##1}%
1404     {You must assign strings to some category, typically\\%
1405     captions or extras, but you set none}}%
1406 \fi
1407 \ifx\@empty#1%
1408   \bbl@usehooks{defaultcommands}{}%
1409 \else
1410   \@expandtwoargs
1411   \bbl@usehooks{encodedcommands}{\bbl@sc@charset}{\bbl@sc@fontenc}}%
1412 \fi}

```

There are two versions of `\bbl@scswitch`. The first version is used when `ldfs` are read, and it makes sure `\langle group \rangle \langle language \rangle` is reset, but only once (`\bbl@screset` is used to keep track of this). The second version is used in the preamble and packages loaded after `babel` and does nothing. The macro `\bbl@forlang` loops `\bbl@L` but its body is executed only if the value is in `\BabelLanguages` (inside `babel`) or `\date \langle language \rangle` is defined (after `babel` has been loaded). There are also two version of `\bbl@forlang`. The first one skips the current iteration if the language is not in `\BabelLanguages` (used in `ldfs`), and the second one skips undefined languages (after `babel` has been loaded).

```

1413 \def\bbl@forlang#1##2{%
1414   \bbl@for#1\bbl@L{%
1415     \bbl@xin@{,#1,}{,\BabelLanguages,}%
1416     \ifin@#2\relax\fi}}
1417 \def\bbl@scswitch{%
1418   \bbl@forlang\bbl@tempa{%

```

```

1419 \ifx\bb1@G\@empty\else
1420 \ifx\SetString\@gobb1etwo\else
1421 \edef\bb1@GL{\bb1@G\bb1@tempa}%
1422 \bb1@xin@{\bb1@GL,}{,\bb1@screset,}%
1423 \ifin@\else
1424 \global\expandafter\let\csname\bb1@GL\endcsname\@undefined
1425 \xdef\bb1@screset{\bb1@screset,\bb1@GL}%
1426 \fi
1427 \fi
1428 \fi}}
1429 \AtEndOfPackage{%
1430 \def\bb1@forlang#1#2{\bb1@for#1\bb1@L{\bb1@ifunset{date#1}{#2}}}%
1431 \let\bb1@scswitch\relax}
1432 \@onlypreamble\EndBabelCommands
1433 \def\EndBabelCommands{%
1434 \bb1@usehooks{stopcommands}{}%
1435 \endgroup
1436 \endgroup
1437 \bb1@scafter}

```

Now we define commands to be used inside \StartBabelCommands.

Strings The following macro is the actual definition of \SetString when it is “active” First save the “switcher”. Create it if undefined. Strings are defined only if undefined (ie, like \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.

```

1438 \def\bb1@setstring#1#2{%
1439 \bb1@forlang\bb1@tempa{%
1440 \edef\bb1@LC{\bb1@tempa\bb1@stripslash#1}%
1441 \bb1@ifunset{\bb1@LC}% eg, \germanchaptername
1442 {\global\expandafter % TODO - con \bb1@exp ?
1443 \bb1@add\csname\bb1@G\bb1@tempa\expandafter\endcsname\expandafter
1444 {\expandafter\bb1@scset\expandafter#1\csname\bb1@LC\endcsname}}}%
1445 {}}%
1446 \def\BabelString{#2}%
1447 \bb1@usehooks{stringprocess}{}%
1448 \expandafter\bb1@stringdef
1449 \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.

```

1450 \ifx\bb1@opt@strings\relax
1451 \def\bb1@scset#1#2{\def#1{\bb1@encoded#2}}
1452 \bb1@patchuclc
1453 \let\bb1@encoded\relax
1454 \def\bb1@encoded@uclc#1{%
1455 \@inmathwarn#1%
1456 \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
1457 \expandafter\ifx\csname ?\string#1\endcsname\relax
1458 \TextSymbolUnavailable#1%
1459 \else
1460 \csname ?\string#1\endcsname
1461 \fi
1462 \else
1463 \csname\cf@encoding\string#1\endcsname

```

```

1464   \fi}
1465 \else
1466   \def\bbl@scset#1#2{\def#1{#2}}
1467 \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.

```

1468 <<(*Macros local to BabelCommands)>> ≡
1469 \def\SetStringLoop##1##2{%
1470   \def\bbl@templ####1{\expandafter\noexpand\csname##1\endcsname}%
1471   \count@\z@
1472   \bbl@loop\bbl@tempa{##2}{% empty items and spaces are ok
1473     \advance\count@\@ne
1474     \toks@\expandafter{\bbl@tempa}%
1475     \bbl@exp{%
1476       \\SetString\bbl@templ{\romannumeral\count@}{\the\toks@}%
1477       \count@=\the\count@\relax}}}%
1478 <</Macros local to BabelCommands>>

```

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

```

1479 \def\bbl@aftercmds#1{%
1480   \toks@\expandafter{\bbl@scafter#1}%
1481   \xdef\bbl@scafter{\the\toks@}}

```

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

```

1482 <<(*Macros local to BabelCommands)>> ≡
1483 \newcommand\SetCase[3][]{%
1484   \bbl@patchuclc
1485   \bbl@forlang\bbl@tempa{%
1486     \expandafter\bbl@encstring
1487     \csname\bbl@tempa @bbl@uclc\endcsname{\bbl@tempa##1}%
1488     \expandafter\bbl@encstring
1489     \csname\bbl@tempa @bbl@uc\endcsname{##2}%
1490     \expandafter\bbl@encstring
1491     \csname\bbl@tempa @bbl@lc\endcsname{##3}}}%
1492 <</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.

```

1493 <<(*Macros local to BabelCommands)>> ≡
1494 \newcommand\SetHyphenMap[1]{%
1495   \bbl@forlang\bbl@tempa{%
1496     \expandafter\bbl@stringdef
1497     \csname\bbl@tempa @bbl@hyphenmap\endcsname{##1}}}%
1498 <</Macros local to BabelCommands>>

```

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

```

1499 \newcommand\BabelLower[2]{% one to one.
1500   \ifnum\lccode#1=#2\else
1501     \babel@savevariable{\lccode#1}%
1502     \lccode#1=#2\relax
1503   \fi}

```

```

1504 \newcommand\BabelLowerMM[4]{% many-to-many
1505   \@tempcnta=#1\relax
1506   \@tempcntb=#4\relax
1507   \def\bbl@tempa{%
1508     \ifnum\@tempcnta>#2\else
1509       \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
1510       \advance\@tempcnta#3\relax
1511       \advance\@tempcntb#3\relax
1512       \expandafter\bbl@tempa
1513     \fi}%
1514   \bbl@tempa}
1515 \newcommand\BabelLowerM0[4]{% many-to-one
1516   \@tempcnta=#1\relax
1517   \def\bbl@tempa{%
1518     \ifnum\@tempcnta>#2\else
1519       \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
1520       \advance\@tempcnta#3
1521       \expandafter\bbl@tempa
1522     \fi}%
1523   \bbl@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

1524 <<(*More package options)>> ≡
1525 \DeclareOption{hyphenmap=off}{\chardef\bbl@opt@hyphenmap\z@}
1526 \DeclareOption{hyphenmap=first}{\chardef\bbl@opt@hyphenmap\@ne}
1527 \DeclareOption{hyphenmap=select}{\chardef\bbl@opt@hyphenmap\tw@}
1528 \DeclareOption{hyphenmap=other}{\chardef\bbl@opt@hyphenmap\thr@@}
1529 \DeclareOption{hyphenmap=other*}{\chardef\bbl@opt@hyphenmap4\relax}
1530 <</More package options>>

```

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

```

1531 \AtEndOfPackage{%
1532   \ifx\bbl@opt@hyphenmap\undefined
1533     \bbl@xin@{,}{\bbl@language@opts}%
1534     \chardef\bbl@opt@hyphenmap\ifin@4\else\@ne\fi
1535   \fi}

```

9.10 Macros common to a number of languages

`\set@low@box` The following macro is used to lower quotes to the same level as the comma. It prepares its argument in box register 0.

```

1536 \bbl@trace{Macros related to glyphs}
1537 \def\set@low@box#1{\setbox\tw@\hbox{,}\setbox\z@\hbox{#1}%
1538   \dimen\z@\ht\z@ \advance\dimen\z@ -\ht\tw@%
1539   \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.

```

1540 \def\save@sf@q#1{\leavevmode
1541   \begingroup
1542     \edef\SF{\spacefactor\the\spacefactor}#1\SF
1543   \endgroup}

```

9.11 Making glyphs available

This section makes a number of glyphs available that either do not exist in the OT1 encoding and have to be ‘faked’, or that are not accessible through T1enc.def.

9.11.1 Quotation marks

`\quotedblbase` In the T1 encoding the opening double quote at the baseline is available as a separate character, accessible via `\quotedblbase`. In the OT1 encoding it is not available, therefore we make it available by lowering the normal open quote character to the baseline.

```
1544 \ProvideTextCommand{\quotedblbase}{OT1}{%
1545   \save@sf@q{\set@low@box{\textquotedblright\}}%
1546   \box\z@\kern-.04em\bb1@allowhyphens}}
```

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

```
1547 \ProvideTextCommandDefault{\quotedblbase}{%
1548   \UseTextSymbol{OT1}{\quotedblbase}}
```

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

```
1549 \ProvideTextCommand{\quotesinglbase}{OT1}{%
1550   \save@sf@q{\set@low@box{\textquoteright\}}%
1551   \box\z@\kern-.04em\bb1@allowhyphens}}
```

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

```
1552 \ProvideTextCommandDefault{\quotesinglbase}{%
1553   \UseTextSymbol{OT1}{\quotesinglbase}}
```

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

```
\guillemotright 1554 \ProvideTextCommand{\guillemotleft}{OT1}{%
1555   \ifmmode
1556     \ll
1557   \else
1558     \save@sf@q{\nobreak
1559       \raise.2ex\hbox{\scriptscriptstyle\ll}\bb1@allowhyphens}%
1560   \fi}
1561 \ProvideTextCommand{\guillemotright}{OT1}{%
1562   \ifmmode
1563     \gg
1564   \else
1565     \save@sf@q{\nobreak
1566       \raise.2ex\hbox{\scriptscriptstyle\gg}\bb1@allowhyphens}%
1567   \fi}
```

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

```
1568 \ProvideTextCommandDefault{\guillemotleft}{%
1569   \UseTextSymbol{OT1}{\guillemotleft}}
1570 \ProvideTextCommandDefault{\guillemotright}{%
1571   \UseTextSymbol{OT1}{\guillemotright}}
```

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

```
\guilsinglright 1572 \ProvideTextCommand{\guilsinglleft}{OT1}{%
1573   \ifmmode
1574     <%
1575   \else
1576     \save@sf@q{\nobreak
1577       \raise.2ex\hbox{\scriptscriptstyle<}\bb1@allowhyphens}%
1578   \fi}
1579 \ProvideTextCommand{\guilsinglright}{OT1}{%
1580   \ifmmode
```

```

1581 >%
1582 \else
1583 \save@sf@q{\nobreak
1584 \raise.2ex\hbox{\scriptscriptstyle>}\bbl@allowhyphens}%
1585 \fi}

```

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

```

1586 \ProvideTextCommandDefault{\guilsinglleft}{%
1587 \UseTextSymbol{OT1}{\guilsinglleft}}
1588 \ProvideTextCommandDefault{\guilsinglright}{%
1589 \UseTextSymbol{OT1}{\guilsinglright}}

```

9.11.2 Letters

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

```

1590 \DeclareTextCommand{\ij}{OT1}{%
1591 i\kern-0.02em\bbl@allowhyphens j}
1592 \DeclareTextCommand{\IJ}{OT1}{%
1593 I\kern-0.02em\bbl@allowhyphens J}
1594 \DeclareTextCommand{\ij}{T1}{\char188}
1595 \DeclareTextCommand{\IJ}{T1}{\char156}

```

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

```

1596 \ProvideTextCommandDefault{\ij}{%
1597 \UseTextSymbol{OT1}{\ij}}
1598 \ProvideTextCommandDefault{\IJ}{%
1599 \UseTextSymbol{OT1}{\IJ}}

```

`\dj` The croatian language needs the letters `\dj` and `\DJ`; they are available in the T1 encoding, 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).

```

1600 \def\crrtic@{\hrule height0.1ex width0.3em}
1601 \def\crrtic@{\hrule height0.1ex width0.33em}
1602 \def\ddj@{%
1603 \setbox0\hbox{d}\dimen@=\ht0
1604 \advance\dimen@1ex
1605 \dimen@.45\dimen@
1606 \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
1607 \advance\dimen@ii.5ex
1608 \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
1609 \def\DDJ@{%
1610 \setbox0\hbox{D}\dimen@=.55\ht0
1611 \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
1612 \advance\dimen@ii.15ex % correction for the dash position
1613 \advance\dimen@ii-.15\fontdimen7\font % correction for cmtt font
1614 \dimen\thr@@\expandafter\rem@pt\the\fontdimen7\font\dimen@
1615 \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
1616 %
1617 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
1618 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}

```

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


```

1619 \ProvideTextCommandDefault{\dj}{%
1620   \UseTextSymbol{OT1}{\dj}}
1621 \ProvideTextCommandDefault{\DJ}{%
1622   \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.

```

1623 \DeclareTextCommand{\SS}{OT1}{SS}
1624 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}

```

9.11.3 Shorthands for quotation marks

Shorthands are provided for a number of different quotation marks, which make them usable both outside and inside mathmode. They are defined with \ProvideTextCommandDefault, but this is very likely not required because their definitions are based on encoding-dependent macros.

\glq The ‘german’ single quotes.

```

\grq 1625 \ProvideTextCommandDefault{\glq}{%
1626   \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}

```

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

```

1627 \ProvideTextCommand{\grq}{T1}{%
1628   \textormath{\kern\z@\textquoteleft}{\mbox{\textquoteleft}}}
1629 \ProvideTextCommand{\grq}{TU}{%
1630   \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
1631 \ProvideTextCommand{\grq}{OT1}{%
1632   \save@sf@q{\kern-.0125em
1633     \textormath{\textquoteleft}{\mbox{\textquoteleft}}%
1634     \kern.07em\relax}}
1635 \ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}

```

\glqq The ‘german’ double quotes.

```

\grqq 1636 \ProvideTextCommandDefault{\glqq}{%
1637   \textormath{\quotedblbase}{\mbox{\quotedblbase}}}

```

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

```

1638 \ProvideTextCommand{\grqq}{T1}{%
1639   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
1640 \ProvideTextCommand{\grqq}{TU}{%
1641   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
1642 \ProvideTextCommand{\grqq}{OT1}{%
1643   \save@sf@q{\kern-.07em
1644     \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}%
1645     \kern.07em\relax}}
1646 \ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}

```

\flq The ‘french’ single guillemets.

```

\frq 1647 \ProvideTextCommandDefault{\flq}{%
1648   \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}
1649 \ProvideTextCommandDefault{\frq}{%
1650   \textormath{\guilsinglright}{\mbox{\guilsinglright}}}

```

`\flqq` The ‘french’ double guillemets.
`\frqq`

```

1651 \ProvideTextCommandDefault{\flqq}{%
1652   \textormath{\guillemotleft}{\mbox{\guillemotleft}}}
1653 \ProvideTextCommandDefault{\frqq}{%
1654   \textormath{\guillemotright}{\mbox{\guillemotright}}}
```

9.11.4 Umlauts and tremas

The command `\` needs to have a different effect for different languages. For German for instance, the ‘umlaut’ should be positioned lower than the default position for placing it over the letters a, o, u, A, O and U. When placed over an e, i, E or I it can retain its normal position. For Dutch the same glyph is always placed in the lower position.

`\umlauthigh` To be able to provide both positions of `\` we provide two commands to switch the
`\umlautlow` positioning, the default will be `\umlauthigh` (the normal positioning).

```

1655 \def\uumlauthigh{%
1656   \def\bbl@umlauta##1{\leavevmode\bgrou%
1657     \expandafter\accent\csname\f@encoding dqpos\endcsname
1658     ##1\bbl@allowhyphens\egroup}%
1659   \let\bbl@umlaute\bbl@umlauta}
1660 \def\uumlautlow{%
1661   \def\bbl@umlauta{\protect\lower@umlaut}}
1662 \def\uumlautelownow{%
1663   \def\bbl@umlaute{\protect\lower@umlaut}}
1664 \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.

```

1665 \expandafter\ifx\csname U@D\endcsname\relax
1666   \csname newdimen\endcsname\U@D
1667 \fi
```

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

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

```

1668 \def\lower@umlaut#1{%
1669   \leavevmode\bgrou%
1670     \U@D 1ex%
1671     {\setbox\z@\hbox{%
1672       \expandafter\char\csname\f@encoding dqpos\endcsname}%
1673       \dimen@ -.45ex\advance\dimen@\ht\z@
1674       \ifdim 1ex<\dimen@ \fontdimen5\font\dimen@ \fi}%
1675     \expandafter\accent\csname\f@encoding dqpos\endcsname
1676     \fontdimen5\font\U@D #1%
1677   \egroup}
```

For all vowels we declare `\` to be a composite command which uses `\bbl@umlauta` or `\bbl@umlaute` to position the umlaut character. We need to be sure that these definitions override the ones that are provided when the package `fontenc` with option `OT1` is used.

Therefore these declarations are postponed until the beginning of the document. Note these definitions only apply to some languages, but babel sets them for *all* languages – you may want to redefine `\bbl@umlauta` and/or `\bbl@umlaute` for a language in the corresponding ldf (using the babel switching mechanism, of course).

```

1678 \AtBeginDocument{%
1679   \DeclareTextCompositeCommand{"}{OT1}{a}{\bbl@umlauta{a}}%
1680   \DeclareTextCompositeCommand{"}{OT1}{e}{\bbl@umlaute{e}}%
1681   \DeclareTextCompositeCommand{"}{OT1}{i}{\bbl@umlaute{i}}%
1682   \DeclareTextCompositeCommand{"}{OT1}{\i}{\bbl@umlaute{\i}}%
1683   \DeclareTextCompositeCommand{"}{OT1}{o}{\bbl@umlauta{o}}%
1684   \DeclareTextCompositeCommand{"}{OT1}{u}{\bbl@umlauta{u}}%
1685   \DeclareTextCompositeCommand{"}{OT1}{A}{\bbl@umlauta{A}}%
1686   \DeclareTextCompositeCommand{"}{OT1}{E}{\bbl@umlaute{E}}%
1687   \DeclareTextCompositeCommand{"}{OT1}{I}{\bbl@umlaute{I}}%
1688   \DeclareTextCompositeCommand{"}{OT1}{O}{\bbl@umlauta{O}}%
1689   \DeclareTextCompositeCommand{"}{OT1}{U}{\bbl@umlauta{U}}%
1690 }

```

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

```

1691 \ifx\l@english\@undefined
1692   \chardef\l@english\z@
1693   \fi
1694 \main@language{english}

```

9.12 Layout

Work in progress.

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

```

1695 \bbl@trace{Bidi layout}
1696 \providecommand\IfBabelLayout[3]{#3}%
1697 \newcommand\BabelPatchSection[1]{%
1698   \@ifundefined{#1}{}{%
1699     \bbl@exp{\let\<bbl@ss@#1>\<#1>}%
1700     \@namedef{#1}{%
1701       \@ifstar{\bbl@presec@s{#1}}%
1702       {\@dblarg{\bbl@presec@x{#1}}}}%
1703 \def\bbl@presec@x#1[#2]#3{%
1704   \bbl@exp{%
1705     \\select@language@x{\bbl@main@language}%
1706     \\@nameuse{bbl@sspre@#1}%
1707     \\@nameuse{bbl@ss@#1}%
1708     [\\foreignlanguage{\languagename}{\unexpanded{#2}}]%
1709     {\\foreignlanguage{\languagename}{\unexpanded{#3}}}%
1710     \\select@language@x{\languagename}}%
1711 \def\bbl@presec@s#1#2{%
1712   \bbl@exp{%
1713     \\select@language@x{\bbl@main@language}%
1714     \\@nameuse{bbl@sspre@#1}%
1715     \\@nameuse{bbl@ss@#1}*%
1716     {\\foreignlanguage{\languagename}{\unexpanded{#2}}}%
1717     \\select@language@x{\languagename}}%
1718 \IfBabelLayout{sectioning}%
1719   {\BabelPatchSection{part}%
1720   \BabelPatchSection{chapter}%
1721   \BabelPatchSection{section}%
1722   \BabelPatchSection{subsection}%

```

```

1723 \BabelPatchSection{subsubsection}%
1724 \BabelPatchSection{paragraph}%
1725 \BabelPatchSection{subparagraph}%
1726 \def\babel@toc#1{%
1727   \select@language@x{\bbl@main@language}}{}
1728 \IfBabelLayout{captions}%
1729 {\BabelPatchSection{caption}}{}

```

9.13 Load engine specific macros

```

1730 \bbl@trace{Input engine specific macros}
1731 \ifcase\bbl@engine
1732 \input txtbabel.def
1733 \or
1734 \input luababel.def
1735 \or
1736 \input xebabel.def
1737 \fi

```

9.14 Creating 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.

```

1738 \bbl@trace{Creating languages and reading ini files}
1739 \newcommand\babelprovide[2][{}%
1740 \let\bbl@savelangname\languagename
1741 \edef\bbl@savelocaleid{\the\localeid}%
1742 % Set name and locale id
1743 \def\languagename{#2}%
1744 \bbl@id@assign
1745 \chardef\localeid\@nameuse{\bbl@id@\languagename}%
1746 \let\bbl@KVP@captions\@nil
1747 \let\bbl@KVP@import\@nil
1748 \let\bbl@KVP@main\@nil
1749 \let\bbl@KVP@script\@nil
1750 \let\bbl@KVP@language\@nil
1751 \let\bbl@KVP@hyphenrules\@nil % only for provide@new
1752 \let\bbl@KVP@mapfont\@nil
1753 \let\bbl@KVP@maparabic\@nil
1754 \let\bbl@KVP@mapdigits\@nil
1755 \let\bbl@KVP@intraspace\@nil
1756 \let\bbl@KVP@intrapenalty\@nil
1757 \bbl@forkv{#1}{% TODO - error handling
1758   \in@{.}{##1}%
1759   \ifin@
1760     \bbl@renewinikey##1\@{##2}%
1761   \else
1762     \bbl@csarg\def{KVP@##1}{##2}%
1763   \fi}%
1764 % == import, captions ==
1765 \ifx\bbl@KVP@import\@nil\else
1766 \bbl@exp{\bbl@ifblank{\bbl@KVP@import}}%
1767   {\begingroup
1768     \def\BabelBeforeIni##1##2{\gdef\bbl@KVP@import{##1}\endinput}%
1769     \InputIfFileExists{babel-#2.tex}{}{}%
1770     \endgroup}%
1771   {}%

```

```

1772 \fi
1773 \ifx\bb1@KVP@captions\@nil
1774 \let\bb1@KVP@captions\bb1@KVP@import
1775 \fi
1776 % Load ini
1777 \bb1@ifunset{date#2}%
1778   {\bb1@provide@new{#2}}%
1779   {\bb1@ifblank{#1}%
1780     {\bb1@error
1781       {If you want to modify `#2' you must tell how in\\%
1782         the optional argument. See the manual for the\\%
1783         available options.}%
1784       {Use this macro as documented}}%
1785     {\bb1@provide@renew{#2}}}%
1786 % Post tasks
1787 \bb1@exp{\bb1@babelensure[exclude=\\today]{#2}}%
1788 \bb1@ifunset{bb1@ensure@\languagename}%
1789   {\bb1@exp{%
1790     \\DeclareRobustCommand\<bb1@ensure@\languagename>[1]{%
1791       \\foreignlanguage{\languagename}%
1792       {###1}}}%
1793   }%
1794 % At this point all parameters are defined if 'import'. Now we
1795 % execute some code depending on them. But what about if nothing was
1796 % imported? We just load the very basic parameters: ids and a few
1797 % more.
1798 \bb1@ifunset{bb1@lname#2}%
1799   {\def\BabelBeforeIni##1##2{%
1800     \begingroup
1801       \catcode`\[=12 \catcode`\]=12 \catcode`\==12 %
1802       \let\bb1@ini@captions@aux\@gobbletwo
1803       \def\bb1@inidate #####1.####2.####3.####4\relax #####5####6{%
1804         \bb1@read@ini{##1}{basic data}%
1805         \bb1@exportkey{chrng}{characters.ranges}{}%
1806         \bb1@exportkey{dgnat}{numbers.digits.native}{}%
1807         % \bb1@exportkey{hyphr}{typography.hyphenrules}{}%
1808         % \bb1@exportkey{intsp}{typography.intraspaces}{}%
1809         \endgroup}%
1810       {\setbox\z@\hbox{\InputIfFileExists{babel-#2.tex}{}}}%
1811     }%
1812   % -
1813   % == script, language ==
1814   % Override the values from ini or defines them
1815   \ifx\bb1@KVP@script\@nil\else
1816     \bb1@csarg\edef{sname#2}{\bb1@KVP@script}%
1817   \fi
1818   \ifx\bb1@KVP@language\@nil\else
1819     \bb1@csarg\edef{lname#2}{\bb1@KVP@language}%
1820   \fi
1821   % == mapfont ==
1822   % For bidi texts, to switch the font based on direction
1823   \ifx\bb1@KVP@mapfont\@nil\else
1824     \bb1@ifsamestring{\bb1@KVP@mapfont}{direction}{}%
1825     {\bb1@error{Option `bb1@KVP@mapfont' unknown for\\%
1826       mapfont. Use `direction'.%
1827       {See the manual for details.}}}%
1828     \bb1@ifunset{bb1@lsys@\languagename}{\bb1@provide@lsys{\languagename}}}%
1829     \bb1@ifunset{bb1@wdir@\languagename}{\bb1@provide@dirs{\languagename}}}%
1830     \ifx\bb1@mapselect\@undefined

```

```

1831 \AtBeginDocument{%
1832   \expandafter\bbledit\csname selectfont \endcsname{\bbledit@mapselect}}%
1833   {\selectfont}}%
1834 \def\bbledit@mapselect{%
1835   \let\bbledit@mapselect\relax
1836   \edef\bbledit@prefontid{\fontid\font}}%
1837 \def\bbledit@mapdir##1{%
1838   {\def\language##1}%
1839   \let\bbledit@ifrestoring\@firstoftwo % avoid font warning
1840   \bbledit@switchfont
1841   \directlua{Babel.fontmap
1842     [\the\csname bbledit@wdir##1\endcsname]%
1843     [\bbledit@prefontid]=\fontid\font}}%
1844 \fi
1845 \bbledit@exp{\bbledit@add\bbledit@mapselect{\bbledit@mapdir{\language}}}%
1846 \fi
1847 % == intraspace, intrapenalty ==
1848 % For CJK, East Asian, Southeast Asian, if interspace in ini
1849 \ifx\bbledit@KVP@intraspace\@nil\else % We can override the ini or set
1850   \bbledit@csarg\edef{intsp@#2}{\bbledit@KVP@intraspace}%
1851 \fi
1852 \ifcase\bbledit@engine\or % lua
1853   \bbledit@ifunset{bbledit@intsp@\language}{}%
1854   {\expandafter\ifx\csname bbledit@intsp@\language\endcsname\@empty\else
1855     \bbledit@xin@{\bbledit@cs{sbcp@\language}}{Hant,Hans,Jpan,Kore,Kana}%
1856     \ifin@ % cjk
1857       \bbledit@cjk@intraspace
1858       \directlua{
1859         Babel = Babel or {}
1860         Babel.locale_props = Babel.locale_props or {}
1861         Babel.locale_props[\the\localeid].linebreak = 'c'
1862       }%
1863       \bbledit@exp{\bbledit@intraspace\bbledit@cs{intsp@\language}\@}%
1864       \ifx\bbledit@KVP@intrapenalty\@nil
1865         \bbledit@intrapenalty0@@
1866       \fi
1867     \else % sea
1868       \bbledit@sea@intraspace
1869       \bbledit@exp{\bbledit@intraspace\bbledit@cs{intsp@\language}\@}%
1870       \directlua{
1871         Babel = Babel or {}
1872         Babel.sea_ranges = Babel.sea_ranges or {}
1873         Babel.set_chranges('\bbledit@cs{sbcp@\language}',
1874           '\bbledit@cs{chrng@\language}')
1875       }%
1876       \ifx\bbledit@KVP@intrapenalty\@nil
1877         \bbledit@intrapenalty0@@
1878       \fi
1879     \fi
1880   \fi
1881   \ifx\bbledit@KVP@intrapenalty\@nil\else
1882     \expandafter\bbledit@intrapenalty\bbledit@KVP@intrapenalty@@
1883   \fi}%
1884 \or % xe
1885   \bbledit@xin@{\bbledit@cs{sbcp@\language}}{Thai,Lao,Khmr}%
1886   \ifin@ % sea (currently ckj not handled)
1887   \bbledit@ifunset{bbledit@intsp@\language}{}%
1888   {\expandafter\ifx\csname bbledit@intsp@\language\endcsname\@empty\else
1889     \ifx\bbledit@KVP@intraspace\@nil

```

```

1890         \bbl@exp{%
1891         \\bbl@intraspace\bbl@cs{intsp@\language}\@@}%
1892     \fi
1893     \ifx\bbl@KVP@intrapenalty\@nil
1894         \bbl@intrapenalty0\@@
1895     \fi
1896 \fi
1897 \ifx\bbl@KVP@intraspace\@nil\else % We may override the ini
1898     \expandafter\bbl@intraspace\bbl@KVP@intraspace\@@
1899 \fi
1900 \ifx\bbl@KVP@intrapenalty\@nil\else
1901     \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
1902 \fi
1903 \ifx\bbl@ispacesize\@undefined
1904     \AtBeginDocument{%
1905         \expandafter\bbl@add
1906         \csname selectfont \endcsname{\bbl@ispacesize}}%
1907     \def\bbl@ispacesize{\bbl@cs{xeisp@\bbl@cs{sbcp@\language}}}%
1908 \fi}%
1909 \fi
1910 \fi
1911 % == maparabic ==
1912 % Native digits, if provided in ini (TeX level, xe and lua)
1913 \ifcase\bbl@engine\else
1914     \bbl@ifunset{bbl@dgnat@\language}{}%
1915     {\expandafter\ifx\csname bbl@dgnat@\language\endcsname\@empty\else
1916         \expandafter\expandafter\expandafter
1917         \bbl@setdigits\csname bbl@dgnat@\language\endcsname
1918         \ifx\bbl@KVP@maparabic\@nil\else
1919             \ifx\bbl@latinarabic\@undefined
1920                 \expandafter\let\expandafter\@arabic
1921                 \csname bbl@counter@\language\endcsname
1922             \else % ie, if layout=counters, which redefines \@arabic
1923                 \expandafter\let\expandafter\bbl@latinarabic
1924                 \csname bbl@counter@\language\endcsname
1925             \fi
1926         \fi
1927     \fi}%
1928 \fi
1929 % == mapdigits ==
1930 % Native digits (lua level).
1931 \ifodd\bbl@engine
1932     \ifx\bbl@KVP@mapdigits\@nil\else
1933         \bbl@ifunset{bbl@dgnat@\language}{}%
1934         {\RequirePackage{luatexbase}%
1935         \bbl@activate@preotf
1936         \directlua{
1937             Babel = Babel or {} %% -> presets in luababel
1938             Babel.digits_mapped = true
1939             Babel.digits = Babel.digits or {}
1940             Babel.digits[\the\localeid] =
1941                 table.pack(string.utfvalue('\bbl@cs{dgnat@\language}'))
1942             if not Babel.numbers then
1943                 function Babel.numbers(head)
1944                     local LOCALE = luatexbase.registernumber'bbl@attr@locale'
1945                     local GLYPH = node.id'glyph'
1946                     local inmath = false
1947                     for item in node.traverse(head) do
1948                         if not inmath and item.id == GLYPH then

```

```

1949         local temp = node.get_attribute(item, LOCALE)
1950         if Babel.digits[temp] then
1951             local chr = item.char
1952             if chr > 47 and chr < 58 then
1953                 item.char = Babel.digits[temp][chr-47]
1954             end
1955         end
1956         elseif item.id == node.id'math' then
1957             inmath = (item.subtype == 0)
1958         end
1959     end
1960     return head
1961 end
1962 end
1963 }}
1964 \fi
1965 \fi
1966 % == require.babel in ini ==
1967 % To load or reload the babel-*.tex, if require.babel in ini
1968 \bbl@ifunset{bbl@rqtex@\languagename}{}%
1969 {\expandafter\ifx\cscname bbl@rqtex@\languagename\endcsname\@empty\else
1970     \let\BabelBeforeIni\@gobbletwo
1971     \chardef\atcatcode=\catcode`\@
1972     \catcode`\@=11\relax
1973     \InputIfFileExists{babel-bbl@cs{rqtex@\languagename}.tex}{}{}%
1974     \catcode`\@=\atcatcode
1975     \let\atcatcode\relax
1976 \fi}%
1977 % == main ==
1978 \ifx\bbl@KVP@main\@nil % Restore only if not 'main'
1979     \let\languagename\bbl@savelangname
1980     \chardef\localeid\bbl@savelocaleid\relax
1981 \fi}

```

A tool to define the macros for native digits from the list provided in the ini file. Somewhat convoluted because there are 10 digits, but only 9 arguments in \TeX .

```

1982 \def\bbl@setdigits#1#2#3#4#5{%
1983 \bbl@exp{%
1984 \def\<\languagename digits>#####1{% ie, \langdigits
1985 \<bbl@digits@\languagename>#####1\\\@nil}%
1986 \def\<\languagename counter>#####1{% ie, \langcounter
1987 \\\expandafter\<bbl@counter@\languagename>%
1988 \\\cscname c@#####1\endcsname}%
1989 \def\<bbl@counter@\languagename>#####1{% ie, \bbl@counter@lang
1990 \\\expandafter\<bbl@digits@\languagename>%
1991 \\\number#####1\\\@nil}}%
1992 \def\bbl@tempa##1##2##3##4##5{%
1993 \bbl@exp{% Wow, quite a lot of hashes! :- (
1994 \def\<bbl@digits@\languagename>#####1{%
1995 \\\ifx#####1\\\@nil % ie, \bbl@digits@lang
1996 \\\else
1997 \\\ifx0#####1#1%
1998 \\\else\\\ifx1#####1#2%
1999 \\\else\\\ifx2#####1#3%
2000 \\\else\\\ifx3#####1#4%
2001 \\\else\\\ifx4#####1#5%
2002 \\\else\\\ifx5#####1##1%
2003 \\\else\\\ifx6#####1##2%
2004 \\\else\\\ifx7#####1##3%

```



```

2061 \fi
2062 % == hyphenrules ==
2063 \bbl@provide@hyphens{#1}}

```

The hyphenrules option is handled with an auxiliary macro.

```

2064 \def\bbl@provide@hyphens#1{%
2065 \let\bbl@tempa\relax
2066 \ifx\bbl@KVP@hyphenrules\@nil\else
2067 \bbl@replace\bbl@KVP@hyphenrules{ }{,}%
2068 \bbl@foreach\bbl@KVP@hyphenrules{%
2069 \ifx\bbl@tempa\relax % if not yet found
2070 \bbl@ifsamestring{##1}{+}%
2071 {\bbl@exp{\addlanguage\<1@##1>}}}%
2072 {}%
2073 \bbl@ifunset{1@##1}%
2074 {}%
2075 {\bbl@exp{\let\bbl@tempa\<1@##1>}}}%
2076 \fi}%
2077 \fi
2078 \ifx\bbl@tempa\relax % if no opt or no language in opt found
2079 \ifx\bbl@KVP@import\@nil\else % if importing
2080 \bbl@exp{%
2081 \bbl@ifblank{\@nameuse{bbl@hyphr@#1}}}%
2082 {}%
2083 {\let\bbl@tempa\<1@\@nameuse{bbl@hyphr@\language}>}}}%
2084 \fi
2085 \fi
2086 \bbl@ifunset{bbl@tempa}% ie, relax or undefined
2087 {\bbl@ifunset{1@#1}% no hyphenrules found - fallback
2088 {\bbl@exp{\adddialect\<1@#1>\language}}}%
2089 {}}% so, 1@<lang> is ok - nothing to do
2090 {\bbl@exp{\adddialect\<1@#1>\bbl@tempa}}}% found in opt list or ini
2091 \bbl@ifunset{bbl@prehc@\language}%
2092 {}% TODO - XeTeX, based on \babelfont and HyphenChar?
2093 {\ifodd\bbl@engine\bbl@exp{%
2094 \bbl@ifblank{\@nameuse{bbl@prehc@#1}}}%
2095 {}%
2096 {\AddBabelHook[\language]{babel-prehc-\language}{patterns}%
2097 {\prehyphenchar=\@nameuse{bbl@prehc@\language}\relax}}}%
2098 \fi}}

```

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

```

2099 \def\bbl@read@ini#1#2{%
2100 \openin1=babel-#1.ini % FIXME - number must not be hardcoded
2101 \ifeof1
2102 \bbl@error
2103 {There is no ini file for the requested language\%
2104 (#1). Perhaps you misspelled it or your installation\%
2105 is not complete.}%
2106 {Fix the name or reinstall babel.}%
2107 \else
2108 \let\bbl@section\@empty
2109 \let\bbl@savestrings\@empty
2110 \let\bbl@savetoday\@empty
2111 \let\bbl@savestate\@empty
2112 \def\bbl@inipreread##1=##2\@@{%
2113 \bbl@trim@def\bbl@tempa{##1}% Redundant below !!
2114 % Move trims here ??

```

```

2115     \bbl@ifunset{bbl@KVP@\bbl@section.\bbl@tempa}%
2116     {\expandafter\bbl@inireader\bbl@tempa=##2\@}%
2117     {}}%
2118     \let\bbl@inireader\bbl@iniskip
2119     \bbl@info{Importing #2 for \language\%
2120             from babel-#1.ini. Reported}%
2121     \loop
2122     \if T\ifeof1F\fi T\relax % Trick, because inside \loop
2123     \endlinechar\m@ne
2124     \read1 to \bbl@line
2125     \endlinechar`\^^M
2126     \ifx\bbl@line\empty\else
2127     \expandafter\bbl@iniline\bbl@line\bbl@iniline
2128     \fi
2129     \repeat
2130     \fi}
2131 \def\bbl@iniline#1\bbl@iniline{%
2132 \@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 (TODO - but note the last section is not ended). By default, key=val pairs are ignored.

```

2133 \def\bbl@iniskip#1\@{%          if starts with ;
2134 \def\bbl@inisec[#1]#2\@{%      if starts with opening bracket
2135 \def\bbl@elt##1##2{\bbl@inireader##1=##2\@}%
2136 \@nameuse{bbl@renew@\bbl@section}%
2137 \global\bbl@csarg\let{renew@\bbl@section}\relax
2138 \@nameuse{bbl@secpost@\bbl@section}% ends previous section
2139 \def\bbl@section{#1}%
2140 \def\bbl@elt##1##2{%
2141     \@namedef{bbl@KVP@#1..##1}{}}%
2142 \@nameuse{bbl@renew@#1}%
2143 \@nameuse{bbl@secp@#1}% starts current section
2144 \bbl@ifunset{bbl@inikv@#1}%
2145     {\let\bbl@inireader\bbl@iniskip}%
2146     {\bbl@exp{\let\\bbl@inireader\<bbl@inikv@#1>}}}
2147 \def\bbl@renewinkey#1..#2\@#3{%
2148     \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>.

```

2149 \def\bbl@inikv#1=#2\@{%      key=value
2150     \bbl@trim\def\bbl@tempa{#1}%
2151     \bbl@trim\toks@{#2}%
2152     \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.

```

2153 \def\bbl@exportkey#1#2#3{%
2154     \bbl@ifunset{bbl@kv@#2}%
2155     {\bbl@csarg\gdef{#1@\language}{#3}}%
2156     {\expandafter\ifx\csname bbl@kv@#2\endcsname\empty
2157     \bbl@csarg\gdef{#1@\language}{#3}}%
2158     \else
2159     \bbl@exp{\global\let\<bbl@#1@\language>\<bbl@kv@#2>}}%
2160     \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.

```

2161 \let\bbl@inikv@identification\bbl@inikv

```

```

2162 \def\bbl@secpost@identification{%
2163   \bbl@ifunset{bbl@kv@identification.name.opentype}%
2164     {\bbl@exportkey{lname}{identification.name.english}{}}%
2165     {\bbl@exportkey{lname}{identification.name.opentype}{}}%
2166   \bbl@exportkey{lbcpl}{identification.tag.bcp47}{}%
2167   \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
2168   \bbl@ifunset{bbl@kv@identification.script.name.opentype}%
2169     {\bbl@exportkey{sname}{identification.script.name}{}}%
2170     {\bbl@exportkey{sname}{identification.script.name.opentype}{}}%
2171   \bbl@exportkey{sbcpl}{identification.script.tag.bcp47}{}%
2172   \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}}
2173 \let\bbl@inikv@typography\bbl@inikv
2174 \let\bbl@inikv@characters\bbl@inikv
2175 \let\bbl@inikv@numbers\bbl@inikv
2176 \def\bbl@after@ini{%
2177   \bbl@exportkey{lftm}{typography.lefthyphenmin}{2}%
2178   \bbl@exportkey{rgtm}{typography.righthyphenmin}{3}%
2179   \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
2180   \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
2181   \bbl@exportkey{intsp}{typography.intraspace}{}%
2182   \bbl@exportkey{jstfy}{typography.justify}{w}%
2183   \bbl@exportkey{chrng}{characters.ranges}{}%
2184   \bbl@exportkey{dgnat}{numbers.digits.native}{}%
2185   \bbl@exportkey{rqtex}{identification.require.babel}{}%
2186   \bbl@xin@{0.5}{\@nameuse{bbl@kv@identification.version}}%
2187   \ifin@
2188     \bbl@warning{%
2189       There are neither captions nor date in `language'.\%
2190       It may not be suitable for proper typesetting, and it\%
2191       could change. Reported}%
2192   \fi
2193   \bbl@xin@{0.9}{\@nameuse{bbl@kv@identification.version}}%
2194   \ifin@
2195     \bbl@warning{%
2196       The `language' date format may not be suitable\%
2197       for proper typesetting, and therefore it very likely will\%
2198       change in a future release. Reported}%
2199   \fi
2200   \bbl@toggle\bbl@savetoday
2201   \bbl@toggle\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.

```

2202 \ifcase\bbl@engine
2203   \bbl@csarg\def{inikv@captions.licr}#1=#2\@@{%
2204     \bbl@ini@captions@aux{#1}{#2}}
2205 \else
2206   \def\bbl@inikv@captions#1=#2\@@{%
2207     \bbl@ini@captions@aux{#1}{#2}}
2208 \fi

```

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

```

2209 \def\bbl@ini@captions@aux#1#2{%
2210   \bbl@trim\def\bbl@tempa{#1}%
2211   \bbl@ifblank{#2}%
2212     {\bbl@exp{%
2213       \toks@{\bbl@nocaption{\bbl@tempa}{\language\bbl@tempa name}}}%
2214     {\bbl@trim\toks@{#2}}%

```

```

2215 \bbl@exp{%
2216   \\bbl@add\\bbl@savestrings{%
2217     \\SetString<\bbl@tempa name>{\the\toks@}}}}

```

But dates are more complex. The full date format is stores in `date.gregorian`, so we must read it in non-Unicode engines, too (saved months are just discarded when the LICR section is reached).

TODO. Remove copypaste pattern.

```

2218 \bbl@csarg\def{inikv@date.gregorian}#1=#2\@@{%           for defaults
2219   \bbl@inidate#1...\relax{#2}{}}
2220 \bbl@csarg\def{inikv@date.islamic}#1=#2\@@{%
2221   \bbl@inidate#1...\relax{#2}{islamic}}
2222 \bbl@csarg\def{inikv@date.hebrew}#1=#2\@@{%
2223   \bbl@inidate#1...\relax{#2}{hebrew}}
2224 \bbl@csarg\def{inikv@date.persian}#1=#2\@@{%
2225   \bbl@inidate#1...\relax{#2}{persian}}
2226 \bbl@csarg\def{inikv@date.indian}#1=#2\@@{%
2227   \bbl@inidate#1...\relax{#2}{indian}}
2228 \ifcase\bbl@engine
2229   \bbl@csarg\def{inikv@date.gregorian.licr}#1=#2\@@{% override
2230     \bbl@inidate#1...\relax{#2}{}}
2231   \bbl@csarg\def{secpre@date.gregorian.licr}{%           discard uni
2232     \ifcase\bbl@engine\let\bbl@savestate\empty\fi}
2233 \fi
2234 % eg: 1=months, 2=wide, 3=1, 4=dummy
2235 \def\bbl@inidate#1.#2.#3.#4\relax#5#6{% TODO - ignore with 'captions'
2236   \bbl@trim@def\bbl@tempa{#1.#2}%
2237   \bbl@ifsamestring{\bbl@tempa}{months.wide}%           to savedate
2238   {\bbl@trim@def\bbl@tempa{#3}%
2239     \bbl@trim\toks@{#5}%
2240     \bbl@exp{%
2241       \\bbl@add\\bbl@savestate{%
2242         \\SetString<month\romannumeral\bbl@tempa#6name>{\the\toks@}}}}%
2243     {\bbl@ifsamestring{\bbl@tempa}{date.long}%           defined now
2244       {\bbl@trim@def\bbl@toreplace{#5}%
2245         \bbl@TG@@date
2246         \global\bbl@csarg\let{date@\languagename}\bbl@toreplace
2247         \bbl@exp{%
2248           \gdef<\languagename date>{\protect<\languagename date >}%
2249           \gdef<\languagename date >####1####2####3%
2250             \\bbl@usedategroupttrue
2251             \<bbl@ensure@\languagename>{%
2252               \<bbl@date@\languagename>{####1}{####2}{####3}}}%
2253             \\bbl@add\\bbl@savetoday{%
2254               \\SetString\\today{%
2255                 \<\languagename date>{\the\year}{\the\month}{\the\day}}}}}}%
2256       {}}

```

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.

```

2257 \let\bbl@calendar\empty
2258 \newcommand\BabelDateSpace{\nobreakspace}
2259 \newcommand\BabelDateDot{.\@}
2260 \newcommand\BabelDated[1]{\number#1}
2261 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}
2262 \newcommand\BabelDateM[1]{\number#1}
2263 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
2264 \newcommand\BabelDateMMMM[1]{%

```

```

2265 \csname month\romannumeral#1\bb1@calendar name\endcsname}}%
2266 \newcommand\BabelDatey[1]{\number#1}%
2267 \newcommand\BabelDateyy[1]{%
2268 \ifnum#1<10 0\number#1 %
2269 \else\ifnum#1<100 \number#1 %
2270 \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
2271 \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
2272 \else
2273 \bb1@error
2274 {Currently two-digit years are restricted to the\
2275 range 0-9999.}%
2276 {There is little you can do. Sorry.}%
2277 \fi\fi\fi\fi}}
2278 \newcommand\BabelDateyyy[1]{\number#1} % FIXME - add leading 0
2279 \def\bb1@replace@finish@iii#1{%
2280 \bb1@exp{\def\#1####1####2####3{\the\toks@}}
2281 \def\bb1@TG@date{%
2282 \bb1@replace\bb1@toreplace{[ ]}{\BabelDateSpace{}}%
2283 \bb1@replace\bb1@toreplace{[.]}{\BabelDateDot{}}%
2284 \bb1@replace\bb1@toreplace{[d]}{\BabelDated{####3}}%
2285 \bb1@replace\bb1@toreplace{[dd]}{\BabelDatedd{####3}}%
2286 \bb1@replace\bb1@toreplace{[M]}{\BabelDateM{####2}}%
2287 \bb1@replace\bb1@toreplace{[MM]}{\BabelDateMM{####2}}%
2288 \bb1@replace\bb1@toreplace{[MMMM]}{\BabelDateMMMM{####2}}%
2289 \bb1@replace\bb1@toreplace{[y]}{\BabelDatey{####1}}%
2290 \bb1@replace\bb1@toreplace{[yy]}{\BabelDateyy{####1}}%
2291 \bb1@replace\bb1@toreplace{[yyyy]}{\BabelDateyyyy{####1}}%
2292 % Note after \bb1@replace \toks@ contains the resulting string.
2293 % TODO - Using this implicit behavior doesn't seem a good idea.
2294 \bb1@replace@finish@iii\bb1@toreplace}

```

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

```

2295 \def\bb1@provide@lsys#1{%
2296 \bb1@ifunset{bb1@lname@#1}%
2297 {\bb1@ini@basic{#1}}%
2298 {}%
2299 \bb1@csarg\let{lsys@#1}\@empty
2300 \bb1@ifunset{bb1@sname@#1}{\bb1@csarg\gdef{sname@#1}{Default}}{}%
2301 \bb1@ifunset{bb1@sotf@#1}{\bb1@csarg\gdef{sotf@#1}{DFLT}}{}%
2302 \bb1@csarg\bb1@add@list{lsys@#1}{Script=\bb1@cs{sname@#1}}%
2303 \bb1@ifunset{bb1@lname@#1}{%
2304 {\bb1@csarg\bb1@add@list{lsys@#1}{Language=\bb1@cs{lname@#1}}}%
2305 \bb1@csarg\bb1@toGLOBAL{lsys@#1}}

```

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

```

2306 \def\bb1@ini@basic#1{%
2307 \def\BabelBeforeIni##1##2{%
2308 \begingroup
2309 \bb1@add\bb1@secpost@identification{\closein1 }%
2310 \catcode`\[=12 \catcode`\]=12 \catcode`\==12 %
2311 \bb1@read@ini{##1}{font and identification data}%
2312 \endinput % babel- .tex may contain onlypreamble's
2313 \endgroup}% boxed, to avoid extra spaces:
2314 {\setbox\z@\hbox{\InputIfFileExists{babel-#1.tex}{}}}}

```

```

2315% \section{Adjusting the Babel bahavior}
2316%
2317% \changes{babel-3.36}{2019/10/30}{New macro \cs{babeladjust}}
2318%
2319% A generic high level inteface is provided to adjust some global
2320% and general settings.
2321%
2322% \begin{macrocode}
2323 \newcommand\babeladjust[1]{% TODO. Error handling.
2324 \bbl@forkv{#1}{\@nameuse{bbl@ADJ@##1@##2}}}
2325%
2326 \def\bbl@adjust@lua#1#2{%
2327 \ifvmode
2328 \ifnum\currentgrouplevel=\z@
2329 \directlua{ Babel.#2 }%
2330 \expandafter\expandafter\expandafter\@gobble
2331 \fi
2332 \fi
2333 {\bbl@error % The error is gobbled if everything went ok.
2334 {Currently, #1 related features can be adjusted only\%
2335 in the main vertical list.}%
2336 {Maybe things change in the future, but this is what it is.}}}
2337 \@namedef{bbl@ADJ@bidi.mirroring@on}{%
2338 \bbl@adjust@lua{bidi}{mirroring_enabled=true}}
2339 \@namedef{bbl@ADJ@bidi.mirroring@off}{%
2340 \bbl@adjust@lua{bidi}{mirroring_enabled=false}}
2341 \@namedef{bbl@ADJ@bidi.text@on}{%
2342 \bbl@adjust@lua{bidi}{bidi_enabled=true}}
2343 \@namedef{bbl@ADJ@bidi.text@off}{%
2344 \bbl@adjust@lua{bidi}{bidi_enabled=false}}
2345 \@namedef{bbl@ADJ@bidi.mapdigits@on}{%
2346 \bbl@adjust@lua{bidi}{digits_mapped=true}}
2347 \@namedef{bbl@ADJ@bidi.mapdigits@off}{%
2348 \bbl@adjust@lua{bidi}{digits_mapped=false}}
2349%
2350 \@namedef{bbl@ADJ@linebreak.sea@on}{%
2351 \bbl@adjust@lua{linebreak}{sea_enabled=true}}
2352 \@namedef{bbl@ADJ@linebreak.sea@off}{%
2353 \bbl@adjust@lua{linebreak}{sea_enabled=false}}
2354 \@namedef{bbl@ADJ@linebreak.cjk@on}{%
2355 \bbl@adjust@lua{linebreak}{cjk_enabled=true}}
2356 \@namedef{bbl@ADJ@linebreak.cjk@off}{%
2357 \bbl@adjust@lua{linebreak}{cjk_enabled=false}}
2358%
2359 \def\bbl@adjust@layout#1{%
2360 \ifvmode
2361 #1%
2362 \expandafter\@gobble
2363 \fi
2364 {\bbl@error % The error is gobbled if everything went ok.
2365 {Currently, layout related features can be adjusted only\%
2366 in vertical mode.}%
2367 {Maybe things change in the future, but this is what it is.}}}
2368 \@namedef{bbl@ADJ@layout.tabular@on}{%
2369 \bbl@adjust@layout{\let\@tabular\bbl@NL@tabular}}
2370 \@namedef{bbl@ADJ@layout.tabular@off}{%
2371 \bbl@adjust@layout{\let\@tabular\bbl@OL@tabular}}
2372 \@namedef{bbl@ADJ@layout.lists@on}{%
2373 \bbl@adjust@layout{\let\list\bbl@NL@list}}

```

```
2374 \@namedef{bbl@ADJ@layout.lists@on}{%
2375 \bbl@adjust@layout{\let\list\bbl@OL@list}}
```

10 The kernel of Babel (babel.def for L^AT_EXonly)

10.1 The redefinition of the style commands

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

```
2376 {\def\format{lpain}
2377 \ifx\fmtname\format
2378 \else
2379 \def\format{LaTeX2e}
2380 \ifx\fmtname\format
2381 \else
2382 \aftergroup\endinput
2383 \fi
2384 \fi}
```

10.2 Cross referencing macros

The L^AT_EX book states:

The *key* argument is any sequence of letters, digits, and punctuation symbols; upper- and lowercase letters are regarded as different.

When the above quote should still be true when a document is typeset in a language that has active characters, special care has to be taken of the category codes of these characters when they appear in an argument of the cross referencing macros.

When a cross referencing command processes its argument, all tokens in this argument should be character tokens with category ‘letter’ or ‘other’.

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

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

```
2385 %\bbl@redefine\newlabel#1#2{%
2386 % \@safe@activetrue\org@newlabel{#1}{#2}\@safe@activesfalse}
```

`\@newl@bel` We need to change the definition of the L^AT_EX-internal macro `\@newl@bel`. This is needed because we need to make sure that shorthand characters expand to their non-active version.

The following package options control which macros are to be redefined.

```
2387 <<{*More package options}>> ≡
2388 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
2389 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
2390 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
2391 <</More package options>>
```


First we open a new group to keep the changed setting of `\protect` local and then we set the `@safe@actives` switch to true to make sure that any shorthand that appears in any of the arguments immediately expands to its non-active self.

```

2392 \bbl@trace{Cross referencing macros}
2393 \ifx\bbl@opt@safe\empty\else
2394   \def\@newl@bel#1#2#3{%
2395     {\@safe@activestru
2396       \bbl@ifunset{#1@#2}%
2397         \relax
2398       {\gdef\@multiplelabels{%
2399         \@latex@warning@no@line{There were multiply-defined labels}}}%
2400         \@latex@warning@no@line{Label `#2' multiply defined}}}%
2401     \global\@namedef{#1@#2}{#3}}

```

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

```

2402 \CheckCommand*\@testdef[3]{%
2403   \def\reserved@a{#3}%
2404   \expandafter\ifx\csname#1@#2\endcsname\reserved@a
2405   \else
2406     \@tempwattrue
2407   \fi}

```

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

```

2408 \def\@testdef#1#2#3{%
2409   \@safe@activestru

```

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

```

2410   \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname

```

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

```

2411   \def\bbl@tempb{#3}%
2412   \@safe@activesfalse

```

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

```

2413   \ifx\bbl@tempa\relax
2414   \else
2415     \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
2416   \fi

```

We do the same for `\bbl@tempb`.

```

2417   \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%

```

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

```

2418   \ifx\bbl@tempa\bbl@tempb
2419   \else
2420     \@tempwattrue
2421   \fi}
2422 \fi

```

`\ref` The same holds for the macro `\ref` that references a label and `\pageref` to reference a page. So we redefine `\ref` and `\pageref`. While we change these macros, we make them

robust as well (if they weren't already) to prevent problems if they should become expanded at the wrong moment.

```

2423 \bbl@xin@{R}\bbl@opt@safe
2424 \ifin@
2425 \bbl@redefineroobust\ref#1{%
2426   \@safe@activestruer\org@ref{#1}\@safe@activesfalse}
2427 \bbl@redefineroobust\pageref#1{%
2428   \@safe@activestruer\org@pageref{#1}\@safe@activesfalse}
2429 \else
2430 \let\org@ref\ref
2431 \let\org@pageref\pageref
2432 \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.

```

2433 \bbl@xin@{B}\bbl@opt@safe
2434 \ifin@
2435 \bbl@redefine\@citex[#1]#2{%
2436   \@safe@activestruer\edef\@tempa{#2}\@safe@activesfalse
2437   \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.

```

2438 \AtBeginDocument{%
2439   \@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.)

```

2440   \def\@citex[#1][#2]#3{%
2441     \@safe@activestruer\edef\@tempa{#3}\@safe@activesfalse
2442     \org@@citex[#1][#2]{\@tempa}}%
2443   }{}}

```

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

```

2444 \AtBeginDocument{%
2445   \@ifpackageloaded{cite}{%
2446     \def\@citex[#1]#2{%
2447       \@safe@activestruer\org@@citex[#1]{#2}\@safe@activesfalse}%
2448     }{}}

```

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

```

2449 \bbl@redefine\nocite#1{%
2450   \@safe@activestruer\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@activestruer` 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.

```
2451 \bbl@redefine\bibcite{%
2452   \bbl@cite@choice
2453   \bibcite}
```

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

```
2454 \def\bbl@bibcite#1#2{%
2455   \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.

```
2456 \def\bbl@cite@choice{%
2457   \global\let\bibcite\bbl@bibcite
```

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

```
2458   \@ifpackageloaded{natbib}{\global\let\bibcite\org@bibcite}{}%
2459   \@ifpackageloaded{cite}{\global\let\bibcite\org@bibcite}{}%
```

Make sure this only happens once.

```
2460   \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.

```
2461 \AtBeginDocument{\bbl@cite@choice}
```

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

```
2462 \bbl@redefine\@bibitem#1{%
2463   \@safe@activestrue\org@@bibitem{#1}\@safe@activesfalse}
2464 \else
2465   \let\org@nocite\nocite
2466   \let\org@@citex\@citex
2467   \let\org@bibcite\bibcite
2468   \let\org@@bibitem\@bibitem
2469 \fi
```

10.3 Marks

`\markright` Because the output routine is asynchronous, we must pass the current language attribute to the head lines, together with the text that is put into them. To achieve this we need to adapt the definition of `\markright` and `\markboth` somewhat.

We check whether the argument is empty; if it is, we just make sure the scratch token register is empty. Next, we store the argument to `\markright` in the scratch token register. This way these commands will not be expanded later, and we make sure that the text is typeset using the correct language settings. While doing so, we make sure that active characters that may end up in the mark are not disabled by the output routine kicking in while `\@safe@activestrue` is in effect.

```
2470 \bbl@trace{Marks}
2471 \IfBabelLayout{sectioning}
2472   {\ifx\bbl@opt@headfoot\@nnil
```

```

2473 \g@addto@macro\@resetactivechars{%
2474 \set@typeset@protect
2475 \expandafter\select@language@x\expandafter{\bbl@main@language}%
2476 \let\protect\noexpand
2477 \edef\thepage{%
2478 \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}%
2479 \fi}
2480 {\ifbbl@single\else
2481 \bbl@ifunset{markright } \bbl@redefine\bbl@redefineroobust
2482 \markright#1{%
2483 \bbl@ifblank{#1}%
2484 {\org@markright{}}%
2485 {\toks@{#1}%
2486 \bbl@exp{%
2487 \org@markright{\protect\foreignlanguage{\language}%
2488 {\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 macros, so it's not necessary anymore, but it's preserved for older versions.)

```

2489 \ifx\@mkboth\markboth
2490 \def\bbl@tempc{\let\@mkboth\markboth}
2491 \else
2492 \def\bbl@tempc{}
2493 \fi
2494 \bbl@ifunset{markboth } \bbl@redefine\bbl@redefineroobust
2495 \markboth#1#2{%
2496 \protected@edef\bbl@tempb##1{%
2497 \protect\foreignlanguage
2498 {\language}{\protect\bbl@restore@actives##1}}%
2499 \bbl@ifblank{#1}%
2500 {\toks@{}}%
2501 {\toks@\expandafter{\bbl@tempb{#1}}}%
2502 \bbl@ifblank{#2}%
2503 {\@temptokena{}}%
2504 {\@temptokena\expandafter{\bbl@tempb{#2}}}%
2505 \bbl@exp{\org@markboth{\the\toks@}{\the\@temptokena}}
2506 \bbl@tempc
2507 \fi} % end ifbbl@single, end \IfBabelLayout

```

10.4 Preventing clashes with other packages

10.4.1 `ifthen`

`\ifthenelse` Sometimes a document writer wants to create a special effect depending on the page a certain fragment of text appears on. This can be achieved by the following piece of code:

```

\ifthenelse{\isodd{\pageref{some:label}}}
{code_for_odd_pages}
{code_for_even_pages}

```

In order for this to work the argument of `\isodd` needs to be fully expandable. With the above redefinition of `\pageref` it is not in the case of this example. To overcome that, we add some code to the definition of `\ifthenelse` to make things work.

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

```
2508 \bbl@trace{Preventing clashes with other packages}
2509 \bbl@xin@{R}\bbl@opt@safe
2510 \ifin@
2511 \AtBeginDocument{%
2512   \@ifpackageloaded{ifthen}{%
```

Then we can redefine `\ifthenelse`:

```
2513   \bbl@redefine@long\ifthenelse#1#2#3{%
```

We want to revert the definition of `\pageref` and `\ref` to their original definition for the first argument of `\ifthenelse`, so we first need to store their current meanings.

```
2514     \let\bbl@temp@pref\pageref
2515     \let\pageref\org@pageref
2516     \let\bbl@temp@ref\ref
2517     \let\ref\org@ref
```

Then we can set the `\@safe@actives` switch and call the original `\ifthenelse`. In order to be able to use shorthands in the second and third arguments of `\ifthenelse` the resetting of the switch *and* the definition of `\pageref` happens inside those arguments. When the package wasn't loaded we do nothing.

```
2518     \@safe@activestrue
2519     \org@ifthenelse{#1}%
2520     {\let\pageref\bbl@temp@pref
2521     \let\ref\bbl@temp@ref
2522     \@safe@activesfalse
2523     #2}%
2524     {\let\pageref\bbl@temp@pref
2525     \let\ref\bbl@temp@ref
2526     \@safe@activesfalse
2527     #3}%
2528   }%
2529 }{}%
2530 }
```

10.4.2 varioref

`\@vpageref` When the package `varioref` is in use we need to modify its internal command `\@vpageref`
`\vrefpagenum` in order to prevent problems when an active character ends up in the argument of `\vref`.

`\Ref` The same needs to happen for `\vrefpagenum`.

```
2531 \AtBeginDocument{%
2532   \@ifpackageloaded{varioref}{%
2533     \bbl@redefine\@vpageref#1[#2]#3{%
2534       \@safe@activestrue
2535       \org@@@vpageref{#1}#2#3}%
2536       \@safe@activesfalse}%
2537     \bbl@redefine\vrefpagenum#1#2{%
2538       \@safe@activestrue
2539       \org\vrefpagenum{#1}#2}%
2540       \@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.

```

2541     \expandafter\def\csname Ref \endcsname#1{%
2542         \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
2543     }{}%
2544 }
2545 \fi

```

10.4.3 `hhline`

`\hhline` Delaying the activation of the shorthand characters has introduced a problem with the `hhline` package. The reason is that it uses the ‘:’ character which is made active by the french support in `babel`. Therefore we need to *reload* the package when the ‘:’ is an active character.

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

```

2546 \AtEndOfPackage{%
2547     \AtBeginDocument{%
2548         \ifpackageloaded{hhline}%

```

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

```

2549         {\expandafter\ifx\csname normal@char\string:\endcsname\relax
2550         \else

```

In that case we simply reload the package. Note that this happens *after* the category code of the @-sign has been changed to other, so we need to temporarily change it to letter again.

```

2551             \makeatletter
2552             \def\@currname{hhline}\input{hhline.sty}\makeatother
2553             \fi}%
2554         {}}

```

10.4.4 `hyperref`

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

```

2555 \AtBeginDocument{%
2556     \ifx\pdfstringdefDisableCommands\undefined\else
2557     \pdfstringdefDisableCommands{\languageshorthands{system}}%
2558     \fi}

```

10.4.5 `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.

```

2559 \DeclareRobustCommand{\FOREIGNLANGUAGE}[1]{%
2560     \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.

```

2561 \def\substitutefontfamily#1#2#3{%
2562     \lowercase{\immediate\openout15=#1#2.fd\relax}%
2563     \immediate\write15{%
2564         \string\ProvidesFile{#1#2.fd}%
2565         [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
2566         \space generated font description file]^^J

```

```

2567 \string\DeclareFontFamily{#1}{#2}{}^^J
2568 \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{}^^J
2569 \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{}^^J
2570 \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{}^^J
2571 \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{}^^J
2572 \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{}^^J
2573 \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{}^^J
2574 \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{}^^J
2575 \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{}^^J
2576 }%
2577 \closeout15
2578 }

```

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

```
2579 \@onlypreamble\substitutefontfamily
```

10.5 Encoding and fonts

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

```
\ensureascii
```

```

2580 \bbl@trace{Encoding and fonts}
2581 \newcommand\BabelNonASCII{LGR,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU,PU,PD1}
2582 \newcommand\BabelNonText{TS1,T3,TS3}
2583 \let\org@TeX\TeX
2584 \let\org@LaTeX\LaTeX
2585 \let\ensureascii\@firstofone
2586 \AtBeginDocument{%
2587   \in@false
2588   \bbl@foreach\BabelNonASCII{% is there a text non-ascii enc?
2589     \ifin@\else
2590       \lowercase{\bbl@xin@{,#1enc.def,}{,\@filelist,}}%
2591       \fi}%
2592   \ifin@ % if a text non-ascii has been loaded
2593     \def\ensureascii#1{{\fontencoding{OT1}\selectfont#1}}%
2594     \DeclareTextCommandDefault{\TeX}{\org@TeX}%
2595     \DeclareTextCommandDefault{\LaTeX}{\org@LaTeX}%
2596     \def\bbl@tempb#1\@@{\uppercase{\bbl@tempc#1}ENC.DEF\empty\@@}%
2597     \def\bbl@tempc#1ENC.DEF#2\@@{%
2598       \ifx\empty#2\else
2599         \bbl@ifunset{T#1}%
2600         {}%
2601         {\bbl@xin@{,#1,}{,\BabelNonASCII,\BabelNonText,}}%
2602         \ifin@
2603           \DeclareTextCommand{\TeX}{#1}{\ensureascii{\org@TeX}}%
2604           \DeclareTextCommand{\LaTeX}{#1}{\ensureascii{\org@LaTeX}}%
2605         \else
2606           \def\ensureascii##1{{\fontencoding{#1}\selectfont##1}}%
2607           \fi}%
2608     \fi}%
2609   \bbl@foreach\@filelist{\bbl@tempb#1\@@}% TODO - \@@ de mas??
2610   \bbl@xin@{\cf@encoding,}{,\BabelNonASCII,\BabelNonText,}%

```

```

2611 \ifin@\else
2612 \edef\ensureascii#1{%
2613 \noexpand\fontencoding{\cf@encoding}\noexpand\selectfont#1}}%
2614 \fi
2615 \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.

```
2616 \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.

```

2617 \AtBeginDocument{%
2618 \@ifpackageloaded{fontspec}%
2619 {\xdef\latinencoding{%
2620 \ifx\UTFencname\@undefined
2621 EU\ifcase\bbl@engine\or2\or1\fi
2622 \else
2623 \UTFencname
2624 \fi}}%
2625 {\gdef\latinencoding{OT1}%
2626 \ifx\cf@encoding\bbl@t@one
2627 \xdef\latinencoding{\bbl@t@one}%
2628 \else
2629 \@ifl@aded{def}{t1enc}{\xdef\latinencoding{\bbl@t@one}}}%
2630 \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.

```

2631 \DeclareRobustCommand{\latintext}{%
2632 \fontencoding{\latinencoding}\selectfont
2633 \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.

```

2634 \ifx\@undefined\DeclareTextFontCommand
2635 \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}
2636 \else
2637 \DeclareTextFontCommand{\textlatin}{\latintext}
2638 \fi

```

10.6 Basic bidi support

Work in progress. This code is currently placed here for practical reasons.

It is loosely based on `rlbabel.def`, but most of it has been developed from scratch. This babel module (by Johannes Braams and Boris Lavva) has served the purpose of typesetting R documents for two decades, and despite its flaws I think it is still a good starting point (some parts have been copied here almost verbatim), partly thanks to its simplicity. I’ve also looked at ARABI (by Youssef Jabri), which is compatible with babel.

There are two ways of modifying macros to make them “bidi”, namely, by patching the internal low-level macros (which is what I have done with lists, columns, counters, tocs, much like rlbabel did), and by introducing a “middle layer” just below the user interface (sectioning, footnotes).

- pdftex provides a minimal support for bidi text, and it must be done by hand. Vertical typesetting is not possible.
- xetex is somewhat better, thanks to its font engine (even if not always reliable) and a few additional tools. However, very little is done at the paragraph level. Another challenging problem is text direction does not honour \TeX grouping.
- luatex can provide the most complete solution, as we can manipulate almost freely the node list, the generated lines, and so on, but bidi text does not work out of the box and some development is necessary. It also provides tools to properly set left-to-right and right-to-left page layouts. As Lua \TeX -ja shows, vertical typesetting is possible, too. Its main drawback is font handling is often considered to be less mature than xetex, mainly in Indic scripts (but there are steps to make HarfBuzz, the xetex font engine, available in luatex; see <<https://github.com/tatzetwerk/luatex-harfbuzz>>).

```

2639 \bbl@trace{Basic (internal) bidi support}
2640 \def\bbl@alscripts{,Arabic,Syriac,Thaana,}
2641 \def\bbl@rscripts{%
2642   ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
2643   Old Hungarian,Old Hungarian,Lybian,Mandaean,Manichaean,%
2644   Manichaean,Meroitic Cursive,Meroitic,Old North Arabian,%
2645   Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
2646   Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%
2647   Old South Arabian,}%
2648 \def\bbl@provide@dirs#1{%
2649   \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts\bbl@rscripts}%
2650   \ifin@
2651     \global\bbl@csarg\chardef{wdir@#1}\@ne
2652     \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts}%
2653     \ifin@
2654       \global\bbl@csarg\chardef{wdir@#1}\tw@ % useless in xetex
2655       \fi
2656     \else
2657       \global\bbl@csarg\chardef{wdir@#1}\z@
2658       \fi
2659     \ifodd\bbl@engine
2660       \bbl@csarg\ifcase{wdir@#1}%
2661         \directlua{ Babel.locale_props[\the\localeid].textdir = 'l' }%
2662         \or
2663         \directlua{ Babel.locale_props[\the\localeid].textdir = 'r' }%
2664         \or
2665         \directlua{ Babel.locale_props[\the\localeid].textdir = 'al' }%
2666         \fi
2667     \fi}
2668 \def\bbl@switchdir{%
2669   \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}}%
2670   \bbl@ifunset{bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{}}%
2671   \bbl@exp{\bbl@setdirs\bbl@cs{wdir@\languagename}}}}
2672 \def\bbl@setdirs#1{% TODO - math
2673   \ifcase\bbl@select@type % TODO - strictly, not the right test
2674     \bbl@bodydir{#1}%
2675     \bbl@paddir{#1}%
2676   \fi

```

```

2677 \bbl@textdir{#1}}
2678 \ifodd\bbl@engine % luatex=1
2679 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
2680 \DisableBabelHook{babel-bidi}
2681 \chardef\bbl@thetextdir\z@
2682 \chardef\bbl@thepardir\z@
2683 \def\bbl@getluadir#1{%
2684   \directlua{
2685     if tex.#1dir == 'TLT' then
2686       tex.sprint('0')
2687     elseif tex.#1dir == 'TRT' then
2688       tex.sprint('1')
2689     end}}
2690 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\textdir.. 3=0 lr/1 r1
2691   \ifcase#3\relax
2692     \ifcase\bbl@getluadir{#1}\relax\else
2693       #2 TLT\relax
2694     \fi
2695   \else
2696     \ifcase\bbl@getluadir{#1}\relax
2697       #2 TRT\relax
2698     \fi
2699   \fi}
2700 \def\bbl@textdir#1{%
2701   \bbl@setluadir{text}\textdir{#1}%
2702   \chardef\bbl@thetextdir#1\relax
2703   \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*3+#1}}
2704 \def\bbl@pardir#1{%
2705   \bbl@setluadir{par}\pardir{#1}%
2706   \chardef\bbl@thepardir#1\relax}
2707 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}
2708 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}
2709 \def\bbl@dirparastext{\pardir\the\textdir\relax}% %%%
2710 % Sadly, we have to deal with boxes in math with basic.
2711 % Activated every math with the package option bidi=:
2712 \def\bbl@mathboxdir{%
2713   \ifcase\bbl@thetextdir\relax
2714     \everyhbox{\textdir TLT\relax}%
2715   \else
2716     \everyhbox{\textdir TRT\relax}%
2717   \fi}
2718 \else % pdftex=0, xetex=2
2719 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
2720 \DisableBabelHook{babel-bidi}
2721 \newcount\bbl@dirlevel
2722 \chardef\bbl@thetextdir\z@
2723 \chardef\bbl@thepardir\z@
2724 \def\bbl@textdir#1{%
2725   \ifcase#1\relax
2726     \chardef\bbl@thetextdir\z@
2727     \bbl@textdir@i\beginL\endL
2728   \else
2729     \chardef\bbl@thetextdir\@ne
2730     \bbl@textdir@i\beginR\endR
2731   \fi}
2732 \def\bbl@textdir@i#1#2{%
2733   \ifhmode
2734     \ifnum\currentgrouplevel>\z@
2735       \ifnum\currentgrouplevel=\bbl@dirlevel

```

```

2736     \bbl@error{Multiple bidi settings inside a group}%
2737     {I'll insert a new group, but expect wrong results.}%
2738     \bgroup\aftergroup#2\aftergroup\egroup
2739     \else
2740     \ifcase\currentgrouptype\or % 0 bottom
2741     \aftergroup#2% 1 simple {}
2742     \or
2743     \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
2744     \or
2745     \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
2746     \or\or\or % vbox vtop align
2747     \or
2748     \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
2749     \or\or\or\or\or\or % output math disc insert vcent mathchoice
2750     \or
2751     \aftergroup#2% 14 \beginngroup
2752     \else
2753     \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
2754     \fi
2755     \fi
2756     \bbl@dirlevel\currentgrouplevel
2757     \fi
2758     #1%
2759     \fi}
2760 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
2761 \let\bbl@bodydir@gobble
2762 \let\bbl@pagedir@gobble
2763 \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).

```

2764 \def\bbl@xebidipar{%
2765   \let\bbl@xebidipar\relax
2766   \TeXeTstate\@ne
2767   \def\bbl@xeeverypar{%
2768     \ifcase\bbl@thepardir
2769     \ifcase\bbl@thetextdir\else\beginR\fi
2770     \else
2771     {\setbox\z@\lastbox\beginR\box\z@}%
2772     \fi}%
2773   \let\bbl@severypar\everypar
2774   \newtoks\everypar
2775   \everypar=\bbl@severypar
2776   \bbl@severypar{\bbl@xeeverypar\the\everypar}}
2777 \@ifpackagewith{babel}{bidi=bidi}%
2778 {\let\bbl@textdir@i@gobbletwo
2779   \let\bbl@xebidipar\@empty
2780   \AddBabelHook{bidi}{foreign}{%
2781     \def\bbl@tempa{\def\BabelText####1}%
2782     \ifcase\bbl@thetextdir
2783     \expandafter\bbl@tempa\expandafter{\BabelText{\LR{##1}}}%
2784     \else
2785     \expandafter\bbl@tempa\expandafter{\BabelText{\RL{##1}}}%
2786     \fi}
2787   \def\bbl@pardir#1{\ifcase#1\relax\setLR\else\setRL\fi}}
2788 {}%
2789 \fi

```

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

```
2790 \DeclareRobustCommand\babelsublr[1]{\leavevmode{\bbl@textdir\z@#1}}
2791 \AtBeginDocument{%
2792   \ifx\pdfstringdefDisableCommands\undefined\else
2793     \ifx\pdfstringdefDisableCommands\relax\else
2794       \pdfstringdefDisableCommands{\let\babelsublr\@firstofone}%
2795     \fi
2796   \fi}
```

10.7 Local Language Configuration

`\loadlocalcfg` At some sites it may be necessary to add site-specific actions to a language definition file. This can be done by creating a file with the same name as the language definition file, but with the extension `.cfg`. For instance the file `nor.sk.cfg` will be loaded when the language definition file `nor.sk.ldf` is loaded.

For plain-based formats we don't want to override the definition of `\loadlocalcfg` from `plain.def`.

```
2797 \bbl@trace{Local Language Configuration}
2798 \ifx\loadlocalcfg\undefined
2799   \ifpackagewith{babel}{noconfigs}%
2800     {\let\loadlocalcfg@gobble}%
2801     {\def\loadlocalcfg#1{%
2802       \InputIfFileExists{#1.cfg}%
2803       {\typeout{*****^J%
2804                 * Local config file #1.cfg used^^J%
2805                 *}}%
2806       \@empty}}
2807 \fi
```

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

```
2808 \ifx\@unexpandable@protect\undefined
2809   \def\@unexpandable@protect{\noexpand\protect\noexpand}
2810   \long\def\protected@write#1#2#3{%
2811     \begingroup
2812       \let\thepage\relax
2813       #2%
2814       \let\protect\@unexpandable@protect
2815       \edef\reserved@a{\write#1{#3}}%
2816       \reserved@a
2817     \endgroup
2818     \if@nobreak\ifvmode\nobreak\fi\fi}
2819 \fi
2820 </core>
2821 <*kernel>
```

11 Multiple languages (switch.def)

Plain \TeX version 3.0 provides the primitive `\language` that is used to store the current language. When used with a pre-3.0 version this function has to be implemented by allocating a counter.

```
2822 <<Make sure ProvidesFile is defined>>
2823 \ProvidesFile{switch.def}[<<date>> <<version>> Babel switching mechanism]
2824 <<Load macros for plain if not LaTeX>>
2825 <<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.

```

2826 \def\bbl@version{<<version>>}
2827 \def\bbl@date{<<date>>}
2828 \def\adddialect#1#2{%
2829   \global\chardef#1#2\relax
2830   \bbl@usehooks{adddialect}{#1}{#2}}%
2831 \begingroup
2832   \count@#1\relax
2833   \def\bbl@elt##1##2##3##4{%
2834     \ifnum\count@=##2\relax
2835       \bbl@info{\string#1 = using hyphenrules for ##1\%
2836         (\string\language\the\count@)}%
2837       \def\bbl@elt####1####2####3####4{%
2838         \fi}%
2839       \bbl@languages
2840 \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.

```

2841 \def\bbl@fixname#1{%
2842   \begingroup
2843   \def\bbl@temp{l@}%
2844   \edef\bbl@tempd{\noexpand\@ifundefined{\noexpand\bbl@temp#1}}%
2845   \bbl@tempd
2846   {\lowercase\expandafter{\bbl@tempd}%
2847    {\uppercase\expandafter{\bbl@tempd}%
2848     \@empty
2849     {\edef\bbl@tempd{\def\noexpand#1{#1}}%
2850      \uppercase\expandafter{\bbl@tempd}}}%
2851    {\edef\bbl@tempd{\def\noexpand#1{#1}}%
2852     \lowercase\expandafter{\bbl@tempd}}}%
2853   \@empty
2854   \edef\bbl@tempd{\endgroup\def\noexpand#1{#1}}%
2855   \bbl@tempd}
2856 \def\bbl@iflanguage#1{%
2857   \@ifundefined{l@#1}{\@nolanerr{#1}\@gobble}\@firstofone}

```

`\iflanguage` Users might want to test (in a private package for instance) which language is currently active. For this we provide a test macro, `\iflanguage`, that has three arguments. It checks whether the first argument is a known language. If so, it compares the first argument with the value of `\language`. Then, depending on the result of the comparison, it executes either the second or the third argument.

```

2858 \def\iflanguage#1{%
2859   \bbl@iflanguage{#1}{%
2860     \ifnum\csname l@#1\endcsname=\language
2861       \expandafter\@firstoftwo
2862     \else
2863       \expandafter\@secondoftwo
2864     \fi}}

```

11.1 Selecting the language

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

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

```
2865 \let\bbl@select@type\z@
2866 \edef\selectlanguage{%
2867   \noexpand\protect
2868   \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`.

```
2869 \ifx\@undefined\protect\let\protect\relax\fi
```

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

```
2870 \ifx\documentclass\@undefined
2871   \def\xstring{\string\string\string}
2872 \else
2873   \let\xstring\string
2874 \fi
```

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

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

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

```
2875 \def\bbl@language@stack{}
```

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

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

```
2876 \def\bbl@push@language{%
2877   \xdef\bbl@language@stack{\language+\bbl@language@stack}}
```

Retrieving information from the stack is a little bit less simple, as we need to remove the element from the stack while storing it in the macro `\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 (delimited by '-') in its third argument.

```
2878 \def\bbl@pop@lang#1+#2-#3{%
2879   \edef\language{#1}\xdef#3{#2}}
```

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

```
2880 \let\bbl@ifrestoring\@secondoftwo
2881 \def\bbl@pop@language{%
2882   \expandafter\bbl@pop@lang\bbl@language@stack-\bbl@language@stack
2883   \let\bbl@ifrestoring\@firstoftwo
2884   \expandafter\bbl@set@language\expandafter{\language}%
2885   \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.

```
2886 \chardef\localeid\z@
2887 \def\bbl@id@last{0} % No real need for a new counter
2888 \def\bbl@id@assign{%
2889   \bbl@ifunset{bbl@id@\language}%
2890     {\count@bbl@id@last\relax
2891      \advance\count@\@ne
2892      \bbl@csarg\chardef{id@\language}\count@
2893      \edef\bbl@id@last{\the\count@}%
2894      \ifcase\bbl@engine\or
2895        \directlua{
2896          Babel = Babel or {}
2897          Babel.locale_props = Babel.locale_props or {}
2898          Babel.locale_props[\bbl@id@last] = {}
2899        }%
2900      \fi}%
2901   {}}
```

The unprotected part of `\selectlanguage`.

```
2902 \expandafter\def\csname selectlanguage \endcsname#1{%
2903   \ifnum\bbl@hymapsel=\@ccclv\let\bbl@hymapsel\tw@\fi
2904   \bbl@push@language
2905   \aftergroup\bbl@pop@language
2906   \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.

```

2907 \def\BabelContentsFiles{toc,lof,lot}
2908 \def\bbl@set@language#1{% from selectlanguage, pop@
2909   \edef\language{%
2910     \ifnum\escapechar=\expandafter`\string#1\@empty
2911     \else\string#1\@empty\fi}%
2912   \select@language{\language}%
2913   % write to aux
2914   \expandafter\ifx\csname date\language\endcsname\relax\else
2915     \if@filesw
2916       \ifx\babel@aux@\gobbletwo\else % Set if single in the first, redundant
2917         \protected@write\@auxout{\string\babel@aux{\language}}{}%
2918         \fi
2919         \bbl@usehooks{write}{}%
2920       \fi
2921     \fi}
2922 \def\select@language#1{% from set@, babel@aux
2923   % set hmap
2924   \ifnum\bbl@hmapsel=\@cclv\chardef\bbl@hmapsel4\relax\fi
2925   % set name
2926   \edef\language{#1}%
2927   \bbl@fixname\language
2928   \bbl@iflanguage\language{%
2929     \expandafter\ifx\csname date\language\endcsname\relax
2930       \bbl@error
2931       {Unknown language `#1'. Either you have\\%
2932         misspelled its name, it has not been installed,\\%
2933         or you requested it in a previous run. Fix its name,\\%
2934         install it or just rerun the file, respectively. In\\%
2935         some cases, you may need to remove the aux file}%
2936       {You may proceed, but expect wrong results}%
2937     \else
2938       % set type
2939       \let\bbl@select@type\z@
2940       \expandafter\bbl@switch\expandafter{\language}%
2941     \fi}}
2942 \def\babel@aux#1#2{%
2943   \expandafter\ifx\csname date#1\endcsname\relax
2944     \expandafter\ifx\csname bbl@auxwarn@#1\endcsname\relax
2945       \@namedef{bbl@auxwarn@#1}{}%
2946       \bbl@warning
2947       {Unknown language `#1'. Very likely you\\%
2948         requested it in a previous run. Expect some\\%
2949         wrong results in this run, which should vanish\\%
2950         in the next one. Reported}%
2951     \fi
2952   \else
2953     \select@language{#1}%
2954     \bbl@foreach\BabelContentsFiles{%
2955       \@writefile{##1}{\babel@toc{#1}{#2}}}% %% TODO - ok in plain?
2956   \fi}

```



```
2957 \def\babel@toc#1#2{%
2958   \select@language{#1}}
```

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

```
2959 \let\select@language@x\select@language
```

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

The name of the language is stored in the control sequence `\languagename`. Then we have to *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.

```
2960 \newif\ifbbl@usedategroup
2961 \def\bbl@switch#1{% from select@, foreign@
2962   % restore
2963   \originalTeX
2964   \expandafter\def\expandafter\originalTeX\expandafter{%
2965     \csname noextras#1\endcsname
2966     \let\originalTeX\@empty
2967     \babel@beginsave}%
2968   \bbl@usehooks{afterreset}{}%
2969   \languageshorthands{none}%
2970   % set the locale id
2971   \bbl@id@assign
2972   \chardef\localeid\@nameuse{bbl@id@\@languagename}%
2973   % switch captions, date
2974   \ifcase\bbl@select@type
2975     \ifhmode
2976       \hskip\z@skip % trick to ignore spaces
2977       \csname captions#1\endcsname\relax
2978       \csname date#1\endcsname\relax
2979       \loop\ifdim\lastskip>\z@\unskip\repeat\unskip
2980     \else
2981       \csname captions#1\endcsname\relax
2982       \csname date#1\endcsname\relax
2983     \fi
2984   \else
2985     \ifbbl@usedategroup % if \foreign... within \<lang>date
2986     \bbl@usedategroupfalse
2987     \ifhmode
2988       \hskip\z@skip % trick to ignore spaces
2989       \csname date#1\endcsname\relax
2990       \loop\ifdim\lastskip>\z@\unskip\repeat\unskip
2991     \else
2992       \csname date#1\endcsname\relax
2993     \fi
2994   \fi
2995 \fi
```

```

2996 % switch extras
2997 \bbl@usehooks{beforeextras}{}%
2998 \csname extras#1\endcsname\relax
2999 \bbl@usehooks{afterextras}{}%
3000 % > babel-ensure
3001 % > babel-sh-<short>
3002 % > babel-bidi
3003 % > babel-fontspec
3004 % hyphenation - case mapping
3005 \ifcase\bbl@opt@hyphenmap\or
3006 \def\BabelLower##1##2{\lccode##1=##2\relax}%
3007 \ifnum\bbl@hymapsel>4\else
3008 \csname\languagenam @bbl@hyphenmap\endcsname
3009 \fi
3010 \chardef\bbl@opt@hyphenmap\z@
3011 \else
3012 \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
3013 \csname\languagenam @bbl@hyphenmap\endcsname
3014 \fi
3015 \fi
3016 \global\let\bbl@hymapsel\@cclv
3017 % hyphenation - patterns
3018 \bbl@patterns{#1}%
3019 % hyphenation - mins
3020 \babel@savevariable\lefthyphenmin
3021 \babel@savevariable\righthyphenmin
3022 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
3023 \set@hyphenmins\tw@\thr@\relax
3024 \else
3025 \expandafter\expandafter\expandafter\set@hyphenmins
3026 \csname #1hyphenmins\endcsname\relax
3027 \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.

```

3028 \long\def\otherlanguage#1{%
3029 \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\thr@\fi
3030 \csname selectlanguage \endcsname{#1}%
3031 \ignorespaces}

```

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

```

3032 \long\def\endotherlanguage{%
3033 \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`.

```

3034 \expandafter\def\csname otherlanguage*\endcsname#1{%
3035 \ifnum\bbl@hymapsel=\@cclv\chardef\bbl@hymapsel4\relax\fi
3036 \foreign@language{#1}}

```

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

```
3037 \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`.

```
3038 \providecommand\bbl@beforeforeign{}
3039 \edef\foreignlanguage{%
3040   \noexpand\protect
3041   \expandafter\noexpand\csname foreignlanguage \endcsname}
3042 \expandafter\def\csname foreignlanguage \endcsname{%
3043   \@ifstar\bbl@foreign@s\bbl@foreign@x}
3044 \def\bbl@foreign@x#1#2{%
3045   \begingroup
3046     \let\BabelText\@firstofone
3047     \bbl@beforeforeign
3048     \foreign@language{#1}%
3049     \bbl@usehooks{foreign}{}%
3050     \BabelText{#2}% Now in horizontal mode!
3051   \endgroup}
3052 \def\bbl@foreign@s#1#2{% TODO - \shapemode, \setpar, ?\@@par
3053   \begingroup
3054     {\par}%
3055     \let\BabelText\@firstofone
3056     \foreign@language{#1}%
3057     \bbl@usehooks{foreign*}{}%
3058     \bbl@dirparastext
3059     \BabelText{#2}% Still in vertical mode!
3060     {\par}%
3061   \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`.

```
3062 \def\foreign@language#1{%
3063   % set name
3064   \edef\languagename{#1}%
3065   \bbl@fixname\languagename
```



```

3108 \def\hyphenrules#1{%
3109   \edef\bbl@tempf{#1}%
3110   \bbl@fixname\bbl@tempf
3111   \bbl@iflanguage\bbl@tempf{%
3112     \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
3113     \languageshorthands{none}%
3114     \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
3115       \set@hyphenmins\tw@\thr@@\relax
3116     \else
3117       \expandafter\expandafter\expandafter\set@hyphenmins
3118       \csname\bbl@tempf hyphenmins\endcsname\relax
3119     \fi}}
3120 \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.

```

3121 \def\providehyphenmins#1#2{%
3122   \expandafter\ifx\csname #1hyphenmins\endcsname\relax
3123     \@namedef{#1hyphenmins}{#2}%
3124   \fi}

```

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

```

3125 \def\set@hyphenmins#1#2{%
3126   \lefthyphenmin#1\relax
3127   \righthyphenmin#2\relax}

```

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

```

3128 \ifx\ProvidesFile\@undefined
3129   \def\ProvidesLanguage#1[#2 #3 #4]{%
3130     \wlog{Language: #1 #4 #3 <#2>}%
3131   }
3132 \else
3133   \def\ProvidesLanguage#1{%
3134     \begingroup
3135     \catcode`\ 10 %
3136     \@makeother\%
3137     \@ifnextchar[%]
3138       {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}
3139   \def\@provideslanguage#1[#2]{%
3140     \wlog{Language: #1 #2}%
3141     \expandafter\xdef\csname ver@#1.ldf\endcsname{#2}%
3142     \endgroup}
3143 \fi

```

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

```

3144 \def\LdfInit{%
3145   \chardef\atcatcode=\catcode`\@

```

```

3146 \catcode`\@=11\relax
3147 \input babel.def\relax
3148 \catcode`\@=\atcatcode \let\atcatcode\relax
3149 \LdfInit}

```

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

```

3150 \ifx\originalTeX\undefined\let\originalTeX\@empty\fi

```

Because this part of the code can be included in a format, we make sure that the macro which initialises the save mechanism, `\babel@beginsave`, is not considered to be undefined.

```

3151 \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’:

```

3152 \providecommand\setlocale{%
3153   \bbl@error
3154   {Not yet available}%
3155   {Find an armchair, sit down and wait}}
3156 \let\uselocale\setlocale
3157 \let\locale\setlocale
3158 \let\selectlocale\setlocale
3159 \let\textlocale\setlocale
3160 \let\textlanguage\setlocale
3161 \let\languagegettext\setlocale

```

11.2 Errors

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

`\@noopterr` When the package was loaded without options not everything will work as expected. An error message is issued in that case. When the format knows about `\PackageError` it must be $\LaTeX 2\epsilon$, so we can safely use its error handling interface. Otherwise we’ll have to ‘keep it simple’.

```

3162 \edef\bbl@nulllanguage{\string\language=0}
3163 \ifx\PackageError\undefined
3164   \def\bbl@error#1#2{%
3165     \begingroup
3166       \newlinechar=`^^J
3167       \def\{^^J(babel) }%
3168       \errhelp{#2}\errmessage{\{#1}%
3169     \endgroup}
3170   \def\bbl@warning#1{%
3171     \begingroup
3172       \newlinechar=`^^J
3173       \def\{^^J(babel) }%
3174       \message{\{#1}%
3175     \endgroup}
3176   \def\bbl@info#1{%
3177     \begingroup
3178       \newlinechar=`^^J
3179     \def\{^^J}%

```

```

3180     \wlog{#1}%
3181   \endgroup}
3182 \else
3183   \def\bb1@error#1#2{%
3184     \begingroup
3185       \def\{\MessageBreak}%
3186       \PackageError{babel}{#1}{#2}%
3187     \endgroup}
3188 \def\bb1@warning#1{%
3189   \begingroup
3190     \def\{\MessageBreak}%
3191     \PackageWarning{babel}{#1}%
3192   \endgroup}
3193 \def\bb1@info#1{%
3194   \begingroup
3195     \def\{\MessageBreak}%
3196     \PackageInfo{babel}{#1}%
3197   \endgroup}
3198 \fi
3199 \@ifpackagewith{babel}{silent}
3200   {\let\bb1@info@gobble
3201    \let\bb1@warning@gobble}
3202   {}
3203 \def\bb1@nocaption{\protect\bb1@nocaption@i}
3204 \def\bb1@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
3205   \global\@namedef{#2}{\textbf{?#1?}}%
3206   \@nameuse{#2}%
3207   \bb1@warning}%
3208   \@backslashchar#2 not set. Please, define\%
3209   it in the preamble with something like:\%
3210   \string\renewcommand\@backslashchar#2{..}\%
3211   Reported}}
3212 \def\bb1@tentative{\protect\bb1@tentative@i}
3213 \def\bb1@tentative@i#1{%
3214   \bb1@warning{%
3215     Some functions for '#1' are tentative.\%
3216     They might not work as expected and their behavior\%
3217     could change in the future.\%
3218     Reported}}
3219 \def\@nolanerr#1{%
3220   \bb1@error
3221   {You haven't defined the language #1\space yet}%
3222   {Your command will be ignored, type <return> to proceed}}
3223 \def\@nopatterns#1{%
3224   \bb1@warning
3225   {No hyphenation patterns were preloaded for\%
3226    the language `#1' into the format.\%
3227    Please, configure your TeX system to add them and\%
3228    rebuild the format. Now I will use the patterns\%
3229    preloaded for \bb1@nulllanguage\space instead}}
3230 \let\bb1@usehooks\@gobbletwo
3231 (/kernel)
3232 (*patterns)

```

12 Loading hyphenation patterns

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

We want to add a message to the message `LATEX 2.09` puts in the `\everyjob` register. This could be done by the following code:

```
#####\let\orgeveryjob\everyjob
#####\def\everyjob#1{%
#####\orgeveryjob{#1}%
#####\orgeveryjob\expandafter{\the\orgeveryjob\immediate\write16{%
#####\hyphenation_patterns_for_\the\loaded@patterns_loaded.}}%
#####\let\everyjob\orgeveryjob\let\orgeveryjob\@undefined}
```

The code above redefines the control sequence `\everyjob` in order to be able to add something to the current contents of the register. This is necessary because the processing of hyphenation patterns happens long before `LATEX` fills the register.

There are some problems with this approach though.

- When someone wants to use several hyphenation patterns with `SITEX` the above scheme won't work. The reason is that `SITEX` overwrites the contents of the `\everyjob` register with its own message.
- Plain `TEX` does not use the `\everyjob` register so the message would not be displayed.

To circumvent this a 'dirty trick' can be used. As this code is only processed when creating a new format file there is one command that is sure to be used, `\dump`. Therefore the original `\dump` is saved in `\org@dump` and a new definition is supplied.

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

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

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

```
3233 <<Make sure ProvidesFile is defined>>
3234 \ProvidesFile{hyphen.cfg}[<<date>>] <<version>> Babel hyphens]
3235 \xdef\bb1@format{\jobname}
3236 \ifx\AtBeginDocument\@undefined
3237   \def\@empty{}
3238   \let\orig@dump\dump
3239   \def\dump{%
3240     \ifx\@ztryfc\@undefined
3241       \else
3242         \toks0=\expandafter{\@preamblecmds}%
3243         \edef\@preamblecmds{\noexpand\@begindocumenthook\the\toks0}%
3244         \def\@begindocumenthook{}%
3245       \fi
3246       \let\dump\orig@dump\let\orig@dump\@undefined\dump}
3247 \fi
3248 <<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.

```
3249 \def\process@line#1#2 #3 #4 {%
3250   \ifx=#1%
3251     \process@synonym{#2}%
3252   \else
3253     \process@language{#1#2}{#3}{#4}%
3254   \fi
3255   \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.

```
3256 \toks@{}
3257 \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.

```
3258 \def\process@synonym#1{%
3259   \ifnum\last@language=\m@ne
3260     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
3261   \else
3262     \expandafter\chardef\csname l@#1\endcsname\last@language
3263     \wlog{\string\l@#1=\string\language\the\last@language}%
3264     \expandafter\let\csname #1hyphenmins\expandafter\endcsname
3265       \csname\languagenamename hyphenmins\endcsname
3266     \let\bbl@elt\relax
3267     \edef\bbl@languages{\bbl@languages\bbl@elt{#1}{\the\last@language}{}}%
3268   \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 `\langle lang \rangle hyphenmins` macro. When no assignments were made we provide a default setting.

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

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

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

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

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

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

```

3269 \def\process@language#1#2#3{%
3270 \expandafter\addlanguage\csname l@#1\endcsname
3271 \expandafter\language\csname l@#1\endcsname
3272 \edef\language#1{%
3273 \bbl@hook@everylanguage{#1}%
3274 % > luatex
3275 \bbl@get@enc#1::\@@@
3276 \begingroup
3277 \lefthyphenmin@m@ne
3278 \bbl@hook@loadpatterns{#2}%
3279 % > luatex
3280 \ifnum\lefthyphenmin=\m@ne
3281 \else
3282 \expandafter\xdef\csname #1hyphenmins\endcsname{%
3283 \the\lefthyphenmin\the\righthyphenmin}%
3284 \fi
3285 \endgroup
3286 \def\bbl@tempa{#3}%
3287 \if\bbl@tempa\@empty\else
3288 \bbl@hook@loadexceptions{#3}%
3289 % > luatex
3290 \fi
3291 \let\bbl@elt\relax
3292 \edef\bbl@languages{%
3293 \bbl@languages\bbl@elt{#1}{\the\language}{#2}{\bbl@tempa}}%
3294 \ifnum\the\language=\z@
3295 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
3296 \set@hyphenmins\tw@\thr@@\relax
3297 \else
3298 \expandafter\expandafter\expandafter\set@hyphenmins
3299 \csname #1hyphenmins\endcsname
3300 \fi
3301 \the\toks@
3302 \toks@{}%
3303 \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.

```

3304 \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.

```

3305 \def\bbl@hook@everylanguage#1{}
3306 \def\bbl@hook@loadpatterns#1{\input #1\relax}
3307 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
3308 \let\bbl@hook@loadkernel\bbl@hook@loadpatterns
3309 \begingroup
3310 \def\AddBabelHook#1#2{%
3311 \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
3312 \def\next{\toks1}%

```

```

3313   \else
3314     \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname###1}%
3315     \fi
3316   \next}
3317 \ifx\directlua\@undefined
3318   \ifx\XeTeXinputencoding\@undefined\else
3319     \input xebabel.def
3320   \fi
3321 \else
3322   \input luababel.def
3323 \fi
3324 \openin1 = babel-\bbl@format.cfg
3325 \ifeof1
3326 \else
3327   \input babel-\bbl@format.cfg\relax
3328 \fi
3329 \closein1
3330 \endgroup
3331 \bbl@hook@loadkernel{switch.def}

```

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

```
3332 \openin1 = language.dat
```

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

```

3333 \def\languagename{english}%
3334 \ifeof1
3335   \message{I couldn't find the file language.dat,\space
3336           I will try the file hyphen.tex}
3337   \input hyphen.tex\relax
3338   \chardef\l@english\z@
3339 \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`.

```
3340 \last@language\m@ne
```

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

```
3341 \loop
```

While reading from the input, it is useful to switch off recognition of the end-of-line character. This saves us stripping off spaces from the contents of the control sequence.

```

3342   \endlinechar\m@ne
3343   \read1 to \bbl@line
3344   \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.

```

3345   \if T\ifeof1F\fi T\relax
3346   \ifx\bbl@line\@empty\else
3347     \edef\bbl@line{\bbl@line\space\space\space}%
3348     \expandafter\process@line\bbl@line\relax
3349   \fi
3350 \repeat

```

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

```

3351 \begingroup
3352   \def\bbl@elt#1#2#3#4{%
3353     \global\language=#2\relax
3354     \gdef\languagename{#1}%
3355     \def\bbl@elt##1##2##3##4{}}%
3356   \bbl@languages
3357 \endgroup
3358 \fi

```

and close the configuration file.

```
3359 \closein1
```

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

```

3360 \if\the\toks@\else
3361   \errhelp{language.dat loads no language, only synonyms}
3362   \errmessage{Orphan language synonym}
3363 \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.

```

3364 \let\bbl@line\@undefined
3365 \let\process@line\@undefined
3366 \let\process@synonym\@undefined
3367 \let\process@language\@undefined
3368 \let\bbl@get@enc\@undefined
3369 \let\bbl@hyph@enc\@undefined
3370 \let\bbl@tempa\@undefined
3371 \let\bbl@hook@loadkernel\@undefined
3372 \let\bbl@hook@everylanguage\@undefined
3373 \let\bbl@hook@loadpatterns\@undefined
3374 \let\bbl@hook@loadexceptions\@undefined
3375 \let\patterns\@undefined

```

Here the code for `iniTEX` ends.

13 Font handling with fontspec

Add the bidi handler just before `luaoftload`, which is loaded by default by LaTeX. Just in case, consider the possibility it has not been loaded. First, a couple of definitions related to `bidi` [misplaced].

```

3376 <<{*More package options}>> ≡
3377 \ifodd\bbl@engine
3378   \DeclareOption{bidi=basic-r}%
3379   {\ExecuteOptions{bidi=basic}}
3380 \DeclareOption{bidi=basic}%
3381   {\let\bbl@beforeforeign\leavevmode
3382     % TODO - to locale_props, not as separate attribute
3383     \newattribute\bbl@attr@dir
3384     % I don't like it, hackish:
3385     \frozen@everymath\expandafter{%
3386       \expandafter\bbl@mathboxdir\the\frozen@everymath}%
3387     \frozen@everydisplay\expandafter{%
3388       \expandafter\bbl@mathboxdir\the\frozen@everydisplay}%

```

```

3389     \bbl@exp{\output{\bodydir\pagedir\the\output}}%
3390     \AtEndOfPackage{\EnableBabelHook{babel-bidi}}%
3391 \else
3392   \DeclareOption{bidi=basic-r}%
3393     {\ExecuteOptions{bidi=basic}}
3394   \DeclareOption{bidi=basic}%
3395     {\bbl@error
3396       {The bidi method `basic' is available only in\\%
3397         luatex. I'll continue with `bidi=default', so\\%
3398         expect wrong results}%
3399       {See the manual for further details.}%
3400     \let\bbl@beforeforeign\leavevmode
3401     \AtEndOfPackage{%
3402       \EnableBabelHook{babel-bidi}%
3403       \bbl@xebidipar}}
3404   \def\bbl@loadxebidi#1{%
3405     \ifx\RTLfootnotetext\@undefined
3406       \AtEndOfPackage{%
3407         \EnableBabelHook{babel-bidi}%
3408         \ifx\fontspec\@undefined
3409           \usepackage{fontspec}% bidi needs fontspec
3410         \fi
3411         \usepackage#1{bidi}}%
3412     \fi}
3413   \DeclareOption{bidi=bidi}%
3414     {\bbl@tentative{bidi=bidi}%
3415     \bbl@loadxebidi{}}
3416   \DeclareOption{bidi=bidi-r}%
3417     {\bbl@tentative{bidi=bidi-r}%
3418     \bbl@loadxebidi{[rldocument]}}
3419   \DeclareOption{bidi=bidi-l}%
3420     {\bbl@tentative{bidi=bidi-l}%
3421     \bbl@loadxebidi{}}
3422 \fi
3423 \DeclareOption{bidi=default}%
3424   {\let\bbl@beforeforeign\leavevmode
3425   \ifodd\bbl@engine
3426     \newattribute\bbl@attr@dir
3427     \bbl@exp{\output{\bodydir\pagedir\the\output}}%
3428   \fi
3429   \AtEndOfPackage{%
3430     \EnableBabelHook{babel-bidi}%
3431     \ifodd\bbl@engine\else
3432       \bbl@xebidipar
3433     \fi}}
3434 <</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`.

```

3435 << *Font selection >> ≡
3436 \bbl@trace{Font handling with fontspec}
3437 \@onlypreamble\babelfont
3438 \newcommand\babelfont[2][1]{% 1=langs/scripts 2=fam
3439   \edef\bbl@tempa{#1}%
3440   \def\bbl@tempb{#2}% Used by \bbl@bblfont
3441   \ifx\fontspec\@undefined
3442     \usepackage{fontspec}%
3443   \fi

```

```

3444 \EnableBabelHook{babel-fontspec}% Just calls \bbl@switchfont
3445 \bbl@bblfont}
3446 \newcommand\bbl@bblfont[2][]{% 1=features 2=fontname, @font=rm|sf|tt
3447 \bbl@ifunset{\bbl@tempb family}%
3448 {\bbl@providfam{\bbl@tempb}}%
3449 {\bbl@exp{%
3450   \\bbl@sreplace\<\bbl@tempb family >%
3451   {\@nameuse{\bbl@tempb default}}{\<\bbl@tempb default>}}}%
3452 % For the default font, just in case:
3453 \bbl@ifunset{bbl@lsys@\languagenam}{\bbl@provide@lsys{\languagenam}}}%
3454 \expandafter\bbl@ifblank\expandafter{\bbl@tempa}%
3455 {\bbl@csarg\edef{\bbl@tempb dflt@}{<>{#1}{#2}}% save bbl@rmdflt@
3456 \bbl@exp{%
3457   \let\<bbl@\bbl@tempb dflt@\languagenam>\<bbl@\bbl@tempb dflt@>%
3458   \\bbl@font@set\<bbl@\bbl@tempb dflt@\languagenam>%
3459   \<\bbl@tempb default>\<\bbl@tempb family>}}%
3460 {\bbl@foreach\bbl@tempa{% ie bbl@rmdflt@lang / *scrt
3461   \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:

```

3462 \def\bbl@providfam#1{%
3463 \bbl@exp{%
3464   \\newcommand\<#1default>{}% Just define it
3465   \\bbl@add@list\\bbl@font@fams{#1}%
3466   \\DeclareRobustCommand\<#1family>%
3467   \\not@math@alphabet\<#1family>\relax
3468   \\fontfamily\<#1default>\\selectfont}%
3469   \\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.

```

3470 \def\bbl@nostdfont#1{%
3471 \bbl@ifunset{bbl@WFF@\f@family}%
3472 {\bbl@csarg\gdef{WFF@\f@family}}% Flag, to avoid dupl warns
3473 \bbl@warning{The current font is not a babel standard family:\%
3474 #1%
3475 \fontname\font\\%
3476 There is nothing intrinsically wrong with this warning, and\\%
3477 you can ignore it altogether if you do not need these\\%
3478 families. But if they are used in the document, you should be\\%
3479 aware 'babel' will no set Script and Language for them, so\\%
3480 you may consider defining a new family with \string\babelfont.\\%
3481 See the manual for further details about \string\babelfont.\\%
3482 Reported}}
3483 {}}%
3484 \gdef\bbl@switchfont{%
3485 \bbl@ifunset{bbl@lsys@\languagenam}{\bbl@provide@lsys{\languagenam}}}%
3486 \bbl@exp{% eg Arabic -> arabic
3487 \lowercase{\edef\\bbl@tempa{\bbl@cs{sname@\languagenam}}}}%
3488 \bbl@foreach\bbl@font@fams{%
3489 \bbl@ifunset{bbl@##1dflt@\languagenam}% (1) language?
3490 {\bbl@ifunset{bbl@##1dflt@*\bbl@tempa}% (2) from script?
3491 {\bbl@ifunset{bbl@##1dflt@}% 2=F - (3) from generic?
3492 {}% 123=F - nothing!
3493 {\bbl@exp{% 3=T - from generic
3494 \global\let\<bbl@##1dflt@\languagenam>%
3495 \<bbl@##1dflt@>}}}%
3496 {\bbl@exp{% 2=T - from script
3497 \global\let\<bbl@##1dflt@\languagenam>%

```

```

3498         \<bbl@##1dflt@*\bbl@tempa>}}}%
3499     {}}%                                1=T - language, already defined
3500 \def\bbl@tempa{\bbl@nostdfont{}}}%
3501 \bbl@foreach\bbl@font@fams{%      don't gather with prev for
3502   \bbl@ifunset{\bbl@##1dflt@\languagename}%
3503     {\bbl@cs{famrst@##1}%
3504     \global\bbl@csarg\let{famrst@##1}\relax}%
3505   {\bbl@exp{% order is relevant
3506     \\bbl@add\\originalTeX{%
3507       \\bbl@font@rst{\bbl@cs{##1dflt@\languagename}}}%
3508       \<##1default>\<##1family>{##1}}}%
3509     \\bbl@font@set\<bbl@##1dflt@\languagename>% the main part!
3510     \<##1default>\<##1family>}}}%
3511 \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`.

```

3512 \ifx\f@family\undefined\else % if latex
3513   \ifcase\bbl@engine % if pdftex
3514     \let\bbl@cckstfont\relax
3515   \else
3516     \def\bbl@cckstfont{%
3517       \begingroup
3518         \global\let\bbl@cckstfont\relax
3519         \let\bbl@tempa\@empty
3520         \bbl@foreach\bbl@font@fams{%
3521           \bbl@ifunset{\bbl@##1dflt@}%
3522             {\@nameuse{##1family}%
3523             \bbl@csarg\gdef{WFF@\f@family}}}% Flag
3524             \bbl@exp{\\bbl@add\\bbl@tempa{* \<##1family>= \f@family\\
3525               \space\space\fontname\font\\}}}%
3526             \bbl@csarg\xdef{##1dflt@}{\f@family}%
3527             \expandafter\xdef\csname ##1default\endcsname{\f@family}}}%
3528             {}}}%
3529     \ifx\bbl@tempa\@empty\else
3530       \bbl@warning{The following fonts are not babel standard families:\\
3531         \bbl@tempa
3532         There is nothing intrinsically wrong with it, but\\
3533         'babel' will no set Script and Language. Consider\\
3534         defining a new family with \string\babelfont.\\
3535         Reported}%
3536     \fi
3537   \endgroup}
3538 \fi
3539 \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.

```

3540 \def\bbl@font@set#1#2#3{ eg \bbl@rmdflt@lang \rmdefault \rmfamily
3541   \bbl@xin@{<>}{#1}%
3542   \ifin@
3543     \bbl@exp{\\bbl@fontspec@set\\#1\expandafter\@gobbletwo#1\\#3}%
3544   \fi
3545   \bbl@exp{%
3546     \def\\#2{#1}%          eg, \rmdefault{\bbl@rmdflt@lang}
3547     \\bbl@ifsamestring{#2}{\f@family}{\\#3\let\\bbl@tempa\relax}{}}}%

```

```

3548%      TODO - next should be global?, but even local does its job. I'm
3549%      still not sure -- must investigate:
3550 \def\bb1@fontspec@set#1#2#3#4{% eg \bb1@rmdflt@lang fnt-opt fnt-nme \xxfamily
3551   \let\bb1@tempe\bb1@mapselect
3552   \let\bb1@mapselect\relax
3553   \let\bb1@temp@fam#4%      eg, '\rmfamily', to be restored below
3554   \let#4\relax      % So that can be used with \newfontfamily
3555   \bb1@exp{%
3556     \let\bb1@temp@pfam\<\bb1@stripslash#4\space>% eg, '\rmfamily '
3557     \<keys_if_exist:nnF>{fontspec-opentype}%
3558     {Script/\bb1@cs{sname@\languagename}}%
3559     {\newfontscript{\bb1@cs{sname@\languagename}}%
3560     {\bb1@cs{sotf@\languagename}}}%
3561     \<keys_if_exist:nnF>{fontspec-opentype}%
3562     {Language/\bb1@cs{lname@\languagename}}%
3563     {\newfontlanguage{\bb1@cs{lname@\languagename}}%
3564     {\bb1@cs{lotf@\languagename}}}%
3565     \newfontfamily\#4%
3566     [\bb1@cs{lsys@\languagename},#2]}{#3}% ie \bb1@exp{.}{#3}
3567 \begingroup
3568   #4%
3569   \xdef#1{\f@family}%      eg, \bb1@rmdflt@lang{FreeSerif(0)}
3570 \endgroup
3571 \let#4\bb1@temp@fam
3572 \bb1@exp{\let\<\bb1@stripslash#4\space>}\bb1@temp@pfam
3573 \let\bb1@mapselect\bb1@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.

```

3574 \def\bb1@font@rst#1#2#3#4{%
3575   \bb1@csarg\def{famrst@#4}{\bb1@font@set{#1}#2#3}}

```

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

```

3576 \def\bb1@font@fams{rm,sf,tt}

```

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

```

3577 \newcommand\babelFSstore[2][{%
3578   \bb1@ifblank{#1}%
3579   {\bb1@csarg\def{sname@#2}{Latin}}%
3580   {\bb1@csarg\def{sname@#2}{#1}}%
3581   \bb1@provide@dirs{#2}%
3582   \bb1@csarg\ifnum{wdir@#2}>\z@
3583     \let\bb1@beforeforeign\leavevmode
3584     \EnableBabelHook{babel-bidi}%
3585   \fi
3586   \bb1@foreach{#2}{%
3587     \bb1@FSstore{##1}{rm}\rmdefault\bb1@save@rmdefault
3588     \bb1@FSstore{##1}{sf}\sfdefault\bb1@save@sfdefault
3589     \bb1@FSstore{##1}{tt}\ttdefault\bb1@save@ttdefault}}
3590 \def\bb1@FSstore#1#2#3#4{%
3591   \bb1@csarg\edef{#2default#1}{#3}%
3592   \expandafter\addto\csname extras#1\endcsname{%
3593     \let#4#3%
3594     \ifx#3\f@family
3595       \edef#3{\csname bbl@#2default#1\endcsname}%
3596     \fontfamily{#3}\selectfont

```



```

3597 \else
3598 \edef#3{\csname bbl@#2default#1\endcsname}%
3599 \fi}%
3600 \expandafter\addto\csname noextras#1\endcsname{%
3601 \ifx#3\f@family
3602 \fontfamily{#4}\selectfont
3603 \fi
3604 \let#3#4}}
3605 \let\bbl@langfeatures\@empty
3606 \def\babelFSfeatures{% make sure \fontspec is redefined once
3607 \let\bbl@ori@fontspec\fontspec
3608 \renewcommand\fontspec[1][{}]{%
3609 \bbl@ori@fontspec[\bbl@langfeatures##1]}
3610 \let\babelFSfeatures\bbl@FSfeatures
3611 \babelFSfeatures}
3612 \def\bbl@FSfeatures#1#2{%
3613 \expandafter\addto\csname extras#1\endcsname{%
3614 \babel@save\bbl@langfeatures
3615 \edef\bbl@langfeatures{#2,}}
3616 <</Font selection>>

```

14 Hooks for XeTeX and LuaTeX

14.1 XeTeX

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

ℒ_{TeX} sets many “codes” just before loading `hyphen.cfg`. That is not a problem in `luatex`, but in `xetex` they must be reset to the proper value. Most of the work is done in `xe(la)tex.ini`, so here we just “undo” some of the changes done by ℒ_{TeX}. Anyway, for consistency Lua_{TeX} also resets the catcodes.

```

3617 <<{*Restore Unicode catcodes before loading patterns}>> ≡
3618 \begingroup
3619 % Reset chars "80-"C0 to category "other", no case mapping:
3620 \catcode`\@=11 \count@=128
3621 \loop\ifnum\count@<192
3622 \global\uccode\count@=0 \global\lccode\count@=0
3623 \global\catcode\count@=12 \global\sffcode\count@=1000
3624 \advance\count@ by 1 \repeat
3625 % Other:
3626 \def\O ##1 {%
3627 \global\uccode"##1=0 \global\lccode"##1=0
3628 \global\catcode"##1=12 \global\sffcode"##1=1000 }%
3629 % Letter:
3630 \def\L ##1 ##2 ##3 {\global\catcode"##1=11
3631 \global\uccode"##1="##2
3632 \global\lccode"##1="##3
3633 % Uppercase letters have sffcode=999:
3634 \ifnum"##1="##3 \else \global\sffcode"##1=999 \fi }%
3635 % Letter without case mappings:
3636 \def\l ##1 {\L ##1 ##1 ##1 }%
3637 \l 00AA
3638 \L 00B5 039C 00B5
3639 \l 00BA
3640 \O 00D7
3641 \l 00DF
3642 \O 00F7

```

```

3643 \L 00FF 0178 00FF
3644 \endgroup
3645 \input #1\relax
3646 <</Restore Unicode catcodes before loading patterns>>

```

Some more common code.

```

3647 <<(*Footnote changes)>> ≡
3648 \bbl@trace{Bidi footnotes}
3649 \ifx\bbl@beforeforeign\leavevmode
3650 \def\bbl@footnote#1#2#3{%
3651 \@ifnextchar[%
3652 {\bbl@footnote@o{#1}{#2}{#3}}%
3653 {\bbl@footnote@x{#1}{#2}{#3}}}
3654 \def\bbl@footnote@x#1#2#3#4{%
3655 \bgroup
3656 \select@language@x{\bbl@main@language}%
3657 \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
3658 \egroup}
3659 \def\bbl@footnote@o#1#2#3[#4]#5{%
3660 \bgroup
3661 \select@language@x{\bbl@main@language}%
3662 \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
3663 \egroup}
3664 \def\bbl@footnotetext#1#2#3{%
3665 \@ifnextchar[%
3666 {\bbl@footnotetext@o{#1}{#2}{#3}}%
3667 {\bbl@footnotetext@x{#1}{#2}{#3}}}
3668 \def\bbl@footnotetext@x#1#2#3#4{%
3669 \bgroup
3670 \select@language@x{\bbl@main@language}%
3671 \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
3672 \egroup}
3673 \def\bbl@footnotetext@o#1#2#3[#4]#5{%
3674 \bgroup
3675 \select@language@x{\bbl@main@language}%
3676 \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
3677 \egroup}
3678 \def\BabelFootnote#1#2#3#4{%
3679 \ifx\bbl@fn@footnote\@undefined
3680 \let\bbl@fn@footnote\footnote
3681 \fi
3682 \ifx\bbl@fn@footnotetext\@undefined
3683 \let\bbl@fn@footnotetext\footnotetext
3684 \fi
3685 \bbl@ifblank{#2}%
3686 {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
3687 \@namedef{\bbl@stripslash#1text}%
3688 {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
3689 {\def#1{\bbl@exp{\bbl@footnote{\bbl@foreignlanguage{#2}}}{#3}{#4}}%
3690 \@namedef{\bbl@stripslash#1text}%
3691 {\bbl@exp{\bbl@footnotetext{\bbl@foreignlanguage{#2}}}{#3}{#4}}}%
3692 \fi
3693 <</Footnote changes>>

```

Now, the code.

```

3694 (*xetex)
3695 \def\BabelStringsDefault{unicode}
3696 \let\xebbl@stop\relax
3697 \AddBabelHook{xetex}{encodedcommands}{%

```

```

3698 \def\bbl@tempa{#1}%
3699 \ifx\bbl@tempa\@empty
3700 \XeTeXinputencoding"bytes"%
3701 \else
3702 \XeTeXinputencoding"#1"%
3703 \fi
3704 \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
3705 \AddBabelHook{xetex}{stopcommands}{%
3706 \xebbl@stop
3707 \let\xebbl@stop\relax}
3708 \def\bbl@intraspace#1 #2 #3\@@{%
3709 \bbl@csarg\gdef{xeisp@\bbl@cs{sbc@}\languagename}}%
3710 {\XeTeXlinebreakskip #1em plus #2em minus #3em\relax}}
3711 \def\bbl@intrapenalty#1\@@{%
3712 \bbl@csarg\gdef{xeipn@\bbl@cs{sbc@}\languagename}}%
3713 {\XeTeXlinebreakpenalty #1\relax}}
3714 \AddBabelHook{xetex}{loadkernel}{%
3715 \langle\Restore Unicode catcodes before loading patterns\rangle}
3716 \ifx\DisableBabelHook\undefined\endinput\fi
3717 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
3718 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@ccheckstdfonts}
3719 \DisableBabelHook{babel-fontspec}
3720 \langle\Font selection\rangle
3721 \input txtbabel.def
3722 \{/xetex)

```

14.2 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 \TeX expansion mechanism the following constructs are valid: \adim\bbl@startskip, \advance\bbl@startskip\adim, \bbl@startskip\adim.

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

```

3723 (*texxet)
3724 \bbl@trace{Redefinitions for bidi layout}
3725 \def\bbl@sspre@caption{%
3726 \bbl@exp{\everybox{\bbl@textdir\bbl@cs{wdir@\bbl@main@language}}}}
3727 \ifx\bbl@opt@layout\@nnil\endinput\fi % No layout
3728 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
3729 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}
3730 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
3731 \def\@hangfrom#1{%
3732 \setbox\@tempboxa\hbox{#1}}%
3733 \hangindent\ifcase\bbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
3734 \noindent\box\@tempboxa}
3735 \def\raggedright{%
3736 \let\@centercr
3737 \bbl@startskip\z@skip
3738 \@rightskip\@flushglue
3739 \bbl@endskip\@rightskip
3740 \parindent\z@
3741 \parfillskip\bbl@startskip}
3742 \def\raggedleft{%
3743 \let\@centercr

```

```

3744 \bbl@startskip\@flushglue
3745 \bbl@endskip\z@skip
3746 \parindent\z@
3747 \parfillskip\bbl@endskip}
3748 \fi
3749 \IfBabelLayout{lists}
3750 {\bbl@sreplace\list
3751  {\@totalleftmargin\leftmargin}{\@totalleftmargin\bbl@listleftmargin}%
3752  \def\bbl@listleftmargin{%
3753   \ifcase\bbl@thepardir\leftmargin\else\rightmargin\fi}%
3754  \ifcase\bbl@engine
3755   \def\labelenumii{}\theenumii{}}% pdftex doesn't reverse ()
3756   \def\p@enumiii{\p@enumii}\theenumii{}}%
3757  \fi
3758  \bbl@sreplace\@verbatim
3759   {\leftskip\@totalleftmargin}%
3760   {\bbl@startskip\textwidth
3761    \advance\bbl@startskip-\linewidth}%
3762  \bbl@sreplace\@verbatim
3763   {\rightskip\z@skip}%
3764   {\bbl@endskip\z@skip}}%
3765  {}
3766 \IfBabelLayout{contents}
3767 {\bbl@sreplace\@dottedtocline{\leftskip}{\bbl@startskip}%
3768  \bbl@sreplace\@dottedtocline{\rightskip}{\bbl@endskip}}
3769 {}
3770 \IfBabelLayout{columns}
3771 {\bbl@sreplace\@outputdblcol{\hb@xt@\textwidth}{\bbl@outputbox}%
3772  \def\bbl@outputbox#1{%
3773   \hb@xt@\textwidth{%
3774    \hskip\columnwidth
3775    \hfil
3776    {\normalcolor\vrule \@width\columnseprule}%
3777    \hfil
3778    \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
3779    \hskip-\textwidth
3780    \hb@xt@\columnwidth{\box\@outputbox \hss}%
3781    \hskip\columnsep
3782    \hskip\columnwidth}}}%
3783  {}
3784 <<Footnote changes>>
3785 \IfBabelLayout{footnotes}%
3786  {\BabelFootnote\footnote\languagename{}}{}%
3787  \BabelFootnote\localfootnote\languagename{}}{}%
3788  \BabelFootnote\mainfootnote{}}{}%
3789  {}

```

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.

```

3790 \IfBabelLayout{counters}%
3791  {\let\bbl@latinarabic=\@arabic
3792   \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
3793   \let\bbl@asciroman=\@roman
3794   \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%
3795   \let\bbl@asciiRoman=\@Roman
3796   \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}}{}
3797 </texet>

```

14.3 LuaTeX

The new loader for luatex is based solely on `language.dat`, which is read on the fly. The code shouldn't be executed when the format is build, so we check if `\AddBabelHook` is defined. Then comes a modified version of the loader in `hyphen.cfg` (without the `hyphenmins` stuff, which is under the direct control of `babel`).

The names `\l@<language>` are defined and take some value from the beginning because all `ldf` files assume this for the corresponding language to be considered valid, but patterns are not loaded (except the first one). This is done later, when the language is first selected (which usually means when the `ldf` finishes). If a language has been loaded, `\bbl@hyphendata@<num>` exists (with the names of the files read).

The default setup preloads the first language into the format. This is intended mainly for 'english', so that it's available without further intervention from the user. To avoid duplicating it, the following rule applies: if the "0th" language and the first language in `language.dat` have the same name then just ignore the latter. If there are new synonymous, 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`). 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.

```
3798 (*luatex)
3799 \ifx\AddBabelHook\undefined
3800 \bbl@trace{Read language.dat}
3801 \begingroup
3802 \toks@{}
3803 \count@% 0=start, 1=0th, 2=normal
3804 \def\bbl@process@line#1#2 #3 #4 {%
3805   \ifx=#1%
3806     \bbl@process@synonym{#2}%
3807   \else
3808     \bbl@process@language{#1#2}{#3}{#4}%
3809   \fi
3810 \ignorespaces}
3811 \def\bbl@manylang{%
3812   \ifnum\bbl@last>\@ne
3813     \bbl@info{Non-standard hyphenation setup}%
3814   \fi
3815 \let\bbl@manylang\relax}
3816 \def\bbl@process@language#1#2#3{%
3817   \ifcase\count@
3818     \@ifundefined{zth#1}{\count@tw@}{\count@\@ne}%
3819   \or
3820     \count@tw@
3821   \fi
```

```

3822 \ifnum\count@=\tw@
3823 \expandafter\addlanguage\csname l@#1\endcsname
3824 \language\allocationnumber
3825 \chardef\bbl@last\allocationnumber
3826 \bbl@manylang
3827 \let\bbl@elt\relax
3828 \xdef\bbl@languages{%
3829 \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
3830 \fi
3831 \the\toks@
3832 \toks@{}}
3833 \def\bbl@process@synonym@aux#1#2{%
3834 \global\expandafter\chardef\csname l@#1\endcsname#2\relax
3835 \let\bbl@elt\relax
3836 \xdef\bbl@languages{%
3837 \bbl@languages\bbl@elt{#1}{#2}{}}}%
3838 \def\bbl@process@synonym#1{%
3839 \ifcase\count@
3840 \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
3841 \or
3842 \@ifundefined{zth#1}{\bbl@process@synonym@aux{#1}{}}}%
3843 \else
3844 \bbl@process@synonym@aux{#1}{\the\bbl@last}%
3845 \fi}
3846 \ifx\bbl@languages@undefined % Just a (sensible?) guess
3847 \chardef\l@english\z@
3848 \chardef\l@USenglish\z@
3849 \chardef\bbl@last\z@
3850 \global\@namedef{bbl@hyphendata@0}{\hyphen.tex}{}
3851 \gdef\bbl@languages{%
3852 \bbl@elt{english}{0}{\hyphen.tex}}%
3853 \bbl@elt{USenglish}{0}{}}
3854 \else
3855 \global\let\bbl@languages@format\bbl@languages
3856 \def\bbl@elt#1#2#3#4{% Remove all except language 0
3857 \ifnum#2>\z@\else
3858 \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
3859 \fi}%
3860 \xdef\bbl@languages{\bbl@languages}%
3861 \fi
3862 \def\bbl@elt#1#2#3#4{\@namedef{zth#1}{}} % Define flags
3863 \bbl@languages
3864 \openin1=language.dat
3865 \ifeof1
3866 \bbl@warning{I couldn't find language.dat. No additional\%
3867 patterns loaded. Reported}%
3868 \else
3869 \loop
3870 \endlinechar@m@ne
3871 \read1 to \bbl@line
3872 \endlinechar`^^M
3873 \if T\ifeof1F\fi T\relax
3874 \ifx\bbl@line\empty\else
3875 \edef\bbl@line{\bbl@line\space\space\space}%
3876 \expandafter\bbl@process@line\bbl@line\relax
3877 \fi
3878 \repeat
3879 \fi
3880 \endgroup

```

```

3881 \bbl@trace{Macros for reading patterns files}
3882 \def\bbl@get@enc#1:#2:#3\@@@\def\bbl@hyph@enc{#2}}
3883 \ifx\babelcatcodetablenum\undefined
3884 \def\babelcatcodetablenum{5211}
3885 \fi
3886 \def\bbl@luapatterns#1#2{%
3887 \bbl@get@enc#1::\@@@
3888 \setbox\z@\hbox\bgroup
3889 \beginingroup
3890 \ifx\catcodetable\undefined
3891 \let\savecatcodetable\luatexsavecatcodetable
3892 \let\initcatcodetable\luatexinitcatcodetable
3893 \let\catcodetable\luatexcatcodetable
3894 \fi
3895 \savecatcodetable\babelcatcodetablenum\relax
3896 \initcatcodetable\numexpr\babelcatcodetablenum+1\relax
3897 \catcodetable\numexpr\babelcatcodetablenum+1\relax
3898 \catcode`\#=6 \catcode`\$=3 \catcode`\&=4 \catcode`\^=7
3899 \catcode`\_ =8 \catcode`\{=1 \catcode`\}=2 \catcode`\~ =13
3900 \catcode`\@=11 \catcode`\^^I=10 \catcode`\^^J=12
3901 \catcode`\<=12 \catcode`\>=12 \catcode`\*=12 \catcode`\.=12
3902 \catcode`\-=12 \catcode`\/=12 \catcode`\[=12 \catcode`\]=12
3903 \catcode`\`=12 \catcode`\'=12 \catcode`\ "=12
3904 \input #1\relax
3905 \catcodetable\babelcatcodetablenum\relax
3906 \endgroup
3907 \def\bbl@tempa{#2}%
3908 \ifx\bbl@tempa\@empty\else
3909 \input #2\relax
3910 \fi
3911 \egroup}%
3912 \def\bbl@patterns@lua#1{%
3913 \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
3914 \csname l@#1\endcsname
3915 \edef\bbl@tempa{#1}%
3916 \else
3917 \csname l@#1:\f@encoding\endcsname
3918 \edef\bbl@tempa{#1:\f@encoding}%
3919 \fi\relax
3920 \@namedef{lu@texhyphen@loaded@the\language}{}% Temp
3921 \@ifundefined{bbl@hyphendata@the\language}%
3922 {\def\bbl@elt##1##2##3##4{%
3923 \ifnum##2=\csname l@#1:\f@encoding\endcsname % #2=spanish, dutch:OT1...
3924 \def\bbl@tempb{##3}%
3925 \ifx\bbl@tempb\@empty\else % if not a synonymous
3926 \def\bbl@tempc{##3}{##4}%
3927 \fi
3928 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
3929 \fi}%
3930 \bbl@languages
3931 \@ifundefined{bbl@hyphendata@the\language}%
3932 {\bbl@info{No hyphenation patterns were set for\%
3933 language '\bbl@tempa'. Reported}}%
3934 {\expandafter\expandafter\expandafter\bbl@luapatterns
3935 \csname bbl@hyphendata@the\language\endcsname}}}}
3936 \endinput\fi
3937 \beginingroup
3938 \catcode`\%=12
3939 \catcode`\ '=12

```

```

3940 \catcode`\:=12
3941 \catcode`\:=12
3942 \directlua{
3943   Babel = Babel or {}
3944   function Babel.bytes(line)
3945     return line:gsub(".",
3946       function (chr) return unicode.utf8.char(string.byte(chr)) end)
3947   end
3948   function Babel.begin_process_input()
3949     if luatexbase and luatexbase.add_to_callback then
3950       luatexbase.add_to_callback('process_input_buffer',
3951         Babel.bytes, 'Babel.bytes')
3952     else
3953       Babel.callback = callback.find('process_input_buffer')
3954       callback.register('process_input_buffer', Babel.bytes)
3955     end
3956   end
3957   function Babel.end_process_input ()
3958     if luatexbase and luatexbase.remove_from_callback then
3959       luatexbase.remove_from_callback('process_input_buffer', 'Babel.bytes')
3960     else
3961       callback.register('process_input_buffer', Babel.callback)
3962     end
3963   end
3964   function Babel.addpatterns(pp, lg)
3965     local lg = lang.new(lg)
3966     local pats = lang.patterns(lg) or ''
3967     lang.clear_patterns(lg)
3968     for p in pp:gmatch('[^%s]+') do
3969       ss = ''
3970       for i in string.utfcharacters(p:gsub('%d', '')) do
3971         ss = ss .. '%d?' .. i
3972       end
3973       ss = ss:gsub('^%%d%?%', '%%.') .. '%d?'
3974       ss = ss:gsub('%.%d%?$', '%%.')
3975       pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
3976       if n == 0 then
3977         tex.sprint(
3978           [[\string\csname\space bbl@info\endcsname{New pattern: }]]
3979           .. p .. [[{ }]])
3980         pats = pats .. ' ' .. p
3981       else
3982         tex.sprint(
3983           [[\string\csname\space bbl@info\endcsname{Renew pattern: }]]
3984           .. p .. [[{ }]])
3985       end
3986     end
3987     lang.patterns(lg, pats)
3988   end
3989 }
3990 \endgroup
3991 \ifx\newattribute\@undefined\else
3992   \newattribute\bbl@attr@locale
3993   \AddBabelHook{luatex}{beforeextras}{%
3994     \setattribute\bbl@attr@locale\localeid}
3995 \fi
3996 \def\BabelStringsDefault{unicode}
3997 \let\luabbl@stop\relax
3998 \AddBabelHook{luatex}{encodedcommands}{%

```



```

3999 \def\bb1@tempa{utf8}\def\bb1@tempb{#1}%
4000 \ifx\bb1@tempa\bb1@tempb\else
4001   \directlua{Babel.begin_process_input()}%
4002   \def\luabbl@stop{%
4003     \directlua{Babel.end_process_input()}}%
4004   \fi}%
4005 \AddBabelHook{luatex}{stopcommands}{%
4006   \luabbl@stop
4007   \let\luabbl@stop\relax}
4008 \AddBabelHook{luatex}{patterns}{%
4009   \@ifundefined{bbl@hyphendata@the\language}%
4010     {\def\bb1@elt##1##2##3##4{%
4011       \ifnum##2=\csname l@##2\endcsname % #2=spanish, dutch:OT1...
4012       \def\bb1@tempb{##3}%
4013       \ifx\bb1@tempb\@empty\else % if not a synonymous
4014         \def\bb1@tempc{##3}{##4}%
4015       \fi
4016       \bbl@csarg\xdef{hyphendata@##2}{\bb1@tempc}%
4017     \fi}%
4018   \bbl@languages
4019   \@ifundefined{bbl@hyphendata@the\language}%
4020     {\bbl@info{No hyphenation patterns were set for\%
4021       language '#2'. Reported}}%
4022     {\expandafter\expandafter\expandafter\bbl@luapatterns
4023       \csname bbl@hyphendata@the\language\endcsname}}}%
4024   \@ifundefined{bbl@patterns@}{}%
4025   \begingroup
4026     \bbl@xin@{, \number\language,}{, \bbl@pttnlist}%
4027     \ifin@else
4028       \ifx\bbl@patterns@\@empty\else
4029         \directlua{ Babel.addpatterns(
4030           [[\bbl@patterns@]], \number\language) }%
4031       \fi
4032       \@ifundefined{bbl@patterns@#1}%
4033         \@empty
4034         {\directlua{ Babel.addpatterns(
4035           [[\space\csname bbl@patterns@#1\endcsname]],
4036           \number\language) }}%
4037       \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
4038     \fi
4039   \endgroup}}
4040 \AddBabelHook{luatex}{everylanguage}{%
4041   \def\process@language##1##2##3{%
4042     \def\process@line####1####2 ####3 ####4 {}}
4043 \AddBabelHook{luatex}{loadpatterns}{%
4044   \input #1\relax
4045   \expandafter\gdef\csname bbl@hyphendata@the\language\endcsname
4046     {{#1}}}}
4047 \AddBabelHook{luatex}{loadexceptions}{%
4048   \input #1\relax
4049   \def\bb1@tempb##1##2{{##1}{##1}}%
4050   \expandafter\xdef\csname bbl@hyphendata@the\language\endcsname
4051     {\expandafter\expandafter\expandafter\bbl@tempb
4052       \csname bbl@hyphendata@the\language\endcsname}}

```

`\babelpatterns` This macro adds patterns. Two macros are used to store them: `\bbl@patterns@` for the global ones and `\bbl@patterns@<lang>` for language ones. We make sure there is a space between words when multiple commands are used.

```

4053 \@onlypreamble\babelpatterns
4054 \AtEndOfPackage{%
4055   \newcommand\babelpatterns[2][\@empty]{%
4056     \ifx\bbbl@patterns@relax
4057       \let\bbbl@patterns@\@empty
4058     \fi
4059     \ifx\bbbl@pttnlist\@empty\else
4060       \bbbl@warning{%
4061         You must not intermingle \string\selectlanguage\space and\%
4062         \string\babelpatterns\space or some patterns will not\%
4063         be taken into account. Reported}%
4064     \fi
4065     \ifx\@empty#1%
4066       \protected@edef\bbbl@patterns@\bbbl@patterns@\space#2}%
4067     \else
4068       \edef\bbbl@tempb{\zap@space#1 \@empty}%
4069       \bbbl@for\bbbl@tempa\bbbl@tempb{%
4070         \bbbl@fixname\bbbl@tempa
4071         \bbbl@iflanguage\bbbl@tempa{%
4072           \bbbl@csarg\protected@edef{patterns@\bbbl@tempa}{%
4073             \@ifundefined{bbbl@patterns@\bbbl@tempa}%
4074             \@empty
4075             {\csname bbbl@patterns@\bbbl@tempa\endcsname\space}%
4076             #2}}}%
4077     \fi}}

```

14.4 Southeast Asian scripts

In progress. Replace regular (ie, implicit) discretionaries by spaceskips, based on the previous glyph (which I think makes sense, because the hyphen and the previous char go always together). Other discretionaries are not touched.

For the moment, only 3 SA languages are activated by default (see Unicode UAX 14).

```

4078 \def\bbbl@intraspace#1 #2 #3\@@{%
4079   \directlua{
4080     Babel = Babel or {}
4081     Babel.intraspaces = Babel.intraspaces or {}
4082     Babel.intraspaces['\csname bbbl@sbc@language\endcsname'] = %
4083       {b = #1, p = #2, m = #3}
4084     Babel.locale_props[\the\localeid].intraspace = %
4085       {b = #1, p = #2, m = #3}
4086   }}
4087 \def\bbbl@intrapenalty#1\@@{%
4088   \directlua{
4089     Babel = Babel or {}
4090     Babel.intrapenalties = Babel.intrapenalties or {}
4091     Babel.intrapenalties['\csname bbbl@sbc@language\endcsname'] = #1
4092     Babel.locale_props[\the\localeid].intrapenalty = #1
4093   }}
4094 \begingroup
4095 \catcode`\%=12
4096 \catcode`\^=14
4097 \catcode`\'=12
4098 \catcode`\-=12
4099 \gdef\bbbl@seaintraspace{^
4100   \let\bbbl@seaintraspace\relax
4101   \directlua{
4102     Babel = Babel or {}
4103     Babel.sea_enabled = true

```

```

4104 Babel.sea_ranges = Babel.sea_ranges or {}
4105 function Babel.set_chranges (script, chrng)
4106     local c = 0
4107     for s, e in string.gmatch(chrng..' ', '(.)%.%.(.-)%s') do
4108         Babel.sea_ranges[script..c]={tonumber(s,16), tonumber(e,16)}
4109         c = c + 1
4110     end
4111 end
4112 function Babel.sea_disc_to_space (head)
4113     local sea_ranges = Babel.sea_ranges
4114     local last_char = nil
4115     local quad = 655360      ^^ 10 pt = 655360 = 10 * 65536
4116     for item in node.traverse(head) do
4117         local i = item.id
4118         if i == node.id'glyph' then
4119             last_char = item
4120         elseif i == 7 and item.subtype == 3 and last_char
4121             and last_char.char > 0x0C99 then
4122             quad = font.getfont(last_char.font).size
4123             for lg, rg in pairs(sea_ranges) do
4124                 if last_char.char > rg[1] and last_char.char < rg[2] then
4125                     lg = lg:sub(1, 4)
4126                     local intraspace = Babel.intraspaces[lg]
4127                     local intrapenalty = Babel.intrapenalties[lg]
4128                     local n
4129                     if intrapenalty ~= 0 then
4130                         n = node.new(14, 0)      ^^ penalty
4131                         n.penalty = intrapenalty
4132                         node.insert_before(head, item, n)
4133                     end
4134                     n = node.new(12, 13)      ^^ (glue, spaceskip)
4135                     node.setglue(n, intraspace.b * quad,
4136                                 intraspace.p * quad,
4137                                 intraspace.m * quad)
4138                     node.insert_before(head, item, n)
4139                     node.remove(head, item)
4140                 end
4141             end
4142         end
4143     end
4144 end
4145 }^^
4146 \bbl@luahyphenate}
4147 \catcode`\%=14
4148 \gdef\bbl@cjkintraspaces{%
4149 \let\bbl@cjkintraspaces\relax
4150 \directlua{
4151     Babel = Babel or {}
4152     require'babel-data-cjk.lua'
4153     Babel.cjk_enabled = true
4154     function Babel.cjk_linebreak(head)
4155         local GLYPH = node.id'glyph'
4156         local last_char = nil
4157         local quad = 655360      % 10 pt = 655360 = 10 * 65536
4158         local last_class = nil
4159         local last_lang = nil
4160
4161         for item in node.traverse(head) do
4162             if item.id == GLYPH then

```

```

4163
4164     local lang = item.lang
4165
4166     local LOCALE = node.get_attribute(item,
4167         luatexbase.registernumber'babel@attr@locale')
4168     local props = Babel.locale_props[LOCALE]
4169
4170     class = Babel.cjk_class[item.char].c
4171
4172     if class == 'cp' then class = 'cl' end % ]) as CL
4173     if class == 'id' then class = 'I' end
4174
4175     if class and last_class and Babel.cjk_breaks[last_class][class] then
4176         br = Babel.cjk_breaks[last_class][class]
4177     else
4178         br = 0
4179     end
4180
4181     if br == 1 and props.linebreak == 'c' and
4182         lang ~= \the\l@nohyphenation\space and
4183         last_lang ~= \the\l@nohyphenation then
4184         local intrapenalty = props.intrapenalty
4185         if intrapenalty ~= 0 then
4186             local n = node.new(14, 0)    % penalty
4187             n.penalty = intrapenalty
4188             node.insert_before(head, item, n)
4189         end
4190         local intraspace = props.intraspace
4191         local n = node.new(12, 13)      % (glue, spaceskip)
4192         node.setglue(n, intraspace.b * quad,
4193             intraspace.p * quad,
4194             intraspace.m * quad)
4195         node.insert_before(head, item, n)
4196     end
4197
4198     quad = font.getfont(item.font).size
4199     last_class = class
4200     last_lang = lang
4201     else % if penalty, glue or anything else
4202         last_class = nil
4203     end
4204 end
4205 lang.hyphenate(head)
4206 end
4207 }%
4208 \bbl@luahyphenate}
4209 \gdef\bbl@luahyphenate{%
4210 \let\bbl@luahyphenate\relax
4211 \directlua{
4212     luatexbase.add_to_callback('hyphenate',
4213     function(head, tail)
4214         if Babel.cjk_enabled then
4215             Babel.cjk_linebreak(head)
4216         end
4217         lang.hyphenate(head)
4218         if Babel.sea_enabled then
4219             Babel.sea_disc_to_space(head)
4220         end
4221     end,

```

```

4222   'Babel.hyphenate')
4223   }
4224 }
4225 \endgroup

```

14.5 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.

```

4226 \AddBabelHook{luatex}{loadkernel}{%
4227 <<Restore Unicode catcodes before loading patterns>>}
4228 \ifx\DisableBabelHook\undefined\endinput\fi
4229 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
4230 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@cckstfont}
4231 \DisableBabelHook{babel-fontspec}
4232 <<Font selection>>

```

Temporary fix for luatex <1.10, which sometimes inserted a spurious closing dir node with a `\textdir` within `\hboxes`. This will be eventually removed.

```

4233 \def\bbl@luafixboxdir{%
4234   \setbox\z@\hbox{\textdir TLT}%
4235   \directlua{
4236     function Babel.first_dir(head)
4237       for item in node.traverse_id(node.id'dir', head) do
4238         return item
4239       end
4240       return nil
4241     end
4242     if Babel.first_dir(tex.box[0].head) then
4243       function Babel.fixboxdirs(head)
4244         local fd = Babel.first_dir(head)
4245         if fd and fd.dir:sub(1,1) == '-' then
4246           head = node.remove(head, fd)
4247         end
4248         return head
4249       end
4250     end
4251   }}
4252 \AtBeginDocument{\bbl@luafixboxdir}

```

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

```

4253 \newcommand\babelcharproperty[1]{%
4254   \count@=#1\relax
4255   \ifvmode
4256     \expandafter\bbl@chprop
4257   \else
4258     \bbl@error{\string\babelcharproperty\space can be used only in\%
4259               vertical mode (preamble or between paragraphs)}%
4260     {See the manual for futher info}%

```

```

4261 \fi}
4262 \newcommand\bbl@chprop[3][\the\count@]{%
4263 \@tempcnta=#1\relax
4264 \bbl@ifunset{\bbl@chprop@#2}%
4265 {\bbl@error{No property named '#2'. Allowed values are\%
4266 direction (bc), mirror (bmg), and linebreak (lb)}%
4267 {See the manual for futher info}}%
4268 }%
4269 \loop
4270 \@nameuse{\bbl@chprop@#2}{#3}%
4271 \ifnum\count@<\@tempcnta
4272 \advance\count@\@ne
4273 \repeat}
4274 \def\bbl@chprop@direction#1{%
4275 \directlua{
4276 Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
4277 Babel.characters[\the\count@]['d'] = '#1'
4278 }}
4279 \let\bbl@chprop@bc\bbl@chprop@direction
4280 \def\bbl@chprop@mirror#1{%
4281 \directlua{
4282 Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
4283 Babel.characters[\the\count@]['m'] = '\number#1'
4284 }}
4285 \let\bbl@chprop@bmg\bbl@chprop@mirror
4286 \def\bbl@chprop@linebreak#1{%
4287 \directlua{
4288 Babel.Babel.cjk_characters[\the\count@] = Babel.Babel.cjk_characters[\the\count@] or {}
4289 Babel.Babel.cjk_characters[\the\count@]['c'] = '#1'
4290 }}
4291 \let\bbl@chprop@lb\bbl@chprop@linebreak

```

14.6 Layout

Work in progress.

Unlike xetex, luatex requires only minimal changes for right-to-left layouts, particularly in monolingual documents (the engine itself reverses boxes – including column order or headings –, margins, etc.) with `bidi=basic`, without having to patch almost any macro where text direction is relevant.

`\@hangfrom` is useful in many contexts and it is redefined always with the layout option. There are, however, a number of issues when the text direction is not the same as the box direction (as set by `\bodydir`), and when `\parbox` and `\hangindent` are involved.

Fortunately, latest releases of luatex simplify a lot the solution with `\shapemode`.

With the issue #15 I realized commands are best patched, instead of redefined. With a few lines, a modification could be applied to several classes and packages. Now, `tabular` seems to work (at least in simple cases) with `array`, `tabularx`, `hline`, `colortbl`, `longtable`, `booktabs`, etc. However, `dcolumn` still fails.

```

4292 \bbl@trace{Redefinitions for bidi layout}
4293 \ifx\@eqnnum\undefined\else
4294 \ifx\bbl@attr@dir\undefined\else
4295 \edef\@eqnnum{%
4296 \unexpanded{\ifcase\bbl@attr@dir\else\bbl@textdir\@ne\fi}%
4297 \unexpanded\expandafter{\@eqnnum}}
4298 \fi
4299 \fi
4300 \ifx\bbl@opt@layout\@nnil\endinput\fi % if no layout
4301 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=

```

```

4302 \def\bbl@nextfake#1{% non-local changes, use always inside a group!
4303   \bbl@exp{%
4304     \mathdir\the\bodydir
4305     #1%           Once entered in math, set boxes to restore values
4306     \<ifmmode>%
4307       \everyvbox{%
4308         \the\everyvbox
4309         \bodydir\the\bodydir
4310         \mathdir\the\mathdir
4311         \everyhbox{\the\everyhbox}%
4312         \everyvbox{\the\everyvbox}}%
4313       \everyhbox{%
4314         \the\everyhbox
4315         \bodydir\the\bodydir
4316         \mathdir\the\mathdir
4317         \everyhbox{\the\everyhbox}%
4318         \everyvbox{\the\everyvbox}}%
4319     \<fi>}}%
4320 \def\@hangfrom#1{%
4321   \setbox\@tempboxa\hbox{#1}%
4322   \hangindent\wd\@tempboxa
4323   \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
4324     \shapemode\@ne
4325   \fi
4326   \noindent\box\@tempboxa}
4327 \fi
4328 \IfBabelLayout{tabular}
4329   {\let\bbl@OL@tabular\@tabular
4330   \bbl@replace\@tabular{$}\bbl@nextfake$}%
4331   \let\bbl@NL@tabular\@tabular
4332   \AtBeginDocument{%
4333     \ifx\bbl@NL@tabular\@tabular\else
4334       \bbl@replace\@tabular{$}\bbl@nextfake$}%
4335     \let\bbl@NL@tabular\@tabular
4336   \fi}}
4337 {}
4338 \IfBabelLayout{lists}
4339   {\let\bbl@OL@list\list
4340   \bbl@sreplace\list{\parshape}\bbl@listparshape}%
4341   \let\bbl@NL@list\list
4342   \def\bbl@listparshape#1#2#3{%
4343     \parshape #1 #2 #3 %
4344     \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
4345       \shapemode\tw@
4346     \fi}}
4347 {}
4348 \IfBabelLayout{graphics}
4349   {\let\bbl@pictresetdir\relax
4350   \def\bbl@pictsetdir{%
4351     \ifcase\bbl@thetextdir
4352     \let\bbl@pictresetdir\relax
4353     \else
4354       \textdir TLT\relax
4355       \def\bbl@pictresetdir{\textdir TRT\relax}%
4356     \fi}%
4357   \let\bbl@OL@picture\@picture
4358   \let\bbl@OL@put\put
4359   \bbl@sreplace\@picture{\hskip-}\bbl@pictsetdir\hskip-}%
4360   \def\put(#1,#2)#3{% Not easy to patch. Better redefine.

```

```

4361 \killglue
4362 \raise#2\unitlength
4363 \hb@xt@z@{\kern#1\unitlength{\bbl@pictresetdir#3}\hss}}%
4364 \AtBeginDocument
4365 {\ifx\tikz@atbegin@node\undefined\else
4366 \let\bbl@OL@pgfpicture\pgfpicture
4367 \bbl@sreplace\pgfpicture{\pgfpicturetrue}{\bbl@pictsetdir\pgfpicturetrue}%
4368 \bbl@add\pgfsys@beginpicture{\bbl@pictsetdir}%
4369 \bbl@add\tikz@atbegin@node{\bbl@pictresetdir}%
4370 \fi}}
4371 {}

```

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.

```

4372 \IfBabelLayout{counters}%
4373 {\let\bbl@OL@textsuperscript\textsuperscript
4374 \bbl@sreplace\textsuperscript{\m@th}{\m@th\mathdir\pagedir}%
4375 \let\bbl@latinarabic=@arabic
4376 \let\bbl@OL@arabic@arabic
4377 \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
4378 \ifpackagewith{babel}{bidi=default}%
4379 {\let\bbl@asciroman=@roman
4380 \let\bbl@OL@roman@roman
4381 \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%
4382 \let\bbl@asciiRoman=@Roman
4383 \let\bbl@OL@roman@Roman
4384 \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}%
4385 \let\bbl@OL@labelenumii\labelenumii
4386 \def\labelenumii}\theenumii}%
4387 \let\bbl@OL@p@enumiii\p@enumiii
4388 \def\p@enumiii{\p@enumii)\theenumii}}}}{}
4389 <<Footnote changes>>
4390 \IfBabelLayout{footnotes}%
4391 {\let\bbl@OL@footnote\footnote
4392 \BabelFootnote\footnote\languagename{}{}}%
4393 \BabelFootnote\localfootnote\languagename{}{}}%
4394 \BabelFootnote\mainfootnote{}{}}{}
4395 {}

```

Some L^AT_EX macros use internally the math mode for text formatting. They have very little in common and are grouped here, as a single option.

```

4396 \IfBabelLayout{extras}%
4397 {\let\bbl@OL@underline\underline
4398 \bbl@sreplace\underline{\$@@underline}{\bbl@nextfake\$@@underline}%
4399 \let\bbl@OL@LaTeX2e\LaTeX2e
4400 \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
4401 \if b\expandafter\car\@series\@nil\boldmath\fi
4402 \babelsublr{%
4403 \LaTeX\kern.15em2\bbl@nextfake$_{\textstyle\varepsilon}$}}}}
4404 {}
4405 </luatex>

```

14.7 Auto bidi with basic and basic-r

The file babel-data-bidi.lua currently only contains data. It is a large and boring file and it is not shown here (see the generated file), but here is a sample:


```

□[0x25]={d='et'},
□[0x26]={d='on'},
□[0x27]={d='on'},
□[0x28]={d='on',lrm=0x29},
□[0x29]={d='on',lrm=0x28},
□[0x2A]={d='on'},
□[0x2B]={d='es'},
□[0x2C]={d='cs'},

```

For the meaning of these codes, see the Unicode standard.

Now the basic-*r* bidi mode. One of the aims is to implement a fast and simple bidi algorithm, with a single loop. I managed to do it for R texts, with a second smaller loop for a special case. The code is still somewhat chaotic, but its behavior is essentially correct. I cannot resist copying the following text from Emacs `bidi.c` (which also attempts to implement the bidi algorithm with a single loop):

Arrrgh!! The UAX#9 algorithm is too deeply entrenched in the assumption of batch-style processing [...]. May the fleas of a thousand camels infest the armpits of those who design supposedly general-purpose algorithms by looking at their own implementations, and fail to consider other possible implementations!

Well, it took me some time to guess what the batch rules in UAX#9 actually mean (in other word, *what* they do and *why*, and not only *how*), but I think (or I hope) I've managed to understand them.

In some sense, there are two bidi modes, one for numbers, and the other for text. Furthermore, setting just the direction in R text is not enough, because there are actually *two* R modes (set explicitly in Unicode with RLM and ALM). In babel the `dir` is set by a higher protocol based on the language/script, which in turn sets the correct `dir` (<l>, <r> or <al>).

From UAX#9: "Where available, markup should be used instead of the explicit formatting characters". So, this simple version just ignores formatting characters. Actually, most of that annex is devoted to how to handle them.

BD14-BD16 are not implemented. Unicode (and the W3C) are making a great effort to deal with some special problematic cases in "streamed" plain text. I don't think this is the way to go – particular issues should be fixed by a high level interface taking into account the needs of the document. And here is where `luatex` excels, because everything related to bidi writing is under our control.

```

4406 (*basic-r)
4407 Babel = Babel or {}
4408
4409 Babel.bidi_enabled = true
4410
4411 require('babel-data-bidi.lua')
4412
4413 local characters = Babel.characters
4414 local ranges = Babel.ranges
4415
4416 local DIR = node.id("dir")
4417
4418 local function dir_mark(head, from, to, outer)
4419   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
4420   local d = node.new(DIR)
4421   d.dir = '+' .. dir
4422   node.insert_before(head, from, d)
4423   d = node.new(DIR)

```

```

4424 d.dir = '-' .. dir
4425 node.insert_after(head, to, d)
4426 end
4427
4428 function Babel.bidi(head, ispar)
4429   local first_n, last_n      -- first and last char with nums
4430   local last_es             -- an auxiliary 'last' used with nums
4431   local first_d, last_d     -- first and last char in L/R block
4432   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):

```

4433   local strong = ('TRT' == tex.pardir) and 'r' or 'l'
4434   local strong_lr = (strong == 'l') and 'l' or 'r'
4435   local outer = strong
4436
4437   local new_dir = false
4438   local first_dir = false
4439   local inmath = false
4440
4441   local last_lr
4442
4443   local type_n = ''
4444
4445   for item in node.traverse(head) do
4446
4447     -- three cases: glyph, dir, otherwise
4448     if item.id == node.id'glyph'
4449       or (item.id == 7 and item.subtype == 2) then
4450
4451       local itemchar
4452       if item.id == 7 and item.subtype == 2 then
4453         itemchar = item.replace.char
4454       else
4455         itemchar = item.char
4456       end
4457       local chardata = characters[itemchar]
4458       dir = chardata and chardata.d or nil
4459       if not dir then
4460         for nn, et in ipairs(ranges) do
4461           if itemchar < et[1] then
4462             break
4463           elseif itemchar <= et[2] then
4464             dir = et[3]
4465             break
4466           end
4467         end
4468       end
4469       dir = dir or 'l'
4470       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).

```

4471   if new_dir then

```

```

4472     attr_dir = 0
4473     for at in node.traverse(item.attr) do
4474         if at.number == luatexbase.registernumber'bbl@attr@dir' then
4475             attr_dir = at.value % 3
4476         end
4477     end
4478     if attr_dir == 1 then
4479         strong = 'r'
4480     elseif attr_dir == 2 then
4481         strong = 'al'
4482     else
4483         strong = 'l'
4484     end
4485     strong_lr = (strong == 'l') and 'l' or 'r'
4486     outer = strong_lr
4487     new_dir = false
4488 end
4489
4490     if dir == 'nsm' then dir = strong end          -- W1

```

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

```

4491     dir_real = dir          -- We need dir_real to set strong below
4492     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:

```

4493     if strong == 'al' then
4494         if dir == 'en' then dir = 'an' end          -- W2
4495         if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
4496         strong_lr = 'r'          -- W3
4497     end

```

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

```

4498     elseif item.id == node.id'dir' and not inmath then
4499         new_dir = true
4500         dir = nil
4501     elseif item.id == node.id'math' then
4502         inmath = (item.subtype == 0)
4503     else
4504         dir = nil          -- Not a char
4505     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>.

```

4506     if dir == 'en' or dir == 'an' or dir == 'et' then
4507         if dir ~= 'et' then
4508             type_n = dir
4509         end
4510         first_n = first_n or item
4511         last_n = last_es or item
4512         last_es = nil
4513     elseif dir == 'es' and last_n then -- W3+W6
4514         last_es = item

```

```

4515 elseif dir == 'cs' then          -- it's right - do nothing
4516 elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
4517   if strong_lr == 'r' and type_n ~= '' then
4518     dir_mark(head, first_n, last_n, 'r')
4519   elseif strong_lr == 'l' and first_d and type_n == 'an' then
4520     dir_mark(head, first_n, last_n, 'r')
4521     dir_mark(head, first_d, last_d, outer)
4522     first_d, last_d = nil, nil
4523   elseif strong_lr == 'l' and type_n ~= '' then
4524     last_d = last_n
4525   end
4526   type_n = ''
4527   first_n, last_n = nil, nil
4528 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:

```

4529 if dir == 'l' or dir == 'r' then
4530   if dir ~= outer then
4531     first_d = first_d or item
4532     last_d = item
4533   elseif first_d and dir ~= strong_lr then
4534     dir_mark(head, first_d, last_d, outer)
4535     first_d, last_d = nil, nil
4536   end
4537 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.

```

4538 if dir and not last_lr and dir ~= 'l' and outer == 'r' then
4539   item.char = characters[item.char] and
4540     characters[item.char].m or item.char
4541 elseif (dir or new_dir) and last_lr ~= item then
4542   local mir = outer .. strong_lr .. (dir or outer)
4543   if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
4544     for ch in node.traverse(node.next(last_lr)) do
4545       if ch == item then break end
4546       if ch.id == node.id'glyph' and characters[ch.char] then
4547         ch.char = characters[ch.char].m or ch.char
4548       end
4549     end
4550   end
4551 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).

```

4552 if dir == 'l' or dir == 'r' then
4553   last_lr = item
4554   strong = dir_real          -- Don't search back - best save now
4555   strong_lr = (strong == 'l') and 'l' or 'r'
4556 elseif new_dir then
4557   last_lr = nil
4558 end
4559 end

```

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

```
4560 if last_lr and outer == 'r' then
4561   for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
4562     if characters[ch.char] then
4563       ch.char = characters[ch.char].m or ch.char
4564     end
4565   end
4566 end
4567 if first_n then
4568   dir_mark(head, first_n, last_n, outer)
4569 end
4570 if first_d then
4571   dir_mark(head, first_d, last_d, outer)
4572 end
```

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

```
4573 return node.prev(head) or head
4574 end
4575 </basic-r>
```

And here the Lua code for bidi=basic:

```
4576 (*basic)
4577 Babel = Babel or {}
4578
4579 -- eg, Babel.fontmap[1][<prefontid>]=<dirfontid>
4580
4581 Babel.fontmap = Babel.fontmap or {}
4582 Babel.fontmap[0] = {} -- l
4583 Babel.fontmap[1] = {} -- r
4584 Babel.fontmap[2] = {} -- al/an
4585
4586 Babel.bidi_enabled = true
4587 Babel.mirroring_enabled = true
4588
4589 -- Temporary:
4590
4591 if harf then
4592   Babel.mirroring_enabled = false
4593 end
4594
4595 require('babel-data-bidi.lua')
4596
4597 local characters = Babel.characters
4598 local ranges = Babel.ranges
4599
4600 local DIR = node.id('dir')
4601 local GLYPH = node.id('glyph')
4602
4603 local function insert_implicit(head, state, outer)
4604   local new_state = state
4605   if state.sim and state.eim and state.sim ~= state.eim then
4606     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
4607     local d = node.new(DIR)
4608     d.dir = '+' .. dir
4609     node.insert_before(head, state.sim, d)
4610     local d = node.new(DIR)
4611     d.dir = '-' .. dir
```

```

4612     node.insert_after(head, state.eim, d)
4613 end
4614 new_state.sim, new_state.eim = nil, nil
4615 return head, new_state
4616 end
4617
4618 local function insert_numeric(head, state)
4619     local new
4620     local new_state = state
4621     if state.san and state.ean and state.san ~= state.ean then
4622         local d = node.new(DIR)
4623         d.dir = '+TLT'
4624         _, new = node.insert_before(head, state.san, d)
4625         if state.san == state.sim then state.sim = new end
4626         local d = node.new(DIR)
4627         d.dir = '-TLT'
4628         _, new = node.insert_after(head, state.ean, d)
4629         if state.ean == state.eim then state.eim = new end
4630     end
4631     new_state.san, new_state.ean = nil, nil
4632     return head, new_state
4633 end
4634
4635 -- TODO - \hbox with an explicit dir can lead to wrong results
4636 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>. A small attempt
4637 -- was s made to improve the situation, but the problem is the 3-dir
4638 -- model in babel/Unicode and the 2-dir model in LuaTeX don't fit
4639 -- well.
4640
4641 function Babel.bidi(head, ispar, hdir)
4642     local d -- d is used mainly for computations in a loop
4643     local prev_d = ''
4644     local new_d = false
4645
4646     local nodes = {}
4647     local outer_first = nil
4648     local inmath = false
4649
4650     local glue_d = nil
4651     local glue_i = nil
4652
4653     local has_en = false
4654     local first_et = nil
4655
4656     local ATDIR = luatexbase.registernumber'bbl@attr@dir'
4657
4658     local save_outer
4659     local temp = node.get_attribute(head, ATDIR)
4660     if temp then
4661         temp = temp % 3
4662         save_outer = (temp == 0 and 'l') or
4663                     (temp == 1 and 'r') or
4664                     (temp == 2 and 'al')
4665     elseif ispar then -- Or error? Shouldn't happen
4666         save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
4667     else -- Or error? Shouldn't happen
4668         save_outer = ('TRT' == hdir) and 'r' or 'l'
4669     end
4670     -- when the callback is called, we are just _after_ the box,

```

```

4671 -- and the texdir is that of the surrounding text
4672 -- if not ispar and hdir ~= tex.texdir then
4673 --   save_outer = ('TRT' == hdir) and 'r' or 'l'
4674 -- end
4675 local outer = save_outer
4676 local last = outer
4677 -- 'al' is only taken into account in the first, current loop
4678 if save_outer == 'al' then save_outer = 'r' end
4679
4680 local fontmap = Babel.fontmap
4681
4682 for item in node.traverse(head) do
4683
4684   -- In what follows, #node is the last (previous) node, because the
4685   -- current one is not added until we start processing the neutrals.
4686
4687   -- three cases: glyph, dir, otherwise
4688   if item.id == GLYPH
4689     or (item.id == 7 and item.subtype == 2) then
4690
4691     local d_font = nil
4692     local item_r
4693     if item.id == 7 and item.subtype == 2 then
4694       item_r = item.replace -- automatic discs have just 1 glyph
4695     else
4696       item_r = item
4697     end
4698     local chardata = characters[item_r.char]
4699     d = chardata and chardata.d or nil
4700     if not d or d == 'nsm' then
4701       for nn, et in ipairs(ranges) do
4702         if item_r.char < et[1] then
4703           break
4704         elseif item_r.char <= et[2] then
4705           if not d then d = et[3]
4706           elseif d == 'nsm' then d_font = et[3]
4707           end
4708           break
4709         end
4710       end
4711     end
4712     d = d or 'l'
4713
4714     -- A short 'pause' in bidi for mapfont
4715     d_font = d_font or d
4716     d_font = (d_font == 'l' and 0) or
4717             (d_font == 'nsm' and 0) or
4718             (d_font == 'r' and 1) or
4719             (d_font == 'al' and 2) or
4720             (d_font == 'an' and 2) or nil
4721     if d_font and fontmap and fontmap[d_font][item_r.font] then
4722       item_r.font = fontmap[d_font][item_r.font]
4723     end
4724
4725     if new_d then
4726       table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
4727       if inmath then
4728         attr_d = 0
4729       else

```

```

4730         attr_d = node.get_attribute(item, ATDIR)
4731         attr_d = attr_d % 3
4732     end
4733     if attr_d == 1 then
4734         outer_first = 'r'
4735         last = 'r'
4736     elseif attr_d == 2 then
4737         outer_first = 'r'
4738         last = 'al'
4739     else
4740         outer_first = 'l'
4741         last = 'l'
4742     end
4743     outer = last
4744     has_en = false
4745     first_et = nil
4746     new_d = false
4747 end
4748
4749 if glue_d then
4750     if (d == 'l' and 'l' or 'r') ~= glue_d then
4751         table.insert(nodes, {glue_i, 'on', nil})
4752     end
4753     glue_d = nil
4754     glue_i = nil
4755 end
4756
4757 elseif item.id == DIR then
4758     d = nil
4759     new_d = true
4760
4761 elseif item.id == node.id'glue' and item.subtype == 13 then
4762     glue_d = d
4763     glue_i = item
4764     d = nil
4765
4766 elseif item.id == node.id'math' then
4767     inmath = (item.subtype == 0)
4768
4769 else
4770     d = nil
4771 end
4772
4773 -- AL <= EN/ET/ES      -- W2 + W3 + W6
4774 if last == 'al' and d == 'en' then
4775     d = 'an'           -- W3
4776 elseif last == 'al' and (d == 'et' or d == 'es') then
4777     d = 'on'           -- W6
4778 end
4779
4780 -- EN + CS/ES + EN      -- W4
4781 if d == 'en' and #nodes >= 2 then
4782     if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
4783         and nodes[#nodes-1][2] == 'en' then
4784         nodes[#nodes][2] = 'en'
4785     end
4786 end
4787
4788 -- AN + CS + AN         -- W4 too, because uax9 mixes both cases

```



```

4789   if d == 'an' and #nodes >= 2 then
4790       if (nodes[#nodes][2] == 'cs')
4791           and nodes[#nodes-1][2] == 'an' then
4792               nodes[#nodes][2] = 'an'
4793           end
4794       end
4795
4796       -- ET/EN          -- W5 + W7->l / W6->on
4797       if d == 'et' then
4798           first_et = first_et or (#nodes + 1)
4799       elseif d == 'en' then
4800           has_en = true
4801           first_et = first_et or (#nodes + 1)
4802       elseif first_et then      -- d may be nil here !
4803           if has_en then
4804               if last == 'l' then
4805                   temp = 'l'    -- W7
4806               else
4807                   temp = 'en'   -- W5
4808               end
4809           else
4810               temp = 'on'      -- W6
4811           end
4812           for e = first_et, #nodes do
4813               if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
4814           end
4815           first_et = nil
4816           has_en = false
4817       end
4818
4819       if d then
4820           if d == 'al' then
4821               d = 'r'
4822               last = 'al'
4823           elseif d == 'l' or d == 'r' then
4824               last = d
4825           end
4826           prev_d = d
4827           table.insert(nodes, {item, d, outer_first})
4828       end
4829
4830       outer_first = nil
4831
4832   end
4833
4834   -- TODO -- repeated here in case EN/ET is the last node. Find a
4835   -- better way of doing things:
4836   if first_et then      -- dir may be nil here !
4837       if has_en then
4838           if last == 'l' then
4839               temp = 'l'    -- W7
4840           else
4841               temp = 'en'   -- W5
4842           end
4843       else
4844           temp = 'on'      -- W6
4845       end
4846       for e = first_et, #nodes do
4847           if nodes[e][1].id == GLYPH then nodes[e][2] = temp end

```

```

4848     end
4849 end
4850
4851 -- dummy node, to close things
4852 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
4853
4854 ----- NEUTRAL -----
4855
4856 outer = save_outer
4857 last = outer
4858
4859 local first_on = nil
4860
4861 for q = 1, #nodes do
4862     local item
4863
4864     local outer_first = nodes[q][3]
4865     outer = outer_first or outer
4866     last = outer_first or last
4867
4868     local d = nodes[q][2]
4869     if d == 'an' or d == 'en' then d = 'r' end
4870     if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
4871
4872     if d == 'on' then
4873         first_on = first_on or q
4874     elseif first_on then
4875         if last == d then
4876             temp = d
4877         else
4878             temp = outer
4879         end
4880         for r = first_on, q - 1 do
4881             nodes[r][2] = temp
4882             item = nodes[r][1] -- MIRRORING
4883             if Babel.mirroring_enabled and item.id == GLYPH
4884                 and temp == 'r' and characters[item.char] then
4885                 item.char = characters[item.char].m or item.char
4886             end
4887         end
4888         first_on = nil
4889     end
4890
4891     if d == 'r' or d == 'l' then last = d end
4892 end
4893
4894 ----- IMPLICIT, REORDER -----
4895
4896 outer = save_outer
4897 last = outer
4898
4899 local state = {}
4900 state.has_r = false
4901
4902 for q = 1, #nodes do
4903
4904     local item = nodes[q][1]
4905
4906     outer = nodes[q][3] or outer

```

```

4907
4908     local d = nodes[q][2]
4909
4910     if d == 'nsm' then d = last end           -- W1
4911     if d == 'en' then d = 'an' end
4912     local isdir = (d == 'r' or d == 'l')
4913
4914     if outer == 'l' and d == 'an' then
4915         state.san = state.san or item
4916         state.ean = item
4917     elseif state.san then
4918         head, state = insert_numeric(head, state)
4919     end
4920
4921     if outer == 'l' then
4922         if d == 'an' or d == 'r' then       -- im -> implicit
4923             if d == 'r' then state.has_r = true end
4924             state.sim = state.sim or item
4925             state.eim = item
4926         elseif d == 'l' and state.sim and state.has_r then
4927             head, state = insert_implicit(head, state, outer)
4928         elseif d == 'l' then
4929             state.sim, state.eim, state.has_r = nil, nil, false
4930         end
4931     else
4932         if d == 'an' or d == 'l' then
4933             if nodes[q][3] then -- nil except after an explicit dir
4934                 state.sim = item -- so we move sim 'inside' the group
4935             else
4936                 state.sim = state.sim or item
4937             end
4938             state.eim = item
4939         elseif d == 'r' and state.sim then
4940             head, state = insert_implicit(head, state, outer)
4941         elseif d == 'r' then
4942             state.sim, state.eim = nil, nil
4943         end
4944     end
4945
4946     if isdir then
4947         last = d           -- Don't search back - best save now
4948     elseif d == 'on' and state.san then
4949         state.san = state.san or item
4950         state.ean = item
4951     end
4952
4953 end
4954
4955 return node.prev(head) or head
4956 end
4957 (/basic)

```

15 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.

16 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.

```

4958 ⟨*nil⟩
4959 \ProvidesLanguage{nil}[⟨⟨date⟩⟩ ⟨⟨version⟩⟩ Nil language]
4960 \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.

```

4961 \ifx\l@nil\@undefined
4962 \newlanguage\l@nil
4963 \@namedef{bbl@hyphendata@the\l@nil}{\{}}% Remove warning
4964 \let\bbl@elt\relax
4965 \edef\bbl@languages{% Add it to the list of languages
4966 \bbl@languages\bbl@elt{nil}{\the\l@nil}{\{}}
4967 \fi

```

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

```

4968 \providehyphenmins{\CurrentOption}{\m@m@m@m}

```

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

```

\captionnil
\datenil
4969 \let\captionnil\@empty
4970 \let\datenil\@empty

```

The macro `\ldf@finish` takes care of looking for a configuration file, setting the main language to be switched on at `\begin{document}` and resetting the category code of `@` to its original value.

```

4971 \ldf@finish{nil}
4972 ⟨/nil⟩

```

17 Support for Plain T_EX (plain.def)

17.1 Not renaming `hyphen.tex`

As Don Knuth has declared that the filename `hyphen.tex` may only be used to designate *his* version of the american English hyphenation patterns, a new solution has to be found in order to be able to load hyphenation patterns for other languages in a plain-based T_EX-format. When asked he responded:

17.2 Emulating some L^AT_EX features

The following code duplicates or emulates parts of L^AT_EX 2_ε that are needed for babel.

```
4992 (*plain)
4993 \def\@empty{}
4994 \def\loadlocalcfg#1{%
4995   \openin0#1.cfg
4996   \ifeof0
4997     \closein0
4998   \else
4999     \closein0
5000     {\immediate\write16{*****}%
5001      \immediate\write16{* Local config file #1.cfg used}%
5002      \immediate\write16{*}%
5003     }
5004   \input #1.cfg\relax
5005   \fi
5006 \endoflfd}
```

17.3 General tools

A number of L^AT_EX macro's that are needed later on.

```
5007 \long\def\@firstofone#1{#1}
5008 \long\def\@firstoftwo#1#2{#1}
5009 \long\def\@secondoftwo#1#2{#2}
5010 \def\@nnil{\@nil}
5011 \def\@gobbletwo#1#2{}
5012 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
5013 \def\@star@or@long#1{%
5014   \@ifstar
5015   {\let\l@ngrel@x\relax#1}%
5016   {\let\l@ngrel@x\long#1}}
5017 \let\l@ngrel@x\relax
5018 \def\@car#1#2\@nil{#1}
5019 \def\@cdr#1#2\@nil{#2}
5020 \let\@typeset@protect\relax
5021 \let\protected@edef\edef
5022 \long\def\@gobble#1{}
5023 \edef\@backslashchar{\expandafter\@gobble\string\}
5024 \def\strip@prefix#1>{}
5025 \def\g@addto@macro#1#2{%
5026   \toks@\expandafter{#1#2}%
5027   \xdef#1{\the\toks@}}
5028 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
5029 \def\@nameuse#1{\csname #1\endcsname}
5030 \def\@ifundefined#1{%
5031   \expandafter\ifx\csname#1\endcsname\relax
5032     \expandafter\@firstoftwo
5033   \else
5034     \expandafter\@secondoftwo
5035   \fi}
5036 \def\@expandtwoargs#1#2#3{%
5037   \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
5038 \def\zap@space#1 #2{%
5039   #1%
5040   \ifx#2\@empty\else\expandafter\zap@space\fi
5041   #2}
```

L^AT_EX 2_ε has the command `\@onlypreamble` which adds commands to a list of commands that are no longer needed after `\begin{document}`.

```
5042 \ifx\@preamblecmds\undefined
5043 \def\@preamblecmds{}
5044 \fi
5045 \def\@onlypreamble#1{%
5046 \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
5047 \@preamblecmds\do#1}}
5048 \@onlypreamble\@onlypreamble
```

Mimick L^AT_EX's `\AtBeginDocument`; for this to work the user needs to add `\begin{document}` to his file.

```
5049 \def\begin{document}{%
5050 \@begin{document}hook
5051 \global\let\@begin{document}hook\undefined
5052 \def\do##1{\global\let##1\undefined}%
5053 \@preamblecmds
5054 \global\let\do\noexpand}

5055 \ifx\@begin{document}hook\undefined
5056 \def\@begin{document}hook{}
5057 \fi
5058 \@onlypreamble\@begin{document}hook
5059 \def\AtBeginDocument{\g@addto@macro\@begin{document}hook}
```

We also have to mimick L^AT_EX's `\AtEndOfPackage`. Our replacement macro is much simpler; it stores its argument in `\@endoflfd`.

```
5060 \def\AtEndOfPackage#1{\g@addto@macro\@endoflfd{#1}}
5061 \@onlypreamble\AtEndOfPackage
5062 \def\@endoflfd{}
5063 \@onlypreamble\@endoflfd
5064 \let\bbl@afterlang\empty
5065 \chardef\bbl@opt@hyphenmap\z@
```

L^AT_EX needs to be able to switch off writing to its auxiliary files; plain doesn't have them by default.

```
5066 \ifx\if@files\undefined
5067 \expandafter\let\csname if@files\expandafter\endcsname
5068 \csname iffalse\endcsname
5069 \fi
```

Mimick L^AT_EX's commands to define control sequences.

```
5070 \def\newcommand{\@star@or@long\new@command}
5071 \def\new@command#1{%
5072 \@testopt{\@newcommand#1}0}
5073 \def\@newcommand#1[#2]{%
5074 \@ifnextchar [{\@xargdef#1[#2]}%
5075 {\@argdef#1[#2]}}
5076 \long\def\@argdef#1[#2]#3{%
5077 \@yargdef#1\@ne{#2}{#3}}
5078 \long\def\@xargdef#1[#2][#3]#4{%
5079 \expandafter\def\expandafter#1\expandafter{%
5080 \expandafter\@protected@testopt\expandafter #1%
5081 \csname\string#1\expandafter\endcsname{#3}}%
5082 \expandafter\@yargdef \csname\string#1\endcsname
5083 \tw@{#2}{#4}}
5084 \long\def\@yargdef#1#2#3{%
5085 \@tempcnta#3\relax
5086 \advance \@tempcnta \@ne
```

```

5087 \let\@hash@relax
5088 \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
5089 \@tempcntb #2%
5090 \@whilenum\@tempcntb <\@tempcnta
5091 \do{%
5092   \edef\reserved@a{\reserved@a\@hash@\the\@tempcntb}%
5093   \advance\@tempcntb \@ne}%
5094 \let\@hash@###
5095 \l@ngrel@x\expandafter\def\expandafter#1\reserved@a}
5096 \def\providecommand{\@star@or@long\provide@command}
5097 \def\provide@command#1{%
5098   \begingroup
5099   \escapechar\m@ne\edef\@gtempa{\string#1}%
5100   \endgroup
5101   \expandafter\@ifundefined\@gtempa
5102     {\def\reserved@a{\new@command#1}}%
5103     {\let\reserved@a\relax
5104      \def\reserved@a{\new@command\reserved@a}}%
5105   \reserved@a}%

5106 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
5107 \def\declare@robustcommand#1{%
5108   \edef\reserved@a{\string#1}%
5109   \def\reserved@b{#1}%
5110   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
5111   \edef#1{%
5112     \ifx\reserved@a\reserved@b
5113       \noexpand\x@protect
5114       \noexpand#1%
5115     \fi
5116     \noexpand\protect
5117     \expandafter\noexpand\csname
5118       \expandafter\@gobble\string#1 \endcsname
5119   }%
5120   \expandafter\new@command\csname
5121     \expandafter\@gobble\string#1 \endcsname
5122 }
5123 \def\x@protect#1{%
5124   \ifx\protect\@typeset@protect\else
5125     \@x@protect#1%
5126   \fi
5127 }
5128 \def\x@protect#1\fi#2#3{%
5129   \fi\protect#1%
5130 }

```

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`.

```

5131 \def\bbl@tempa{\csname newif\endcsname\ifin@}
5132 \ifx\in@\@undefined
5133   \def\in@#1#2{%
5134     \def\in@@##1#1##2##3\in@@{%
5135       \ifx\in@@##2\in@false\else\in@true\fi}%
5136     \in@@#2#1\in@\in@@}
5137 \else
5138   \let\bbl@tempa\@empty
5139 \fi

```


5140 \bbl@tempa

L^AT_EX 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 T_EX 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).

5141 \def@ifpackagewith#1#2#3#4{#3}

The L^AT_EX macro \@ifl@aded checks whether a file was loaded. This functionality is not needed for plain T_EX but we need the macro to be defined as a no-op.

5142 \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 L^AT_EX 2_ε versions; just enough to make things work in plain T_EX environments.

5143 \ifx\@tempcnta\@undefined

5144 \csname newcount\endcsname\@tempcnta\relax

5145 \fi

5146 \ifx\@tempcntb\@undefined

5147 \csname newcount\endcsname\@tempcntb\relax

5148 \fi

To prevent wasting two counters in L^AT_EX 2.09 (because counters with the same name are allocated later by it) we reset the counter that holds the next free counter (\count10).

5149 \ifx\bye\@undefined

5150 \advance\count10 by -2\relax

5151 \fi

5152 \ifx\@ifnextchar\@undefined

5153 \def\@ifnextchar#1#2#3{%

5154 \let\reserved@d=#1%

5155 \def\reserved@a{#2}\def\reserved@b{#3}%

5156 \futurelet\@let@token\@ifnch}

5157 \def\@ifnch{%

5158 \ifx\@let@token\@sptoken

5159 \let\reserved@c\@xifnch

5160 \else

5161 \ifx\@let@token\reserved@d

5162 \let\reserved@c\reserved@a

5163 \else

5164 \let\reserved@c\reserved@b

5165 \fi

5166 \fi

5167 \reserved@c}

5168 \def\:{\let\@sptoken= } \: % this makes \@sptoken a space token

5169 \def\{\@xifnch} \expandafter\def\{\futurelet\@let@token\@ifnch}

5170 \fi

5171 \def\@testopt#1#2{%

5172 \@ifnextchar[#{1}{#1[#2]}}

5173 \def\@protected@testopt#1{%

5174 \ifx\protect\@typeset@protect

5175 \expandafter\@testopt

5176 \else

5177 \@x@protect#1%

5178 \fi}

5179 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax

5180 #2\relax}\fi}

```

5181 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
5182         \else\expandafter\@gobble\fi{#1}}

```

17.4 Encoding related macros

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

```

5183 \def\DeclareTextCommand{%
5184   \@dec@text@cmd\providecommand
5185 }
5186 \def\ProvideTextCommand{%
5187   \@dec@text@cmd\providecommand
5188 }
5189 \def\DeclareTextSymbol#1#2#3{%
5190   \@dec@text@cmd\chardef#1{#2}#3\relax
5191 }
5192 \def\@dec@text@cmd#1#2#3{%
5193   \expandafter\def\expandafter#2%
5194     \expandafter{%
5195       \csname#3-cmd\expandafter\endcsname
5196       \expandafter#2%
5197       \csname#3\string#2\endcsname
5198     }%
5199 %   \let\@ifdefinable\rc@ifdefinable
5200   \expandafter#1\csname#3\string#2\endcsname
5201 }
5202 \def\@current@cmd#1{%
5203   \ifx\protect\@typeset@protect\else
5204     \noexpand#1\expandafter\@gobble
5205   \fi
5206 }
5207 \def\@changed@cmd#1#2{%
5208   \ifx\protect\@typeset@protect
5209     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
5210       \expandafter\ifx\csname ?\string#1\endcsname\relax
5211         \expandafter\def\csname ?\string#1\endcsname{%
5212           \@changed@x@err{#1}%
5213         }%
5214       \fi
5215     \global\expandafter\let
5216       \csname\cf@encoding \string#1\expandafter\endcsname
5217       \csname ?\string#1\endcsname
5218     \fi
5219     \csname\cf@encoding\string#1%
5220       \expandafter\endcsname
5221   \else
5222     \noexpand#1%
5223   \fi
5224 }
5225 \def\@changed@x@err#1{%
5226   \errhelp{Your command will be ignored, type <return> to proceed}%
5227   \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
5228 \def\DeclareTextCommandDefault#1{%
5229   \DeclareTextCommand#1?%
5230 }
5231 \def\ProvideTextCommandDefault#1{%
5232   \ProvideTextCommand#1?%
5233 }
5234 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd

```

```

5235 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
5236 \def\DeclareTextAccent#1#2#3{%
5237   \DeclareTextCommand#1{#2}[1]{\accent#3 #1}
5238 }
5239 \def\DeclareTextCompositeCommand#1#2#3#4{%
5240   \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
5241   \def\reserved@b{\string##1}%
5242   \def\reserved@c{%
5243     \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
5244   \ifx\reserved@b\reserved@c
5245     \expandafter\expandafter\expandafter\ifx
5246       \expandafter\@car\reserved@a\relax\relax\@nil
5247       \@text@composite
5248     \else
5249       \def\reserved@b##1{%
5250         \def\expandafter\noexpand
5251           \csname#2\string#1\endcsname###1{%
5252             \noexpand\@text@composite
5253               \expandafter\noexpand\csname#2\string#1\endcsname
5254                 ###1\noexpand\@empty\noexpand\@text@composite
5255                   {##1}%
5256             }%
5257         }%
5258       \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
5259     \fi
5260     \expandafter\def\csname\expandafter\string\csname
5261       #2\endcsname\string#1-\string#3\endcsname{#4}
5262   \else
5263     \errhelp{Your command will be ignored, type <return> to proceed}%
5264     \errmessage{\string\DeclareTextCompositeCommand\space used on
5265       inappropriate command \protect#1}
5266   \fi
5267 }
5268 \def\@text@composite#1#2#3\@text@composite{%
5269   \expandafter\@text@composite@x
5270     \csname\string#1-\string#2\endcsname
5271 }
5272 \def\@text@composite@x#1#2{%
5273   \ifx#1\relax
5274     #2%
5275   \else
5276     #1%
5277   \fi
5278 }
5279 %
5280 \def\@strip@args#1:#2-#3\@strip@args{#2}
5281 \def\DeclareTextComposite#1#2#3#4{%
5282   \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
5283   \bgroup
5284     \lccode`\@=#4%
5285     \lowercase{%
5286   \egroup
5287     \reserved@a @%
5288   }%
5289 }
5290 %
5291 \def\UseTextSymbol#1#2{%
5292 %   \let\@curr@enc\cf@encoding
5293 %   \@use@text@encoding{#1}%

```

```

5294 #2%
5295 % \@use@text@encoding\@curr@enc
5296 }
5297 \def\UseTextAccent#1#2#3{%
5298 % \let\@curr@enc\cf@encoding
5299 % \@use@text@encoding{#1}%
5300 % #2{\@use@text@encoding\@curr@enc\selectfont#3}%
5301 % \@use@text@encoding\@curr@enc
5302 }
5303 \def\@use@text@encoding#1{%
5304 % \edef\f@encoding{#1}%
5305 % \xdef\font@name{%
5306 % \csname\curr@fontshape/\f@size\endcsname
5307 % }%
5308 % \pickup@font
5309 % \font@name
5310 % \@@enc@update
5311 }
5312 \def\DeclareTextSymbolDefault#1#2{%
5313 % \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
5314 }
5315 \def\DeclareTextAccentDefault#1#2{%
5316 % \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
5317 }
5318 \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.

```

5319 \DeclareTextAccent{"}{OT1}{127}
5320 \DeclareTextAccent{'}{OT1}{19}
5321 \DeclareTextAccent{^}{OT1}{94}
5322 \DeclareTextAccent`}{OT1}{18}
5323 \DeclareTextAccent~}{OT1}{126}

```

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

```

5324 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
5325 \DeclareTextSymbol{\textquotedblright}{OT1}{`\"}
5326 \DeclareTextSymbol{\textquoteleft}{OT1}{``\`'}
5327 \DeclareTextSymbol{\textquoteright}{OT1}{``\`'}
5328 \DeclareTextSymbol{\i}{OT1}{16}
5329 \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`.

```

5330 \ifx\scriptsize\@undefined
5331 % \let\scriptsize\sevenrm
5332 \fi
5333 </plain>

```

18 Acknowledgements

I would like to thank all who volunteered as β -testers for their time. Michel Goossens supplied contributions for most of the other languages. Nico Poppelier helped polish the text of the documentation and supplied parts of the macros for the Dutch language. Paul Wackers and Werenfried Spit helped find and repair bugs.

During the further development of the babel system I received much help from Bernd Raichle, for which I am grateful.

References

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