

Babel

Version 3.20

2018/05/02

Original author

Johannes L. Braams

Current maintainer

Javier Bezos

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

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

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

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

Contents

| | | |
|-----------|--|-----------|
| I | User guide | 4 |
| 1 | The user interface | 4 |
| 1.1 | Monolingual documents | 4 |
| 1.2 | Multilingual documents | 5 |
| 1.3 | Modifiers | 6 |
| 1.4 | xelatex and lualatex | 6 |
| 1.5 | Troubleshooting | 7 |
| 1.6 | Plain | 8 |
| 1.7 | Basic language selectors | 8 |
| 1.8 | Auxiliary language selectors | 9 |
| 1.9 | More on selection | 9 |
| 1.10 | Shorthands | 11 |
| 1.11 | Package options | 14 |
| 1.12 | The base option | 16 |
| 1.13 | ini files | 17 |
| 1.14 | Selecting fonts | 23 |
| 1.15 | Modifying a language | 24 |
| 1.16 | Creating a language | 25 |
| 1.17 | Digits | 26 |
| 1.18 | Getting the current language name | 27 |
| 1.19 | Hyphenation tools | 27 |
| 1.20 | Selecting scripts | 29 |
| 1.21 | Selecting directions | 29 |
| 1.22 | Language attributes | 32 |
| 1.23 | Hooks | 32 |
| 1.24 | Languages supported by babel | 33 |
| 1.25 | Tips, workarounds, know issues and notes | 34 |
| 1.26 | Current and future work | 36 |
| 1.27 | Tentative and experimental code | 37 |
| 2 | Loading languages with language.dat | 38 |
| 2.1 | Format | 38 |
| 3 | The interface between the core of babel and the language definition files | 39 |
| 3.1 | Guidelines for contributed languages | 40 |
| 3.2 | Basic macros | 41 |
| 3.3 | Skeleton | 42 |
| 3.4 | Support for active characters | 43 |
| 3.5 | Support for saving macro definitions | 43 |
| 3.6 | Support for extending macros | 43 |
| 3.7 | Macros common to a number of languages | 44 |
| 3.8 | Encoding-dependent strings | 44 |
| 4 | Changes | 48 |
| 4.1 | Changes in babel version 3.9 | 48 |
| 4.2 | Changes in babel version 3.7 | 48 |
| II | The code | 49 |
| 5 | Identification and loading of required files | 49 |

| | | |
|-----------|--|------------|
| 6 | Tools | 49 |
| 6.1 | Multiple languages | 53 |
| 7 | The Package File (\LaTeX, babel.sty) | 54 |
| 7.1 | base | 54 |
| 7.2 | key=value options and other general option | 56 |
| 7.3 | Conditional loading of shorthands | 57 |
| 7.4 | Language options | 58 |
| 8 | The kernel of Babel (babel.def, common) | 61 |
| 8.1 | Tools | 61 |
| 8.2 | Hooks | 64 |
| 8.3 | Setting up language files | 66 |
| 8.4 | Shorthands | 67 |
| 8.5 | Language attributes | 77 |
| 8.6 | Support for saving macro definitions | 79 |
| 8.7 | Short tags | 80 |
| 8.8 | Hyphens | 80 |
| 8.9 | Multiencoding strings | 82 |
| 8.10 | Macros common to a number of languages | 87 |
| 8.11 | Making glyphs available | 88 |
| 8.11.1 | Quotation marks | 88 |
| 8.11.2 | Letters | 89 |
| 8.11.3 | Shorthands for quotation marks | 90 |
| 8.11.4 | Umlauts and tremas | 91 |
| 8.12 | Layout | 92 |
| 8.13 | Creating languages | 93 |
| 9 | The kernel of Babel (babel.def, only \LaTeX) | 100 |
| 9.1 | The redefinition of the style commands | 100 |
| 9.2 | Cross referencing macros | 100 |
| 9.3 | Marks | 104 |
| 9.4 | Preventing clashes with other packages | 105 |
| 9.4.1 | ifthen | 105 |
| 9.4.2 | varioref | 105 |
| 9.4.3 | hhline | 106 |
| 9.4.4 | hyperref | 106 |
| 9.4.5 | fancyhdr | 107 |
| 9.5 | Encoding and fonts | 107 |
| 9.6 | Basic bidi support | 109 |
| 9.7 | Local Language Configuration | 111 |
| 10 | Multiple languages (switch.def) | 112 |
| 10.1 | Selecting the language | 113 |
| 10.2 | Errors | 121 |
| 11 | Loading hyphenation patterns | 122 |
| 12 | Font handling with fontspec | 127 |
| 13 | Hooks for XeTeX and LuaTeX | 130 |
| 13.1 | XeTeX | 130 |
| 13.2 | Layout | 132 |
| 13.3 | LuaTeX | 135 |
| 13.4 | Layout | 140 |
| 13.5 | Auto bidi with basic-r | 142 |

| | | |
|-----------|---|------------|
| 14 | The ‘nil’ language | 153 |
| 15 | Support for Plain T_EX (plain.def) | 153 |
| 15.1 | Not renaming hyphen.tex | 153 |
| 15.2 | Emulating some L ^A T _E X features | 155 |
| 15.3 | General tools | 155 |
| 15.4 | Encoding related macros | 159 |
| 16 | Acknowledgements | 161 |

Troubleshoooting

| | |
|---|----|
| Paragraph ended before \UTFviii@three@octets was complete | 4 |
| No hyphenation patterns were preloaded for (babel) the language ‘LANG’ into the format | 5 |
| You are loading directly a language style | 7 |
| Unknown language ‘LANG’ | 7 |
| Argument of \language@active@arg” has an extra } | 11 |

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.
- If you are interested in the \TeX multilingual support, please join the kadingira list on <http://tug.org/mailman/listinfo/kadingira>. You can follow the development of babel on <https://github.com/latex3/latex2e/tree/master/required/babel> (which provides some sample files, too).
- See section 3.1 for contributing a language.

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}

\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@threeto@octets was complete.
```

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

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

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

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

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

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

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

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

1.2 Multilingual documents

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

EXAMPLE In \LaTeX , the preamble of the document:

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

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

You can also set the main language explicitly:

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

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

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

WARNING In the preamble the main language has *not* been selected, except hyphenation patterns and the name assigned to `\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 accept them). An example is (spaces are not significant and they can be added or removed):¹

```
\usepackage[latin.medieval, spanish.notilde.lcroman, danish]{babel}
```

Attributes (described below) are considered modifiers, ie, you can set an attribute by including it in the list of modifiers. However, modifiers is a more general mechanism.

1.4 xelatex and lualatex

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

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

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

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

```
\documentclass{article}

\usepackage[vietnamese,danish]{babel}

\begin{document}

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

\selectlanguage{vietnamese}

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

\end{document}
```

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

```
\documentclass{article}

\usepackage[russian]{babel}

\babelfont{rm}{DejaVu Serif}

\begin{document}

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

\end{document}
```

1.5 Troubleshooting

- Loading directly sty files in 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

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”.


```
! Package babel Error: Unknown language `LANG'. Either you have misspelled
(babel)                its name, it has not been installed, or you requested
(babel)                it in a previous run. Fix its name, install it or just
(babel)                rerun the file, respectively
```

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

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

```
\selectlanguage{german}
```

This command can be used as environment, too.

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

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.

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

`\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).

1.8 Auxiliary language selectors

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

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

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

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

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

Spaces after the environment are ignored.

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

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

The environment `hyphenrules` can be used to select *only* the hyphenation rules to be used (it can be used as command, too). This can for instance be used to select ‘nohyphenation’, provided that in `language.dat` the ‘language’ nohyphenation is defined by loading `zerohyph.tex`. It deactivates language shorthands, too (but not user shorthands).

Except for these simple uses, `hyphenrules` is discouraged and `otherlanguage*` (the starred version) is preferred, as the former does not take into account possible changes in encodings of characters like, say, ‘ done by some languages (eg. italian, french, ukraineb). To set hyphenation exceptions, use `\babelhyphenation` (see below).

1.9 More on selection

\babeltags $\langle tag1 \rangle = \langle language1 \rangle, \langle tag2 \rangle = \langle language2 \rangle, \dots$

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

EXAMPLE With

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

you can write

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

and

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

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

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

\babelensure $[\text{include}=\langle commands \rangle, \text{exclude}=\langle commands \rangle, \text{fontenc}=\langle encoding \rangle]\{\langle language \rangle\}$

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

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

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

```
\babelensure{polish}
```

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

⁵With it encoded string may not work as expected.

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

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

1.10 Shorthands

A *shorthand* is a sequence of one or two characters that expands to arbitrary \TeX code. Shorthands can be used for different kinds of things, as for example: (1) in some languages shorthands such as "a are defined to be able to hyphenate the word if the encoding is OT1; (2) in some languages shorthands such as ! are used to insert the right amount of white space; (3) several kinds of discretionary and breaks can be inserted easily with "-", "=", etc. The package `inputenc` as well as `xetex` and `luatex` have alleviated entering non-ASCII characters, but minority languages and some kinds of text can still require characters not directly available on the keyboards (and sometimes not even as separated or precomposed Unicode characters). As to the point 2, now `pdfTeX` provides `\knbcode`, and `luatex` can manipulate the glyph list. Tools for point 3 can be still very useful in general. There are three levels of shorthands: *user*, *language*, and *system* (by order of precedence). Version 3.9 introduces the *language user* level on top of the user level, as described below. In most cases, you will use only shorthands provided by languages.

NOTE Note the following:

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

A typical error when using shorthands is the following:

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

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

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

It is sometimes necessary to switch a shorthand character off temporarily, because it must be used in an entirely different way. For this purpose, the user commands `\shorthandoff` and `\shorthandon` are provided. They each take a list of characters as their arguments. The command `\shorthandoff` sets the `\catcode` for each of the characters in its argument to other (12); the command `\shorthandon` sets the `\catcode` to active (13). Both commands only work on 'known' shorthand characters. If a character is not known to be a shorthand character its category code will be left unchanged.

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.

\useshorthands `*{⟨char⟩}`

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

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

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

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

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

New 3.9a An optional argument allows to (re)define language and system shorthands (some languages do not activate shorthands, so you may want to add `\languageshorthands{⟨lang⟩}` to the corresponding `\extras{⟨lang⟩}`, as explained below). By default, user shorthands are (re)defined.

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

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

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

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

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

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

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

\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 `\defineshorthand` nothing happens.

\languageshorthands $\{\langle language \rangle\}$

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

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

(You may also need to activate them with, for example, `\usesshorthands`.)

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

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

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

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

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.

⁷Thanks to Enrico Gregorio

Languages with only " as defined shorthand character Albanian, Bulgarian, Danish, Dutch, Finnish, German (old and new orthography, also Austrian), Icelandic, Italian, Norwegian, Polish, Portuguese (also Brazilian), Russian, Serbian (with Latin script), Slovene, Swedish, Ukrainian, Upper Sorbian

Basque " ' ~

Breton : ; ? !

Catalan " ' `

Czech " -

Esperanto ^

Estonian " ~

French (all varieties) : ; ? !

Galician " . ' ~ < >

Greek ~

Hungarian `

Kurmanji ^

Latin " ^ =

Slovak " ^ ' -

Spanish " . < > ' ^

Turkish : ! =

In addition, the babel core declares ~ as a one-char shorthand which is let, like the standard ~, to a non breaking space.⁸

1.11 Package options

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

| | |
|-----------------------------|--|
| KeepShorthandsActive | Tells babel not to deactivate shorthands after loading a language file, so that they are also 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 \TeX before they are passed to the package and therefore they will not be recognized); however, t is provided for the common case of ~ (as well as c for not so common case of the comma). With shorthands=off no language shorthands are defined, As some languages use this mechanism for tools not available otherwise, a macro \babelshorthand is defined, which allows using them; see above.

safe= none | ref | bib

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

Some \LaTeX macros are redefined so that using shorthands is safe. With `safe=bib` only `\nocite`, `\bibcite` and `\bibitem` are redefined. With `safe=ref` only `\newlabel`, `\ref` and `\pageref` are redefined (as well as a few macros from `varioref` and `ifthen`). With `safe=none` no macro is redefined. This option is strongly recommended, because a good deal of incompatibilities and errors are related to these redefinitions – of course, in such a case you cannot use shorthands in these macros, but this is not a real problem (just use “allowed” characters).

- math=** active | normal
- Shorthands are mainly intended for text, not for math. By setting this option with the value `normal` they are deactivated in math mode (default is `active`) and things like `\a'` (a closing brace after a shorthand) are not a source of trouble any more.
- config=** $\langle file \rangle$
- 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 spoilt by an unexpected `.cfg` file. However, if the key `config` is set, this file is loaded.
- showlanguages** Prints to the log the list of languages loaded when the format was created: number (remember dialects can share it), name, hyphenation file and exceptions file.
- nocase** New 3.9! Language settings for uppercase and lowercase mapping (as set by `\SetCase`) are ignored. Use only if there are incompatibilities with other packages.
- silent** New 3.9! No warnings and no *infos* are written to the log file.⁹
- strings=** generic | unicode | encoded | $\langle label \rangle$ | $\langle font encoding \rangle$
- Selects the encoding of strings in languages supporting this feature. Predefined labels are `generic` (for traditional \TeX , LICR and ASCII strings), `unicode` (for engines like `xetex` and `luatex`) and `encoded` (for special cases requiring mixed encodings). Other allowed values are font encoding codes (T1, T2A, LGR, L7X...), but only in languages supporting them. Be aware with encoded captions are protected, but they work in `\MakeUppercase` and the like (this feature misuses some internal \LaTeX tools, so use it only as a last resort).
- hyphenmap=** off | main | select | other | other*

⁹You can use alternatively the package `silence`.

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

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

bidi=

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

layout=

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

1.12 The base option

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

\AfterBabelLanguage `{⟨option-name⟩}{⟨code⟩}`

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

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

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

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

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

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 paragraph, but if either xetex or luatex change this behavior it might be added. On the other hand, `other` is provided even if I [JBL] think it isn't really useful, but who knows.

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

1.13 ini files

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

EXAMPLE Although Georgian has its own ldf file, here is how to declare this language with an ini file in Unicode engines. The nil language is required, because currently babel raises an error if there is no language.

```
\documentclass{book}

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

\babelfont{rm}{DejaVu Sans}

\begin{document}

\tableofcontents

\chapter{სამზარეულო და სუფრის ტრადიციები}

ქართული ტრადიციული სამზარეულო ერთ-ერთი უმდიდრესია მთელ მსოფლიოში.

\end{document}
```

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

| | | | |
|---------|---------------------------|---------|-----------------------|
| af | Afrikaans ^{ul} | bm | Bambara |
| agq | Aghem | bn | Bangla ^{ul} |
| ak | Akan | bo | Tibetan ^u |
| am | Amharic ^{ul} | brx | Bodo |
| ar | Arabic ^{ul} | bs-Cyrl | Bosnian |
| as | Assamese | bs-Latn | Bosnian ^{ul} |
| asa | Asu | bs | Bosnian ^{ul} |
| ast | Asturian ^{ul} | ca | Catalan ^{ul} |
| az-Cyrl | Azerbaijani | ce | Chechen |
| az-Latn | Azerbaijani | cgg | Chiga |
| az | Azerbaijani ^{ul} | chr | Cherokee |
| bas | Basaa | ckb | Central Kurdish |
| be | Belarusian ^{ul} | cs | Czech ^{ul} |
| bem | Bemba | cy | Welsh ^{ul} |
| bez | Bena | da | Danish ^{ul} |
| bg | Bulgarian ^{ul} | dav | Taita |

| | | | |
|-------|-------------------------------|-------|--------------------------|
| de-AT | German ^{ul} | ig | Igbo |
| de-CH | German ^{ul} | ii | Sichuan Yi |
| de | German ^{ul} | is | Icelandic ^{ul} |
| dje | Zarma | it | Italian ^{ul} |
| dsb | Lower Sorbian ^{ul} | ja | Japanese |
| dua | Duala | jgo | Ngomba |
| dyo | Jola-Fonyi | jmc | Machame |
| dz | Dzongkha | ka | Georgian ^{ul} |
| ebu | Embu | kab | Kabyle |
| ee | Ewe | kam | Kamba |
| el | Greek ^{ul} | kde | Makonde |
| en-AU | English ^{ul} | kea | Kabuverdianu |
| en-CA | English ^{ul} | khq | Koyra Chiini |
| en-GB | English ^{ul} | ki | Kikuyu |
| en-NZ | English ^{ul} | kk | Kazakh |
| en-US | English ^{ul} | kkj | Kako |
| en | English ^{ul} | kl | Kalaallisut |
| eo | Esperanto ^{ul} | kln | Kalenjin |
| es-MX | Spanish ^{ul} | km | Khmer |
| es | Spanish ^{ul} | kn | Kannada ^{ul} |
| et | Estonian ^{ul} | ko | Korean |
| eu | Basque ^{ul} | kok | Konkani |
| ewo | Ewondo | ks | Kashmiri |
| fa | Persian ^{ul} | ksb | Shambala |
| ff | Fulah | ksf | Bafia |
| fi | Finnish ^{ul} | ksh | Colognian |
| fil | Filipino | kw | Cornish |
| fo | Faroese | ky | Kyrgyz |
| fr | French ^{ul} | lag | Langi |
| fr-BE | French ^{ul} | lb | Luxembourgish |
| fr-CA | French ^{ul} | lg | Ganda |
| fr-CH | French ^{ul} | lkt | Lakota |
| fr-LU | French ^{ul} | ln | Lingala |
| fur | Friulian ^{ul} | lo | Lao ^{ul} |
| fy | Western Frisian | lrc | Northern Luri |
| ga | Irish ^{ul} | lt | Lithuanian ^{ul} |
| gd | Scottish Gaelic ^{ul} | lu | Luba-Katanga |
| gl | Galician ^{ul} | luo | Luo |
| gsw | Swiss German | luy | Luyia |
| gu | Gujarati | lv | Latvian ^{ul} |
| guz | Gusii | mas | Masai |
| gv | Manx | mer | Meru |
| ha-GH | Hausa | mfe | Morisyen |
| ha-NE | Hausa ¹ | mg | Malagasy |
| ha | Hausa | mgh | Makhuwa-Meetto |
| haw | Hawaiian | mgo | Meta' |
| he | Hebrew ^{ul} | mk | Macedonian ^{ul} |
| hi | Hindi ^u | ml | Malayalam ^{ul} |
| hr | Croatian ^{ul} | mn | Mongolian |
| hsb | Upper Sorbian ^{ul} | mr | Marathi ^{ul} |
| hu | Hungarian ^{ul} | ms-BN | Malay ¹ |
| hy | Armenian | ms-SG | Malay ¹ |
| ia | Interlingua ^{ul} | ms | Malay ^{ul} |
| id | Indonesian ^{ul} | mt | Maltese |

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

In some contexts (currently \babel font) an ini file may be loaded by its name. Here is the list of the names currently supported. With these languages, \babel font loads (if not done

before) the language and script names (even if the language is defined as a package option with an ldf file).

| | |
|-----------------------|--------------------------------------|
| aghem | chinese-hant |
| akan | chinese-simplified-hongkongsarchina |
| albanian | chinese-simplified-macausarchina |
| american | chinese-simplified-singapore |
| amharic | chinese-simplified |
| arabic | chinese-traditional-hongkongsarchina |
| armenian | chinese-traditional-macausarchina |
| assamese | chinese-traditional |
| asturian | chinese |
| asu | cognian |
| australian | cornish |
| austrian | croatian |
| azerbaijani-cyrillic | czech |
| azerbaijani-cyrl | danish |
| azerbaijani-latin | duala |
| azerbaijani-latn | dutch |
| azerbaijani | dzongkha |
| bafia | embu |
| bambara | english-au |
| basaa | english-australia |
| basque | english-ca |
| belarusian | english-canada |
| bemba | english-gb |
| ben | english-newzealand |
| bengali | english-nz |
| bodo | english-unitedkingdom |
| bosnian-cyrillic | english-unitedstates |
| bosnian-cyrl | english-us |
| bosnian-latin | english |
| bosnian-latn | esperanto |
| bosnian | estonian |
| brazilian | ewe |
| breton | ewondo |
| british | faroe |
| bulgarian | filipino |
| burmese | finnish |
| canadian | french-be |
| cantonese | french-belgium |
| catalan | french-ca |
| centralatlastamazight | french-canada |
| centralkurdish | french-ch |
| chechen | french-lu |
| cherokee | french-luxembourg |
| chiga | french-switzerland |
| chinese-hans-hk | french |
| chinese-hans-mo | friulian |
| chinese-hans-sg | fulah |
| chinese-hans | galician |
| chinese-hant-hk | ganda |
| chinese-hant-mo | 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 | swedish |
| punjabi-guru | swissgerman |
| punjabi | tachelhit-latin |
| quechua | tachelhit-latn |
| romanian | tachelhit-tfng |
| romansh | tachelhit-tifinagh |
| rombo | tachelhit |
| rundi | taita |
| russian | tamil |
| rwa | tasawaq |
| sakha | telugu |
| samburu | teso |
| samin | thai |
| sango | tibetan |
| sangu | tigrinya |
| scottishgaelic | tongan |
| sena | turkish |
| serbian-cyrillic-bosniaherzegovina | turkmen |
| serbian-cyrillic-kosovo | ukenglish |
| serbian-cyrillic-montenegro | ukrainian |
| serbian-cyrillic | uppertsorbian |
| serbian-cyrl-ba | urdu |
| serbian-cyrl-me | usenglish |
| serbian-cyrl-xk | usorbian |
| serbian-cyrl | uyghur |
| serbian-latin-bosniaherzegovina | uzbek-arab |
| serbian-latin-kosovo | uzbek-arabic |
| serbian-latin-montenegro | uzbek-cyrillic |
| serbian-latin | uzbek-cyrl |
| serbian-latn-ba | uzbek-latin |
| serbian-latn-me | uzbek-latn |
| serbian-latn-xk | uzbek |
| serbian-latn | vai-latin |
| serbian | vai-latn |
| shambala | vai-vai |
| shona | vai-vaii |
| sichuanyi | vai |
| sinhala | vietnam |
| slovak | vietnamese |
| slovene | vunjo |
| slovenian | walser |
| soga | welsh |
| somali | westernfrisian |
| spanish-mexico | yangben |
| spanish-mx | yiddish |
| spanish | yoruba |
| standardmoroccantamazight | zarma |
| swahili | zulu afrikaans |

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=he]{hebrew}

\babelfont{rm}{FreeSerif}

\begin{document}

Svenska \foreignlanguage{hebrew}{עברית} svenska.

\end{document}
```

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

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

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

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:

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


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

This makes sure the OpenType script for Devanagari is deva and not dev2.

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 are passed. You must add them by hand. This is by design, for several reasons (for example, each font has its own set of features and a generic setting for several of them could be problematic, and also a “lower level” font selection is useful).

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

WARNING Do not use `\setxxxxfont` and `\babelfont` at the same time. `\babelfont` follows the standard \TeX 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).

1.15 Modifying a language

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

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

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

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

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

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

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

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

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

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

1.16 Creating a language

New 3.10 And what if there is no style for your language or none fits your needs? You may then define quickly a language with the help of the following macro in the preamble.

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

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

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

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

EXAMPLE If you need a language named arhinish:

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

The main language is not changed (danish in this example). So, you must add `\selectlanguage{arhinish}` or other selectors where necessary. If the language has been loaded as an argument in `\documentclass` or `\usepackage`, then `\babelprovide` redefines the requested data.

`import=` `⟨language-tag⟩`

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

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

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

There are about 200 ini files, with data taken from the ldf files and the CLDR provided by Unicode. Not all languages in the latter are complete, and therefore neither are the ini

files. A few languages will show a warning about the current lack of suitability of the date format (hindi, french, breton, and occitan).

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

captions= `\<language-tag>`

Loads only the strings. For example:

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

hyphenrules= `\<language-list>`

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

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

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

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

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

In other engines it just 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. This value is particularly important because it sets the writing direction.

language= `\<language-name>`

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

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

1.17 Digits

New 3.20 A few `ini` files define a field named `digits.native`. When it is present, two macros are created: `\<language>digits` and `\<language>counter` (only `xetex` and

luatex). With the first, a string of ‘Latin’ digits are converted to the native digits of that language; the second takes a counter name as argument. With option `maparabic` in `\babelprovide`, `\arabic` is redefined to produce the native digits (this is done *globally*, to avoid inconsistencies in, for example, page numbering).

For example:

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

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` $\langle\textit{language}\rangle\langle\textit{true}\rangle\langle\textit{false}\rangle$

If more than one language is used, it might be necessary to know which language is active at a specific time. This can be checked by a call to `\iflanguage`, but note here “language” is used in the 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 tools

`\babelhyphen` $\ast\langle\textit{type}\rangle$

`\babelhyphen` $\ast\langle\textit{text}\rangle$

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, Portugese, Catalan or Danish is a hard hyphen, while in German, Spanish, Norwegian, Slovak or Russian is a soft hyphen. Furthermore, some of them even redefine `\-`, so that you cannot insert a soft hyphen without breaking opportunities in the rest of the word. Therefore, some macros are provide with a set of basic “hyphens” which can be used by themselves, to define a user shorthand, or even in language files.

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

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

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

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

`\babelhyphenation` [`<language>`, `<language>`, ...]{`<exceptions>`}

New 3.9a Sets hyphenation exceptions for the languages given or, without the optional argument, for *all* languages (eg, proper nouns or common loan words, and of course monolingual documents). Language exceptions take precedence over global ones. It can be used only in the preamble, and exceptions are set when the language is first selected, thus taking into account changes of `\lccodes`’s done in `\extras{lang}` as well as the language specific encoding (not set in the preamble by default). Multiple `\babelhyphenation`’s are allowed. For example:

```
\babelhyphenation{Wal-hal-la Dar-bhan-ga}
```

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

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

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

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

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

¹⁴With *luatex* exceptions and patterns can be modified almost freely. However, this is very likely a task for a separate package and *babel* only provides the most basic tools.

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.¹⁵

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.¹⁶

`\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.

The foregoing rules (which are applied “at begin document”) cover most of 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 Setting bidi text has many subtleties (see for example

<https://www.w3.org/TR/html-bidi/>). *This means the babel bidi code may take some time before it is truly stable.*¹⁷ 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.

`bidi=` default | basic-r | basic

New 3.14 Selects the bidi algorithm to be used. With `default` the bidi mechanism is just activated (by default it is not), but every change must 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,

¹⁵The 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.

¹⁶But still defined for backwards compatibility.

¹⁷A basic stable version for `luatex` is planned before Summer 2018. Other engines must wait very likely until Winter.

which handles numbers and unmarked L text within an R context. **New 3.19** Finally, basic supports both L and R text (see 1.27). (They are named basic mainly because they only consider the intrinsic direction of scripts and weak directionality.)

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, which will be improved in the future. Remember `basic-r` is available in `luatex` only.¹⁸

```
\documentclass{article}

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

\babelprovide[import=ar, main]{arabic}

\babelfont{rm}{FreeSerif}

\begin{document}

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

\end{document}
```

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

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

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

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

With counters, `\arabic` is not only considered L text always (with `\babelsublr`, see below), but also an “isolated” block which does not interact with the surrounding chars. So, while `1.2` in R text is rendered in that order with `bidi=basic` (as a decimal number), in `\arabic{c1}.\arabic{c2}` the visual order is `c2.c1`. Of course, you may always adjust the order by changing the language, if necessary.¹⁹

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

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

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

¹⁸At the time of this writing some Arabic fonts are not rendered correctly by the default `luatex` font loader, with misplaced kerns inside some words, so double check the resulting text. It seems a fix is on the way, but in the meanwhile you could have a look at the workaround available on GitHub, under `/required/babel/samples`

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

footnotes not required in monolingual documents, but it may be useful in multilingual documents in all engines; you may use alternatively `\BabelFootnote` described below (what this options does exactly is also explained there).

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

tabular required in `luatex` for `R tabular` (it has been tested only with simple tables, so expect some readjustments in the future); ignored in `pdftex` or `xetex` (which will not support a similar option in the short term) **New 3.18** ,

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

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

Digits in `pdftex` must be marked up explicitly (unlike `luatex` with `bidi=basic-r` and, usually, `xetex`). This command is provided to set `{\lr-text}` in L mode if necessary. It's intended for what Unicode calls weak characters, because words are best set with the corresponding language. For this reason, there is no `rl` counterpart. Any `\babelsublr` in *explicit* L mode is ignored. However, with `bidi=basic` and *implicit* L, it first returns to R and then switches to explicit L. This is by design to provide the proper behaviour in the most usual cases — but if you need to use `\ref` in an L text inside R, it must be marked up explicitly.

`\BabelPatchSection` `{\section-name}`

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

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

New 3.17 Something like:

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

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 `{\langle name \rangle}{\langle event \rangle}{\langle code \rangle}`

The same name can be applied to several events. Hooks may be enabled and disabled for all defined events with `\EnableBabelHook{\langle name \rangle}`, `\DisableBabelHook{\langle name \rangle}`.

Names containing the string `babel` are reserved (they are used, for example, by `\useshortands*` to add a hook for the event `afterextras`).

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

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 the above, if necessary.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.24 Languages supported by babel

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

Afrikaans afrikaans

Azerbaijani azerbaijani

Basque basque

Breton breton

Bulgarian bulgarian

Catalan catalan

Croatian croatian

Czech czech

Danish danish

Dutch dutch

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

Esperanto esperanto

Estonian estonian

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

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

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

```

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

```

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

1.25 Tips, workarounds, know issues and notes

- If you use the document class `book` *and* you use `\ref` inside the argument of `\chapter` (or just use `\ref` inside `\MakeUppercase`), \LaTeX will keep complaining about an undefined label. To prevent such problems, you could revert to using uppercase labels, you can use `\lowercase{\ref{foo}}` inside the argument of `\chapter`, or, if you will not use shorthands in labels, set the `safe` option to `none` or `bib`.

- Both `ltxdoc` and `babel` use `\AtBeginDocument` to change some catcodes, and `babel` reloads `hline` to make sure `:` has the right one, so if you want to change the catcode of `|` it has to be done using the same method at the proper place, with

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

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

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

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

(A recent version of `inputenc` is required.)

- For the hyphenation to work correctly, `lccodes` cannot change, because \TeX only takes into account the values when the paragraph is hyphenated, i.e., when it has been finished.²⁰ So, if you write a chunk of French text with `\foreignlanguage`, the apostrophes might not be taken into account. This is a limitation of \TeX , not of `babel`. Alternatively, you may use `\usesorthands` to activate `'` and `\defineshortand`, or redefine `\textquoteright` (the latter is called by the non-ASCII right quote).
- `\bibitem` is out of sync with `\selectlanguage` in the `.aux` file. The reason is `\bibitem` uses `\immediate` (and others, in fact), while `\selectlanguage` doesn't. There is no known workaround.
- `Babel` does not take into account `\normalsfcodes` and (non-)French spacing is not always properly (un)set by languages. However, problems are unlikely to happen and therefore this part remains untouched in version 3.9 (but it is in the 'to do' list).
- Using a character mathematically active (ie, with math code "8000) as a shorthand can make \TeX enter in an infinite loop in some rare cases. (Another issue in the 'to do' list, although there is a partial solution.)

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

csquotes Logical markup for quotes.

iflang Tests correctly the current language.

hyphsubst Selects a different set of patterns for a language.

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

siunitx Typesetting of numbers and physical quantities.

biblatex Programmable bibliographies and citations.

bicaption Bilingual captions.

babelbib Multilingual bibliographies.

microtype Adjusts the typesetting according to some languages (kerning and spacing).
Ligatures can be disabled.

substitutefont Combines fonts in several encodings.

mkpattern Generates hyphenation patterns.

tracklang Tracks which languages have been requested.

²⁰This explains why \LaTeX 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.

1.26 Current and future work

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

It is possible now to typeset Arabic or Hebrew with numbers and L text. Next on the roadmap are line breaking in Thai and the like, as well as “non-European” digits. Also on the roadmap are R layouts (lists, footnotes, tables, column order), page and section numbering, and maybe kashida justification.

As to Thai line breaking, here is the basic idea of what luatex can do for us, with the Thai patterns and a little script (the final version will not be so little, of course). It replaces each discretionary by the equivalent to ZWJ.

```
\documentclass{article}

\usepackage[nil]{babel}

\babelprovide[import=th, main]{thai}

\babelfont{rm}{FreeSerif}

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

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

\begin{document}

(Thai text.)

\end{document}
```

Useful additions would be, for example, time, currency, addresses and personal names.²¹ But that is the easy part, because they don't require modifying the \LaTeX internals.

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

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

1.27 Tentative and experimental code

Option `bidi=basic`

New 3.19 With this package option *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{فصحى العصر} \textit{fuṣḥā l-‘aṣr} (MSA) and
\textit{فصحى التراث} \textit{fuṣḥā t-turāth} (CA).

\end{document}
```

What `mapfont=direction` means is, ‘when a character has the same direction as the script for the “provided” language (arabic in this case), then change its font to that set for this language’ (here defined via `*arabic`, because `Crimson` does not provide Arabic letters). Boxes are “black boxes”. Numbers inside an `\hbox` (as for example in a `\ref`) do not know anything about the surrounding chars. So, `\ref{A}-\ref{B}` are not rendered in the visual order A-B, but in the wrong one B-A (because the hyphen does not “see” the digits inside the `\hbox`’es). If you need `\ref` ranges, the best option is to define a dedicated macro like this (to avoid explicit direction changes in the body; here `\textthe` must be defined to select the main language):

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

In a future a more complete method, reading recursively boxed text, may be added. There are samples on GitHub, under `/required/babel/samples: lua-bidibasic.tex` and `lua-secenum.tex`.

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}
```

Bidi writing in luatex is under development, but a basic implementation is almost finished. On the other hand, in xetex it is taking its first steps. The latter engine poses quite different challenges. An option to manage document layout in luatex (lists, footnotes, etc.) is almost finished, but xetex required more work. See the code section for `\foreignlanguage*` (a new starred version of `\foreignlanguage`). xetex relies on the font to properly handle these unmarked changes, so it is not under the control of T_EX.

2 Loading languages with `language.dat`

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

New 3.9q With luatex, however, patterns are loaded on the fly when requested by the language (except the “0th” language, typically english, which is preloaded always).²² Until 3.9n, this task was delegated to the package `luatex-hyphen`, by Khaled Hosny, Élie Roux, and Manuel Pégourié-Gonnard, and required an extra file named `language.dat.lua`, but now a new mechanism has been devised based solely on `language.dat`. **You must rebuild the formats** if upgrading from a previous version. You may want to have a local `language.dat` for a particular project (for example, a book on Chemistry).²³

2.1 Format

In that file the person who maintains a T_EX environment has to record for which languages he has hyphenation patterns *and* in which files these are stored²⁴. When hyphenation exceptions are stored in a separate file this can be indicated by naming that file *after* the file with the hyphenation patterns.

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

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

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

²³The loader for lua(e)tex is slightly different as it's not based on babel but on `etex.src`. Until 3.9p it just didn't work, but thanks to the new code it works by reloading the data in the babel way, i.e., with `language.dat`.

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

```
=british

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

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

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

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

A typical error when using `babel` is the following:

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

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

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

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

The following assumptions are made:

- Some of the language-specific definitions might be used by plain $\text{T}_{\text{E}}\text{X}$ users, so the files have to be coded so that they can be read by both $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$ and plain $\text{T}_{\text{E}}\text{X}$. 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 $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$ option that is to be used. These macros and their functions are discussed below. You must define all or none for a language (or a dialect); defining, say, `\date<lang>` but not `\captions<lang>` does not raise an error but can lead to unexpected results.

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

- 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 `umlauthhigh` and friends, `\bbl@deactivate`, `\bbl@(non)frenchspacing`, and language specific macros. Use always, if possible, `\bbl@save` and `\bbl@savevariable` (except if you still want to have access to the previous value). Do not reset a macro or a setting to a hardcoded value. Never. Instead save its value in `\extras⟨lang⟩`.
- Do not switch scripts. If you want to make sure a set of glyphs is used, switch either the font encoding (low level) or the language (high level, which in turn may switch the font encoding). Usage of things like `\latintext` is deprecated.²⁶
- Please, for “private” internal macros do not use the `\bbl@` prefix. It is used by babel and it can lead to incompatibilities.

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

3.1 Guidelines for contributed languages

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

- Do not hesitate stating on the file heads you are the author and the maintainer, if you actually are. There is no need to state the babel maintainer(s) as authors if they have not contributed significantly to your language files.
- 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.

²⁶But not removed, for backward compatibility.

- Font and input encodings are usually best placed in the corresponding tree, too, but sometimes they belong more naturally to the babel style. Note you may also need to define a LICR.
- Babel ldf files may just interface a framework, as it happens often with Oriental languages/scripts. This framework is best placed in its own directory.

The following page provides a starting point: <http://www.texnia.com/incubator.html>. If your need further assistance and technical advice in the development of language styles, I am willing to help you. And of course, you can make any suggestion you like.

3.2 Basic macros

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

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

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

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

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

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

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

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

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

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

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

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

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

\ProvidesLanguage The macro `\ProvidesLanguage` should be used to identify the language definition files. Its

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

3.3 Skeleton

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

```

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

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

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

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

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

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

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

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

\StartBabelCommands*{<dialect>}{date}
\SetString\monthiname{<name of first month>}

```

```
% More strings

\EndBabelCommands

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

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

3.4 Support for active characters

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

| | |
|---|--|
| <code>\initiate@active@char</code> | The internal macro <code>\initiate@active@char</code> is used in language definition files to instruct \TeX to give a character the category code ‘active’. When a character has been made active it will remain that way until the end of the document. Its definition may vary. |
| <code>\bbl@activate</code> <code>\bbl@deactivate</code> | The command <code>\bbl@activate</code> is used to change the way an active character expands. <code>\bbl@activate</code> ‘switches on’ the active behavior of the character. <code>\bbl@deactivate</code> lets the active character expand to its former (mostly) non-active self. |
| <code>\declare@shorthand</code> | The macro <code>\declare@shorthand</code> is used to define the various shorthands. It takes three arguments: the name for the collection of shorthands this definition belongs to; the character (sequence) that makes up the shorthand, i.e. <code>~</code> or <code>"a</code> ; and the code to be executed when the shorthand is encountered. (It does <i>not</i> raise an error if the shorthand character has not been “initiated”.) |
| <code>\bbl@add@special</code> <code>\bbl@remove@special</code> | The \TeX book states: “Plain \TeX includes a macro called <code>\dospecials</code> that is essentially a set macro, representing the set of all characters that have a special category code.” [2, p. 380] It is used to set text ‘verbatim’. To make this work if more characters get a special category code, you have to add this character to the macro <code>\dospecial</code> . \TeX adds another macro called <code>\@sanitize</code> representing the same character set, but without the curly braces. The macros <code>\bbl@add@special<char></code> and <code>\bbl@remove@special<char></code> add and remove the character <code><char></code> to these two sets. |

3.5 Support for saving macro definitions

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

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

3.6 Support for extending macros

| | |
|---------------------|--|
| <code>\addto</code> | The macro <code>\addto{<control sequence>}{<\TeX code>}</code> can be used to extend the definition of |
|---------------------|--|

²⁷This mechanism was introduced by Bernd Raichle.

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

3.7 Macros common to a number of languages

`\bbl@allowhyphens`

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

`\allowhyphens`

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

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

`\set@low@box`

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

`\save@sf@q`

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

`\bbl@frenchspacing`

`\bbl@nonfrenchspacing`

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

3.8 Encoding-dependent strings

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

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

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

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

`\StartBabelCommands`

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

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

If a string is set several times (because several blocks are read), the first one takes precedence (ie, it works much like `\providecommand`).

Encoding info is `charset=` followed by a charset, which if given sets how the strings should be translated to the internal representation used by the engine, typically `utf8`, which is the only value supported currently (default is no translations). Note `charset` is applied by `luatex` and `xetex` when reading the file, not when the macro or string is used in the document. A list of font encodings which the strings are expected to work with can be given after `fontenc=` (separated with spaces, if two or more) – recommended, but not mandatory, although blocks without this key are not taken into account if you have requested `strings=encoded`.

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

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

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

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

\EndBabelCommands
```

A real example is:

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

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

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

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

\StartBabelCommands{german,austrian}{date}
\SetString\monthiiiname{Februar}
\SetString\monthiiiname{M}{a}rz}
\SetString\monthivname{April}
\SetString\monthvname{Mai}
```

²⁸In future releases further categories may be added.

```

\SetString\monthviname{Juni}
\SetString\monthviiname{Juli}
\SetString\monthviiiname{August}
\SetString\monthixname{September}
\SetString\monthxname{Oktober}
\SetString\monthxiname{November}
\SetString\monthxiiname{Dezenber}
\SetString\today{\number\day.~%
\csname month\romannumeral\month name\endcsname\space
\number\year}

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

\EndBabelCommands

```

When used in ldf files, previous values of $\langle category \rangle \langle language \rangle$ 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).

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

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

$\backslash EndBabelCommands$ 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 $\backslash abmoniname$, $\backslash abmoniiname$, etc. (and similarly with $\backslash abday$):

```

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

```

#1 is replaced by the roman numeral.

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

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

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

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

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

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

\EndBabelCommands
```

(Note the mapping for OT1 is not complete.)

\SetHyphenMap {*<to-lower-macros>*}

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

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

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


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

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

4 Changes

4.1 Changes in babel version 3.9

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

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

4.2 Changes in babel version 3.7

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

- Shorthands are expandable again. The disadvantage is that one has to type `'{a}` when the acute accent is used as a shorthand character. The advantage is that a number of other problems (such as the breaking of ligatures, etc.) have vanished.
- Two new commands, `\shorthandon` and `\shorthandoff` have been introduced to enable to temporarily switch off one or more shorthands.
- Support for typesetting Hebrew (and potential support for typesetting other right-to-left written languages) is now available thanks to Rama Porrat and Boris Lavva.
- A language attribute has been added to the `\mark...` commands in order to make sure that a Greek header line comes out right on the last page before a language switch.

- Hyphenation pattern files are now read *inside a group*; therefore any changes a pattern file needs to make to lowercase codes, uppercase codes, and category codes are kept local to that group. If they are needed for the language, these changes will need to be repeated and stored in `\extras...`
- The concept of language attributes is introduced. It is intended to give the user some control over the features a language-definition file provides. Its first use is for the Greek language, where the user can choose the πολυτονικό (“polytonikó” or multi-accented) Greek way of typesetting texts.
- The environment `hyphenrules` is introduced.
- The syntax of the file `language.dat` has been extended to allow (optionally) specifying the font encoding to be used while processing the patterns file.
- The command `\providehyphenmins` should now be used in language definition files in order to be able to keep any settings provided by the pattern file.

Part II

The code

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

5 Identification and loading of required files

Code documentation is still under revision.

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

switch.def defines macros to set and switch languages.

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

babel.sty is the \TeX package, which set options and load language styles.

plain.def defines some \TeX 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.

```
1 <<version=3.20>>
2 <<date=2018/05/02>>
```

6 Tools

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

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

```

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

```

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

```

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

```

`\bbl@afterelse` `\bbl@afterfi` Because the code that is used in the handling of active characters may need to look ahead, we take extra care to ‘throw’ it over the `\else` and `\fi` parts of an `\if`-statement³⁰. These macros will break if another `\if... \fi` statement appears in one of the arguments and it is not enclosed in braces.

```

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

```

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

```

28 \def\bbl@tempa#1{%
29   \long\def\bbl@trim##1##2{%
30     \futurelet\bbl@trim@a\bbl@trim@c##2\@nil\@nil#1\@nil\relax{##1}}%
31   \def\bbl@trim@c{%
32     \ifx\bbl@trim@a\@sptoken
33       \expandafter\bbl@trim@b
34     \else
35       \expandafter\bbl@trim@b\expandafter#1%
36     \fi}%

```

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

```

37 \long\def\bbl@trim@b#1##1 \@nil{\bbl@trim@i##1}}
38 \bbl@tempa{ }
39 \long\def\bbl@trim@i#1\@nil#2\relax#3{#3{#1}}
40 \long\def\bbl@trim@def#1{\bbl@trim{\def#1}}

```

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

```

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

```

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

```

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

```

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

```

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

```

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

```

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

```

\bbl@replace

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

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

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

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

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

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

```
123 <<*Make sure ProvidesFile is defined>> \=
124 \ifx\ProvidesFile\@undefined
```

```

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

```

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

```

130 <<(*Load patterns in luatex)>> ≡
131 \ifx\directlua\@undefined\else
132   \ifx\bb1@luapatterns\@undefined
133     \input luababel.def
134   \fi
135 \fi
136 <</Load patterns in luatex>>

```

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

```

137 <<(*Load macros for plain if not LaTeX)>> ≡
138 \ifx\AtBeginDocument\@undefined
139   \input plain.def\relax
140 \fi
141 <</Load macros for plain if not LaTeX>>

```

6.1 Multiple languages

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

```

142 <<(*Define core switching macros)>> ≡
143 \ifx\language\@undefined
144   \csname newcount\endcsname\language
145 \fi
146 <</Define core switching macros>>

```

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

`\addlanguage` To add languages to 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.

```

147 <<(*Define core switching macros)>> ≡
148 \ifx\newlanguage\@undefined
149   \csname newcount\endcsname\last@language
150   \def\addlanguage#1{%
151     \global\advance\last@language\@ne
152     \ifnum\last@language<\@cc1vi
153       \else
154         \errmessage{No room for a new \string\language!}%
155       \fi

```

```

156 \global\chardef#1\last@language
157 \wlog{\string#1 = \string\language\the\last@language}}
158 \else
159 \countdef\last@language=19
160 \def\addlanguage{\alloc@9\language\chardef\@cclvi}
161 \fi
162 <</Define core switching macros>>

```

Now we make sure all required files are loaded. When the command `\AtBeginDocument` doesn't exist we assume that we are dealing with a plain-based format or $\text{\LaTeX}2_{\varepsilon}$. In that case the file `plain.def` is needed (which also defines `\AtBeginDocument`, and therefore it is not loaded twice). We need the first part when the format is created, and `\orig@dump` is used as a flag. Otherwise, we need to use the second part, so `\orig@dump` is not defined (`plain.def` undefines it).

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

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

In order to make use of the features of $\text{\LaTeX}2_{\varepsilon}$, 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.

7.1 base

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

```

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

```

If the format created a list of loaded languages (in `\bbl@languages`), get the name of the 0-th to show the actual language used.

```

179 \ifx\bbl@languages\undefined\else
180   \begingroup
181     \catcode`\^^I=12
182     \@ifpackagewith{babel}{showlanguages}{%
183       \begingroup
184         \def\bbl@elt#1#2#3#4{\wlog{#2^^I#1^^I#3^^I#4}}%
185         \wlog{<*languages>}%
186         \bbl@languages
187         \wlog{</languages>}%
188       \endgroup}{%
189     \endgroup
190     \def\bbl@elt#1#2#3#4{%
191       \ifnum#2=\z@
192         \gdef\bbl@nulllanguage{#1}%
193         \def\bbl@elt##1##2##3##4{}%
194       \fi}%
195     \bbl@languages
196 \fi
197 \ifodd\bbl@engine
198   \let\bbl@tempa\relax
199   \@ifpackagewith{babel}{bidi=basic}%
200   {\def\bbl@tempa{basic}}%
201   {\@ifpackagewith{babel}{bidi=basic-r}%
202     {\def\bbl@tempa{basic-r}}%
203   }%
204 \ifx\bbl@tempa\relax\else
205   \let\bbl@beforeforeign\leavevmode
206   \AtEndOfPackage{\EnableBabelHook{babel-bidi}}%
207   \RequirePackage{luatexbase}%
208   \directlua{
209     require('babel-bidi.lua')
210     require('babel-bidi-\bbl@tempa.lua')
211     luatexbase.add_to_callback('pre_linebreak_filter',
212       Babel.pre_otfload_v,
213       'Babel.pre_otfload_v',
214     luatexbase.priority_in_callback('pre_linebreak_filter',
215       'luaotfload.node_processor') or nil)
216     luatexbase.add_to_callback('hpack_filter',
217       Babel.pre_otfload_h,
218       'Babel.pre_otfload_h',
219     luatexbase.priority_in_callback('hpack_filter',
220       'luaotfload.node_processor') or nil)
221   }
222 \fi
223 \fi

```

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

```

224 \bbl@trace{Defining option 'base'}
225 \@ifpackagewith{babel}{base}{%
226   \ifx\directlua\undefined
227     \DeclareOption*{\bbl@patterns{\CurrentOption}}%
228   \else
229     \DeclareOption*{\bbl@patterns@lua{\CurrentOption}}%
230   \fi
231   \DeclareOption{base}{}%
232   \DeclareOption{showlanguages}{}%
233   \ProcessOptions
234   \global\expandafter\let\csname opt@babel.sty\endcsname\relax

```



```

235 \global\expandafter\let\csname ver@babel.sty\endcsname\relax
236 \global\let@ifl@ter@@\ifl@ter
237 \def@ifl@ter#1#2#3#4#5{\global\let@ifl@ter\ifl@ter@@}%
238 \endinput}{}%

```

7.2 key=value options and other general option

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

```

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

```

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

```

257 \DeclareOption{KeepShorthandsActive}{}
258 \DeclareOption{activeacute}{}
259 \DeclareOption{activegrave}{}
260 \DeclareOption{debug}{}
261 \DeclareOption{noconfigs}{}
262 \DeclareOption{showlanguages}{}
263 \DeclareOption{silent}{}
264 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
265 <<More package options>>

```

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

```

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

```

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

```

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

```

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

```

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

```

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

```

289 \ProcessOptions*

```

7.3 Conditional loading of shorthands

If there is no shorthands=<chars>, the original babel macros are left untouched, but if there is, these macros are wrapped (in babel.def) to define only those given. A bit of optimization: if there is no shorthands=, then \bbl@ifshorthands is always true, and it is always false if shorthands is empty. Also, some code makes sense only with shorthands=...

```

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

```

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

```

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

```

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

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

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

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

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

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

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

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

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

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

7.4 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).

```
344 \bbl@trace{Language options}
345 \let\bbl@afterlang\relax
346 \let\BabelModifiers\relax
```

```

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

```

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

```

362 \def\bbl@try@load@lang#1#2#3{%
363   \IfFileExists{\CurrentOption.ldf}%
364   {\bbl@load@language{\CurrentOption}}%
365   {#1\bbl@load@language{#2}#3}}
366 \DeclareOption{afrikaans}{\bbl@try@load@lang{}{dutch}{}}
367 \DeclareOption{brazil}{\bbl@try@load@lang{}{portuges}{}}
368 \DeclareOption{brazilian}{\bbl@try@load@lang{}{portuges}{}}
369 \DeclareOption{hebrew}{%
370   \input{rlbabel.def}%
371   \bbl@load@language{hebrew}}
372 \DeclareOption{hungarian}{\bbl@try@load@lang{}{magyar}{}}
373 \DeclareOption{lowersorbian}{\bbl@try@load@lang{}{lsorbian}{}}
374 \DeclareOption{nynorsk}{\bbl@try@load@lang{}{norsk}{}}
375 \DeclareOption{polutonikogreek}{%
376   \bbl@try@load@lang{}{greek}{\languageattribute{greek}{polutoniko}}}
377 \DeclareOption{portuguese}{\bbl@try@load@lang{}{portuges}{}}
378 \DeclareOption{russian}{\bbl@try@load@lang{}{russianb}{}}
379 \DeclareOption{ukrainian}{\bbl@try@load@lang{}{ukraineb}{}}
380 \DeclareOption{uppersorbian}{\bbl@try@load@lang{}{usorbian}{}}

```

Another way to extend the list of ‘known’ options for babel was to create the file `bblopts.cfg` in which one can add option declarations. However, this mechanism is deprecated – if you want an alternative name for a language, just create a new `.ldf` file loading the actual one. You can also set the name of the file with the package option `config=<name>`, which will load `<name>.cfg` instead.

```

381 \ifx\bbl@opt@config\@nnil
382   \@ifpackagewith{babel}{noconfigs}{}%
383   {\InputIfFileExists{bblopts.cfg}%
384     {\typeout{*****^J%
385       * Local config file bblopts.cfg used^^J%
386       *}}%
387     {}}%
388 \else
389   \InputIfFileExists{\bbl@opt@config.cfg}%
390   {\typeout{*****^J%
391     * Local config file \bbl@opt@config.cfg used^^J%
392     *}}%
393   {\bbl@error{%
394     Local config file '\bbl@opt@config.cfg' not found}{%
395     Perhaps you misspelled it.}}%
396 \fi

```

Recognizing global options in packages not having a closed set of them is not trivial, as for them to be processed they must be defined explicitly. So, package options not yet taken into account and stored in `bbl@language@opts` are assumed to be languages (note this list also contains the language given with `main`). If not declared above, the name of the option and the file are the same.

```

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

```

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

```

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

```

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

```

411 \ifx\bbl@opt@main\@nnil\else
412   \expandafter
413   \let\expandafter\bbl@loadmain\csname ds@\bbl@opt@main\endcsname
414   \DeclareOption{\bbl@opt@main}{}
415 \fi

```

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

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

```

416 \def\AfterBabelLanguage#1{%
417   \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang{}}
418   \DeclareOption*{}
419   \ProcessOptions*

```

This finished the second pass. Now the third one begins, which loads the main language set with the key `main`. A warning is raised if the main language is not the same as the last named one, or if the value of the key `main` is not a language. Then execute directly the option (because it could be used only in `main`). After loading all languages, we deactivate `\AfterBabelLanguage`.

```

420 \ifx\bbl@opt@main\@nnil
421   \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
422   \let\bbl@tempc\@empty
423   \bbl@for\bbl@tempb\bbl@tempa{%
424     \bbl@xin@{\bbl@tempb},{\bbl@loaded},%
425     \ifin\edef\bbl@tempc{\bbl@tempb}\fi}
426   \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
427   \expandafter\bbl@tempa\bbl@loaded,\@nnil
428   \ifx\bbl@tempb\bbl@tempc\else
429     \bbl@warning{%
430       Last declared language option is '\bbl@tempc',\%
431       but the last processed one was '\bbl@tempb'.\%

```

```

432     The main language cannot be set as both a global\\%
433     and a package option. Use `main=\bbl@tempc' as\\%
434     option. Reported}%
435 \fi
436 \else
437   \DeclareOption{\bbl@opt@main}{\bbl@loadmain}
438   \ExecuteOptions{\bbl@opt@main}
439   \DeclareOption*{}
440   \ProcessOptions*
441 \fi
442 \def\AfterBabelLanguage{%
443   \bbl@error
444   {Too late for \string\AfterBabelLanguage}%
445   {Languages have been loaded, so I can do nothing}}

```

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

```

446 \ifx\bbl@main@language\undefined
447   \bbl@error{%
448     You haven't specified a language option}{%
449     You need to specify a language, either as a global option\\%
450     or as an optional argument to the \string\usepackage\space
451     command;\\%
452     You shouldn't try to proceed from here, type x to quit.}
453 \fi
454 \end{package}
455 \end{core}

```

8 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.

8.1 Tools

```

456 \ifx\ldf@quit\undefined
457 \else
458   \expandafter\endinput
459 \fi
460 <<Make sure ProvidesFile is defined>>
461 \ProvidesFile{babel.def}[\<<date>>] <<version>> Babel common definitions]
462 <<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).

```

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

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

```

`\addto` For each language four control sequences have to be defined that control the language-specific definitions. To be able to add something to these macro once they have been defined the macro `\addto` is introduced. It takes two arguments, a *<control sequence>* and \TeX -code to be added to the *<control sequence>*. If the *<control sequence>* has not been defined before it is defined now. The control sequence could also expand to `\relax`, in which case a circular definition results. The net result is a stack overflow. Otherwise the replacement text for the *<control sequence>* is expanded and stored in a token register, together with the \TeX -code to be added. Finally the *<control sequence>* is redefined, using the contents of the token register.

```

512 \def\addto#1#2{%
513   \ifx#1\@undefined
514     \def#1{#2}%
515   \else
516     \ifx#1\relax
517       \def#1{#2}%
518     \else
519       {\toks@\expandafter{#1#2}%
520        \xdef#1{\the\toks@}}%
521   \fi
522 }

```

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.

```

523 \def\bbl@withactive#1#2{%
524   \begingroup
525   \lccode`~=#2\relax
526   \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 \LaTeX macros completely in case their definitions change (they have changed in the past).

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

```

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

```

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

```

531 \@onlypreamble\bbl@redefine

```

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

```

532 \def\bbl@redefine@long#1{%
533   \edef\bbl@tempa{\bbl@stripslash#1}%
534   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
535   \expandafter\long\expandafter\def\csname\bbl@tempa\endcsname}
536 \@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_`.

```

537 \def\bbl@redefineroobust#1{%
538   \edef\bbl@tempa{\bbl@stripslash#1}%

```



```

539 \bbl@ifunset{\bbl@tempa\space}%
540 {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
541 \bbl@exp{\def\#1{\protect\<\bbl@tempa\space>}}}%
542 {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}}%
543 \@namedef{\bbl@tempa\space}}

```

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

```

544 \@onlypreamble\bbl@redefineroobust

```

8.2 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 very 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.

```

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

```

To ensure forward compatibility, arguments in hooks are set implicitly. So, if a further argument is added in the future, there is no need to change the existing code. Note events intended for `hyphen.cfg` are also loaded (just in case you need them for some reason).

```

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

```

`\babelensure` The user command just parses the optional argument and creates a new macro named `\bbl@e@<language>`. We register a hook at the `afterextras` event which just executes this macro in a “complete” selection (which, if undefined, is `\relax` and does nothing). This part is somewhat involved because we have to make sure things are expanded the correct number of times.

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

```

567 \bbl@trace{Defining babelensure}
568 \newcommand\babelensure[2][{}% TODO - revise test files

```

```

569 \AddBabelHook{babel-ensure}{afterextras}{%
570   \ifcase\bbbl@select@type
571     \@nameuse{bbbl@e@\languagename}%
572   \fi}%
573 \begingroup
574   \let\bbbl@ens@include\@empty
575   \let\bbbl@ens@exclude\@empty
576   \def\bbbl@ens@fontenc{\relax}%
577   \def\bbbl@tempb##1{%
578     \ifx\@empty##1\else\noexpand##1\expandafter\bbbl@tempb\fi}%
579   \edef\bbbl@tempa{\bbbl@tempb#1\@empty}%
580   \def\bbbl@tempb##1=##2\@{\@namedef{bbbl@ens@##1}{##2}}%
581   \bbbl@foreach\bbbl@tempa{\bbbl@tempb##1\@}%
582   \def\bbbl@tempc{\bbbl@ensure}%
583   \expandafter\bbbl@add\expandafter\bbbl@tempc\expandafter{%
584     \expandafter{\bbbl@ens@include}}%
585   \expandafter\bbbl@add\expandafter\bbbl@tempc\expandafter{%
586     \expandafter{\bbbl@ens@exclude}}%
587   \toks@\expandafter{\bbbl@tempc}%
588   \bbbl@exp{%
589     \endgroup
590     \def\<bbbl@e@#2>{\the\toks@{\bbbl@ens@fontenc}}}%
591 \def\bbbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
592   \def\bbbl@tempb##1{% elt for (excluding) \bbbl@captionslist list
593     \ifx##1\@empty\else
594       \in@{##1}{#2}%
595       \ifin\@else
596         \bbbl@ifunset{bbbl@ensure@\languagename}%
597           {\bbbl@exp{%
598             \\DeclareRobustCommand\<bbbl@ensure@\languagename>[1]{%
599               \\foreignlanguage{\languagename}%
600               {\ifx\relax#3\else
601                 \\fontencoding{#3}\\selectfont
602                 \fi
603                 #####1}}}%
604             {}%
605             \toks@\expandafter{##1}%
606             \edef##1{%
607               \bbbl@csarg\noexpand{ensure@\languagename}%
608               {\the\toks@}}}%
609           \fi
610           \expandafter\bbbl@tempb
611         \fi}%
612   \expandafter\bbbl@tempb\bbbl@captionslist\today\@empty
613   \def\bbbl@tempa##1{% elt for include list
614     \ifx##1\@empty\else
615       \bbbl@csarg\in@{ensure@\languagename\expandafter}\expandafter{##1}%
616       \ifin\@else
617         \bbbl@tempb##1\@empty
618         \fi
619       \expandafter\bbbl@tempa
620     \fi}%
621   \bbbl@tempa#1\@empty}
622 \def\bbbl@captionslist{%
623   \prefacename\refname\abstractname\bibname\chaptername\appendixname
624   \contentsname\listfigurename\listtablename\indexname\figurename
625   \tablename\partname\enclname\ccname\headtoname\pagename\seename
626   \alsoname\proofname\glossaryname}

```

8.3 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`.

```
627 \bbl@trace{Macros for setting language files up}
628 \def\bbl@ldfinit{%
629   \let\bbl@screset\@empty
630   \let\BabelStrings\bbl@opt@string
631   \let\BabelOptions\@empty
632   \let\BabelLanguages\relax
633   \ifx\originalTeX\@undefined
634     \let\originalTeX\@empty
635   \else
636     \originalTeX
637   \fi}
638 \def\LdfInit#1#2{%
639   \chardef\atcatcode=\catcode`\@
640   \catcode`\@=11\relax
641   \chardef\eqcatcode=\catcode`\=
642   \catcode`\==12\relax
643   \expandafter\if\expandafter\@backslashchar
644     \expandafter\@car\string#2\@nil
645   \ifx#2\@undefined\else
646     \ldf@quit{#1}%
647   \fi
648 \else
649   \expandafter\ifx\csname#2\endcsname\relax\else
650     \ldf@quit{#1}%
651   \fi
652 \fi
653 \bbl@ldfinit}
```

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

```
654 \def\ldf@quit#1{%
655   \expandafter\main@language\expandafter{#1}%
656   \catcode`\@=\atcatcode \let\atcatcode\relax
657   \catcode`\==\eqcatcode \let\eqcatcode\relax
658   \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.

```
659 \def\bbl@afterldf#1{%
660   \bbl@afterlang
661   \let\bbl@afterlang\relax
662   \let\BabelModifiers\relax
663   \let\bbl@screset\relax}%
664 \def\ldf@finish#1{%
665   \loadlocalcfg{#1}%
666   \bbl@afterldf{#1}%
667   \expandafter\main@language\expandafter{#1}%
668   \catcode`\@=\atcatcode \let\atcatcode\relax
669   \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 .

```
670 \@onlypreamble\LdfInit
671 \@onlypreamble\ldf@quit
672 \@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.

```
673 \def\main@language#1{%
674   \def\bbl@main@language{#1}%
675   \let\language\main@language
676   \bbl@patterns{\language}}
```

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

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

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

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

8.4 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.

```

686 \bbl@trace{Shorhands}
687 \def\bbl@add@special#1{% 1:a macro like \", \?, etc.
688 \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
689 \bbl@ifunset{@sanitize}{\bbl@add@sanitize{\@makeother#1}}%
690 \ifx\nfss@catcodes\undefined\else % TODO - same for above
691 \begingroup
692 \catcode`#1\active
693 \nfss@catcodes
694 \ifnum\catcode`#1=\active
695 \endgroup
696 \bbl@add\nfss@catcodes{\@makeother#1}%
697 \else
698 \endgroup
699 \fi
700 \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.

```

701 \def\bbl@remove@special#1{%
702 \begingroup
703 \def\x##1##2{\ifnum`#1=##2\noexpand\@empty
704 \else\noexpand##1\noexpand##2\fi}%
705 \def\do{\x\do}%
706 \def\@makeother{\x\@makeother}%
707 \edef\x{\endgroup
708 \def\noexpand\dospecials{\dospecials}%
709 \expandafter\ifx\csname @sanitize\endcsname\relax\else
710 \def\noexpand\@sanitize{\@sanitize}%
711 \fi}%
712 \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).

```

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

```

```

718     \bbl@afterfi\csname#2@sh@#1@\endcsname
719     \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.

```

720 \long\@namedef{#3@arg#1}##1{%
721   \expandafter\ifx\csname#2@sh@#1@\string##1@\endcsname\relax
722     \bbl@afterelse\csname#4#1\endcsname##1%
723   \else
724     \bbl@afterfi\csname#2@sh@#1@\string##1@\endcsname
725   \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.

```

726 \def\initiate@active@char#1{%
727   \bbl@ifunset{active@char\string#1}%
728   {\bbl@withactive
729     {\expandafter\@initiate@active@char\expandafter}#1\string#1}%
730   {}}

```

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`).

```

731 \def\@initiate@active@char#1#2#3{%
732   \bbl@csarg\edef{oricat@#2}{\catcode`#2=\the\catcode`#2\relax}%
733   \ifx#1\@undefined
734     \bbl@csarg\edef{oridef@#2}{\let\noexpand#1\noexpand\@undefined}%
735   \else
736     \bbl@csarg\let{oridef@#2}#1%
737     \bbl@csarg\edef{oridef@#2}{%
738       \let\noexpand#1%
739       \expandafter\noexpand\csname bbl@oridef@#2\endcsname}%
740   \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`).

```

741 \ifx#1#3\relax
742   \expandafter\let\csname normal@char#2\endcsname#3%
743 \else
744   \bbl@info{Making #2 an active character}%
745   \ifnum\mathcode`#2="8000
746     \@namedef{normal@char#2}{%
747       \textormath{#3}{\csname bbl@oridef@#2\endcsname}}%
748   \else
749     \@namedef{normal@char#2}{#3}%
750   \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).

```

751 \bbl@restoreactive{#2}%
752 \AtBeginDocument{%
753   \catcode`#2\active
754   \if@filesw
755     \immediate\write\@mainaux{\catcode`\string#2\active}%
756   \fi}%
757 \expandafter\bbl@add@special\csname#2\endcsname
758 \catcode`#2\active
759 \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⟩`).

```

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

```

We now define the default values which the shorthand is set to when activated or deactivated. It is set to the deactivated form (globally), so that the character expands to

`\active@prefix⟨char⟩\normal@char⟨char⟩`

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

```

780 \bbl@csarg\edef{active@#2}{%
781   \noexpand\active@prefix\noexpand#1%
782   \expandafter\noexpand\csname active@char#2\endcsname}%
783 \bbl@csarg\edef{normal@#2}{%
784   \noexpand\active@prefix\noexpand#1%
785   \expandafter\noexpand\csname normal@char#2\endcsname}%
786 \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.

```

787 \bbl@active@def#2\user@group{user@active}{language@active}%
788 \bbl@active@def#2\language@group{language@active}{system@active}%
789 \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 \protect'\protect'. To prevent this from happening a couple of shorthand needs to be defined at user level.

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

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

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

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

```
799 <<{*More package options}>> ≡
800 \DeclareOption{math=active}{}
801 \DeclareOption{math=normal}{\def\bbl@mathnormal{\noexpand\textormath}}
802 <</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.

```
803 \ifpackagewith{babel}{KeepShorthandsActive}%
804   {\let\bbl@restoreactive\@gobble}%
805   {\def\bbl@restoreactive#1{%
806     \bbl@exp{%
807       \\\AfterBabelLanguage\\CurrentOption
808       {\catcode`#1=\the\catcode`#1\relax}%
809       \\\AtEndOfPackage
810       {\catcode`#1=\the\catcode`#1\relax}}}%
811   \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.

```
812 \def\bbl@sh@select#1#2{%
813   \expandafter\ifx\csname#1@sh@#2@sel\endcsname\relax
814     \bbl@afterelse\bbl@scndcs
815   \else
816     \bbl@afterfi\csname#1@sh@#2@sel\endcsname
817   \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.


```

818 \def\active@prefix#1{%
819   \ifx\protect\@typeset@protect
820   \else

```

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

```

821   \ifx\protect\@unexpandable@protect
822     \noexpand#1%
823   \else
824     \protect#1%
825   \fi
826   \expandafter\@gobble
827 \fi}

```

`\if@safe@actives` In some circumstances it is necessary to be able to change the expansion of an active character on the fly. For this purpose the switch `@safe@actives` is available. The setting of this switch should be checked in the first level expansion of `\active@char⟨char⟩`.

```

828 \newif\if@safe@actives
829 \@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.

```

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

```

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

`\bbl@deactivate`

```

831 \def\bbl@activate#1{%
832   \bbl@withactive{\expandafter\let\expandafter}#1%
833   \csname bbl@active@\string#1\endcsname}
834 \def\bbl@deactivate#1{%
835   \bbl@withactive{\expandafter\let\expandafter}#1%
836   \csname bbl@normal@\string#1\endcsname}

```

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

`\bbl@scndcs`

```

837 \def\bbl@firstcs#1#2{\csname#1\endcsname}
838 \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.

```

839 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
840 \def\@decl@short#1#2#3\@nil#4{%
841   \def\bbl@tempa{#3}%
842   \ifx\bbl@tempa\@empty
843     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
844     \bbl@ifunset{#1@sh@\string#2@}{}%
845     {\def\bbl@tempa{#4}%

```

```

846     \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbbl@tempa
847     \else
848         \bbbl@info
849         {Redefining #1 shorthand \string#2\\%
850          in language \CurrentOption}%
851     \fi}%
852     \@namedef{#1@sh@\string#2@}{#4}%
853 \else
854     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbbl@firstcs
855     \bbbl@ifunset{#1@sh@\string#2@\string#3@}{}%
856     {\def\bbbl@tempa{#4}%
857      \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bbbl@tempa
858      \else
859          \bbbl@info
860          {Redefining #1 shorthand \string#2\string#3\\%
861           in language \CurrentOption}%
862      \fi}%
863     \@namedef{#1@sh@\string#2@\string#3@}{#4}%
864 \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.

```

865 \def\textormath{%
866     \ifmmode
867         \expandafter\@secondoftwo
868     \else
869         \expandafter\@firstoftwo
870     \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’.

```

871 \def\user@group{user}
872 \def\language@group{english}
873 \def\system@group{system}

```

`\useshorthands` This is the user level command to tell \TeX 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.

```

874 \def\useshorthands{%
875     \@ifstar\bbbl@usesh@s{\bbbl@usesh@x{}}
876 \def\bbbl@usesh@s#1{%
877     \bbbl@usesh@x
878     {\AddBabelHook{babel-sh-\string#1}{afterextras}{\bbbl@activate{#1}}}%
879     {#1}}
880 \def\bbbl@usesh@x#1#2{%
881     \bbbl@ifshorthand{#2}%
882     {\def\user@group{user}%
883      \initiate@active@char{#2}%
884      #1%
885      \bbbl@activate{#2}}%
886     {\bbbl@error
887      {Cannot declare a shorthand turned off (\string#2)}
888      {Sorry, but you cannot use shorthands which have been\\%
889       turned off in the package options}}}

```

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

```

890 \def\user@language@group{user@\language@group}
891 \def\bbl@set@user@generic#1#2{%
892   \bbl@ifunset{user@generic@active#1}%
893   {\bbl@active@def#1\user@language@group{user@active}{user@generic@active}%
894     \bbl@active@def#1\user@group{user@generic@active}{language@active}%
895     \expandafter\edef\csname#2@sh@#1@@\endcsname{%
896       \expandafter\noexpand\csname normal@char#1\endcsname}%
897     \expandafter\edef\csname#2@sh@#1@\string\protect@\endcsname{%
898       \expandafter\noexpand\csname user@active#1\endcsname}%
899   \@empty}
900 \newcommand\defineshorthand[3][user]{%
901   \edef\bbl@tempa{\zap@space#1 \@empty}%
902   \bbl@for\bbl@tempb\bbl@tempa{%
903     \if*\expandafter\@car\bbl@tempb\@nil
904       \edef\bbl@tempb{user@\expandafter\@gobble\bbl@tempb}%
905       \@expandtwoargs
906       \bbl@set@user@generic{\expandafter\string\@car#2\@nil}\bbl@tempb
907     \fi
908     \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.

```

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

```

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

```

910 \def\aliasshorthand#1#2{%
911   \bbl@ifshorthand{#2}%
912   {\expandafter\ifx\csname active@char\string#2\endcsname\relax
913     \ifx\document\@notprerr
914       \@notshorthand{#2}%
915     \else
916       \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`.

```

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

```

`\@notshorthand`

```

928 \def\@notshorthand#1{%
929   \bbl@error{%

```

```

930 The character '\string #1' should be made a shorthand character;\%
931 add the command \string\usesshorthands\string{#1\string} to
932 the preamble.\%
933 I will ignore your instruction}%
934 {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.

```

935 \newcommand*\shorthandon[1]{\bbl@switch@sh@ne#1\@nnil}
936 \DeclareRobustCommand*\shorthandoff{%
937   \@ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
938 \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.

```

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

```

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

```

956 \def\babelshorthand{\active@prefix\babelshorthand\bbl@putsh}
957 \def\bbl@putsh#1{%
958   \bbl@ifunset{\bbl@active@\string#1}%
959   {\bbl@putsh@i#1\@empty\@nnil}%
960   {\csname bbl@active@\string#1\endcsname}}
961 \def\bbl@putsh@i#1#2\@nnil{%
962   \csname\language\name @sh@\string#1@%
963     \ifx\@empty#2\else\string#2@\fi\endcsname}
964 \ifx\bbl@opt@shorthands\@nnil\else
965   \let\bbl@s@initiate@active@char\initiate@active@char
966   \def\initiate@active@char#1{%
967     \bbl@ifshorthand{#1}{\bbl@s@initiate@active@char{#1}}{}}
968   \let\bbl@s@switch@sh\bbl@switch@sh
969   \def\bbl@switch@sh#1#2{%
970     \ifx#2\@nnil\else

```

```

971 \bbl@afterfi
972 \bbl@ifshorthand{#2}{\bbl@s@switch@sh#1{#2}}{\bbl@switch@sh#1}%
973 \fi}
974 \let\bbl@s@activate\bbl@activate
975 \def\bbl@activate#1{%
976 \bbl@ifshorthand{#1}{\bbl@s@activate{#1}}{}}
977 \let\bbl@s@deactivate\bbl@deactivate
978 \def\bbl@deactivate#1{%
979 \bbl@ifshorthand{#1}{\bbl@s@deactivate{#1}}{}}
980 \fi

```

\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.

```

981 \def\bbl@prim@s{%
982 \prime\futurelet\@let@token\bbl@pr@m@s}
983 \def\bbl@if@primes#1#2{%
984 \ifx#1\@let@token
985 \expandafter\@firstoftwo
986 \else\ifx#2\@let@token
987 \bbl@afterelse\expandafter\@firstoftwo
988 \else
989 \bbl@afterfi\expandafter\@secondoftwo
990 \fi\fi}
991 \begingroup
992 \catcode`\^=7 \catcode`\*=\active \lccode`\*='^
993 \catcode`\'=12 \catcode`\"=\active \lccode`\"=' '
994 \lowercase{%
995 \gdef\bbl@pr@m@s{%
996 \bbl@if@primes""%
997 \pr@@@s
998 {\bbl@if@primes*^{\pr@@@t\egroup}}}}
999 \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).

```

1000 \initiate@active@char{~}
1001 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }
1002 \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.

```

1003 \expandafter\def\csname OT1dqpos\endcsname{127}
1004 \expandafter\def\csname T1dqpos\endcsname{4}

```

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

```

1005 \ifx\f@encoding\@undefined
1006 \def\f@encoding{OT1}
1007 \fi

```

8.5 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.

```
1008 \bbl@trace{Language attributes}
1009 \newcommand\languageattribute[2]{%
1010   \def\bbl@tempc{#1}%
1011   \bbl@fixname\bbl@tempc
1012   \bbl@iflanguage\bbl@tempc{%
1013     \bbl@vforeach{#2}{%
```

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

```
1014     \ifx\bbl@known@attrs\undefined
1015       \in@false
1016     \else
```

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

```
1017       \bbl@xin@{,\bbl@tempc-##1,},{,\bbl@known@attrs,}%
1018     \fi
```

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

```
1019     \ifin@
1020       \bbl@warning{%
1021         You have more than once selected the attribute '##1'\%
1022         for language #1}%
1023     \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.

```
1024       \bbl@exp{%
1025         \bbl@add@list\bbl@known@attrs{\bbl@tempc-##1}}%
1026       \edef\bbl@tempa{\bbl@tempc-##1}%
1027       \expandafter\bbl@ifknown@trib\expandafter{\bbl@tempa}\bbl@attributes%
1028       {\csname\bbl@tempc @attr##1\endcsname}%
1029       {\@attrerr{\bbl@tempc}{##1}}%
1030     \fi}}
```

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

```
1031 \@onlypreamble\languageattribute
```

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

```
1032 \newcommand*{\@attrerr}[2]{%
1033   \bbl@error
1034   {The attribute #2 is unknown for language #1.}%
1035   {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}`.

```

1036 \def\bbl@declare@ttribute#1#2#3{%
1037   \bbl@xin@{,#2,},{,\BabelModifiers,}%
1038   \ifin@
1039     \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
1040   \fi
1041   \bbl@add@list\bbl@attributes{#1-#2}%
1042   \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.

```

1043 \def\bbl@ifattributeset#1#2#3#4{%
    First we need to find out if any attributes were set; if not we're done.

1044   \ifx\bbl@known@attribs\@undefined
1045     \in@false
1046   \else

```

The we need to check the list of known attributes.

```

1047   \bbl@xin@{,#1-#2,},{,\bbl@known@attribs,}%
1048   \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`'.

```

1049   \ifin@
1050     \bbl@afterelse#3%
1051   \else
1052     \bbl@afterfi#4%
1053   \fi
1054 }

```

`\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.

```

1055 \def\bbl@ifknown@ttrib#1#2{%
    We first assume the attribute is unknown.

1056   \let\bbl@tempa\@secondoftwo

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

1057   \bbl@loopx\bbl@tempb{#2}{%
1058     \expandafter\in@\expandafter{\expandafter,\bbl@tempb,}{,#1,}%
1059     \ifin@

```

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

```

1060     \let\bbl@tempa\@firstoftwo
1061   \else
1062   \fi}%

```

Finally we execute `\bbl@tempa`.

```

1063   \bbl@tempa
1064 }

```

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

```

1065 \def\bbl@clear@ttribs{%
1066   \ifx\bbl@attributes\undefined\else
1067     \bbl@loopx\bbl@tempa{\bbl@attributes}{%
1068       \expandafter\bbl@clear@ttrib\bbl@tempa.
1069     }%
1070     \let\bbl@attributes\undefined
1071   \fi}
1072 \def\bbl@clear@ttrib#1-#2.{%
1073   \expandafter\let\csname#1@attr@#2\endcsname\undefined}
1074 \AtBeginDocument{\bbl@clear@ttribs}

```

8.6 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`

```

1075 \bbl@trace{Macros for saving definitions}
1076 \def\babel@beginsave{\babel@savecnt\z@}

```

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

```

1077 \newcount\babel@savecnt
1078 \babel@beginsave

```

`\babel@save` The macro `\babel@save{<csname>}` saves the current meaning of the control sequence `<csname>` to `\originalTeX`³¹. To do this, we let the current meaning to a temporary control sequence, the restore commands are appended to `\originalTeX` and the counter is incremented.

```

1079 \def\babel@save#1{%
1080   \expandafter\let\csname babel@number\babel@savecnt\endcsname#1\relax
1081   \toks@\expandafter{\originalTeX\let#1=}
1082   \bbl@exp{%
1083     \def\\originalTeX{\the\toks@<\babel@number\babel@savecnt>\relax}}
1084   \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.

```

1085 \def\babel@savevariable#1{%
1086   \toks@\expandafter{\originalTeX #1=}
1087   \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.

```

1088 \def\bbl@frenchspacing{%
1089   \ifnum\the\sfcodes\@m
1090     \let\bbl@nonfrenchspacing\relax

```

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


```

1091 \else
1092   \frenchspacing
1093   \let\bbl@nonfrenchspacing\nonfrenchspacing
1094 \fi}
1095 \let\bbl@nonfrenchspacing\nonfrenchspacing

```

8.7 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.

```

1096 \bbl@trace{Short tags}
1097 \def\babeltags#1{%
1098   \edef\bbl@tempa{\zap@space#1 \@empty}%
1099   \def\bbl@tempb##1=##2\@{
1100     \edef\bbl@tempc{%
1101       \noexpand\newcommand
1102       \expandafter\noexpand\csname ##1\endcsname{%
1103         \noexpand\protect
1104         \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
1105       \noexpand\newcommand
1106       \expandafter\noexpand\csname text##1\endcsname{%
1107         \noexpand\foreignlanguage{##2}}
1108     \bbl@tempc}%
1109   \bbl@for\bbl@tempa\bbl@tempa{%
1110     \expandafter\bbl@tempb\bbl@tempa\@}

```

8.8 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.

```

1111 \bbl@trace{Hyphens}
1112 \onlypreamble\babelhyphenation
1113 \AtEndOfPackage{%
1114   \newcommand\babelhyphenation[2][\@empty]{%
1115     \ifx\bbl@hyphenation@relax
1116       \let\bbl@hyphenation@\@empty
1117     \fi
1118     \ifx\bbl@hyphlist\@empty\else
1119       \bbl@warning{%
1120         You must not intermingle \string\selectlanguage\space and\%
1121         \string\babelhyphenation\space or some exceptions will not\%
1122         be taken into account. Reported}%
1123     \fi
1124     \ifx\@empty#1%
1125       \protected@edef\bbl@hyphenation@{\bbl@hyphenation@\space#2}%
1126     \else
1127       \bbl@vforeach{#1}{%
1128         \def\bbl@tempa{##1}%
1129         \bbl@fixname\bbl@tempa
1130         \bbl@iflanguage\bbl@tempa{%
1131           \bbl@csarg\protected@edef{hyphenation@\bbl@tempa}{%
1132             \bbl@ifunset{bbl@hyphenation@\bbl@tempa}%
1133             \@empty
1134             {\csname bbl@hyphenation@\bbl@tempa\endcsname\space}%

```

```

1135          #2}}}%
1136    \fi}}

```

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

```

1137 \def\bbl@allowhyphens{\ifvmode\else\nobreak\hskip\z@skip\fi}
1138 \def\bbl@t@one{T1}
1139 \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`.

```

1140 \newcommand\babellnullhyphen{\char\hyphenchar\font}
1141 \def\babelhyphen{\active@prefix\babelhyphen\bbl@hyphen}
1142 \def\bbl@hyphen{%
1143   \@ifstar{\bbl@hyphen@i @}{\bbl@hyphen@i \@empty}}
1144 \def\bbl@hyphen@i#1#2{%
1145   \bbl@ifunset{\bbl@hy@#1#2\@empty}%
1146   {\csname bbl@#1usehyphen\endcsname{\discretionary{#2}{\#2}}}%
1147   {\csname bbl@hy@#1#2\@empty\endcsname}}

```

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

There should not be a 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.

```

1148 \def\bbl@usehyphen#1{%
1149   \leavevmode
1150   \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
1151   \nobreak\hskip\z@skip}
1152 \def\bbl@@usehyphen#1{%
1153   \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}

```

The following macro inserts the hyphen char.

```

1154 \def\bbl@hyphenchar{%
1155   \ifnum\hyphenchar\font=\m@ne
1156     \babellnullhyphen
1157   \else
1158     \char\hyphenchar\font
1159   \fi}

```

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

```

1160 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{\#2}}}%
1161 \def\bbl@hy@@soft{\bbl@@usehyphen{\discretionary{\bbl@hyphenchar}{\#2}}}%
1162 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
1163 \def\bbl@hy@@hard{\bbl@@usehyphen\bbl@hyphenchar}
1164 \def\bbl@hy@nobreak{\bbl@usehyphen{\mbox{\bbl@hyphenchar}}}
1165 \def\bbl@hy@@nobreak{\mbox{\bbl@hyphenchar}}
1166 \def\bbl@hy@repeat{%
1167   \bbl@usehyphen{%
1168     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}%
1169 \def\bbl@hy@@repeat{%
1170   \bbl@@usehyphen{%

```

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

```

1171 \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}
1172 \def\bbl@hy@empty{\hskip\z@skip}
1173 \def\bbl@hy@@empty{\discretionary{}{}{}}

```

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

```

1174 \def\bbl@disc#1#2{\nobreak\discretionary{#2-}{}{#1}\bbl@allowhyphens}

```

8.9 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.

```

1175 \bbl@trace{Multiencoding strings}
1176 \def\bbl@tglobal#1{\global\let#1#1}
1177 \def\bbl@recatcode#1{%
1178   \@tempcnta="7F
1179   \def\bbl@tempa{%
1180     \ifnum\@tempcnta>"FF\else
1181       \catcode\@tempcnta=#1\relax
1182       \advance\@tempcnta\@ne
1183       \expandafter\bbl@tempa
1184     \fi}%
1185   \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).

```

1186 \ifpackagewith{babel}{nocase}%
1187   {\let\bbl@patchuclc\relax}%
1188   {\def\bbl@patchuclc{%
1189     \global\let\bbl@patchuclc\relax
1190     \g@addto@macro\@uclclist{\reserved@b{\reserved@b\bbl@uclc}}%
1191     \gdef\bbl@uclc##1{%
1192       \let\bbl@encoded\bbl@encoded@uclc
1193       \bbl@ifunset{\language @bbl@uclc}% and resumes it
1194       {##1}%
1195       {\let\bbl@tempa##1\relax % Used by LANG@bbl@uclc
1196         \csname\language @bbl@uclc\endcsname}%
1197       {\bbl@tolower\@empty}{\bbl@toupper\@empty}}}%
1198   \gdef\bbl@tolower{\csname\language @bbl@lc\endcsname}%
1199   \gdef\bbl@toupper{\csname\language @bbl@uc\endcsname}}
1200 <<(*More package options)>> ≡
1201 \DeclareOption{nocase}{}
1202 <</More package options>>

```

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

```

1203 <<{*More package options}>> ≡
1204 \let\bbl@opt@strings\@nnil % accept strings=value
1205 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
1206 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
1207 \def\BabelStringsDefault{generic}
1208 <</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.

```

1209 \@onlypreamble\StartBabelCommands
1210 \def\StartBabelCommands{%
1211   \begingroup
1212   \bbl@reecatcode{11}%
1213   <<Macros local to BabelCommands>>
1214   \def\bbl@provstring##1##2{%
1215     \providecommand##1{##2}%
1216     \bbl@tglobal##1}%
1217   \global\let\bbl@scafter\@empty
1218   \let\StartBabelCommands\bbl@startcmds
1219   \ifx\BabelLanguages\relax
1220     \let\BabelLanguages\CurrentOption
1221   \fi
1222   \begingroup
1223   \let\bbl@screset\@nnil % local flag - disable 1st stopcommands
1224   \StartBabelCommands}
1225 \def\bbl@startcmds{%
1226   \ifx\bbl@screset\@nnil\else
1227     \bbl@usehooks{stopcommands}{}%
1228   \fi
1229   \endgroup
1230   \begingroup
1231   \@ifstar
1232   {\ifx\bbl@opt@strings\@nnil
1233     \let\bbl@opt@strings\BabelStringsDefault
1234   \fi
1235   \bbl@startcmds@i}%
1236   \bbl@startcmds@i}
1237 \def\bbl@startcmds@i#1#2{%
1238   \edef\bbl@L{\zap@space#1 \@empty}%
1239   \edef\bbl@G{\zap@space#2 \@empty}%
1240   \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.

```

1241 \newcommand\bbl@startcmds@ii[1][\@empty]{%
1242   \let\SetString\@gobbletwo
1243   \let\bbl@stringdef\@gobbletwo

```

```

1244 \let\AfterBabelCommands\@gobble
1245 \ifx\@empty#1%
1246   \def\bbl@sc@label{generic}%
1247   \def\bbl@encstring##1##2{%
1248     \ProvideTextCommandDefault##1{##2}%
1249     \bbl@tglobal##1%
1250     \expandafter\bbl@tglobal\csname\string?\string##1\endcsname}%
1251   \let\bbl@sctest\in@true
1252 \else
1253   \let\bbl@sc@charset\space % <- zapped below
1254   \let\bbl@sc@fontenc\space % <- " "
1255   \def\bbl@tempa##1=##2\@nil{%
1256     \bbl@csarg\edef{sc@\zap@space##1 \@empty}{##2 }}%
1257   \bbl@vforeach{label=#1}{\bbl@tempa##1\@nil}%
1258   \def\bbl@tempa##1 ##2{% space -> comma
1259     ##1%
1260     \ifx\@empty##2\else\ifx,##1,\else,\fi\bbl@afterfi\bbl@tempa##2\fi}%
1261   \edef\bbl@sc@fontenc{\expandafter\bbl@tempa\bbl@sc@fontenc\@empty}%
1262   \edef\bbl@sc@label{\expandafter\zap@space\bbl@sc@label\@empty}%
1263   \edef\bbl@sc@charset{\expandafter\zap@space\bbl@sc@charset\@empty}%
1264   \def\bbl@encstring##1##2{%
1265     \bbl@foreach\bbl@sc@fontenc{%
1266       \bbl@ifunset{T#####1}%
1267       }%
1268       {\ProvideTextCommand##1{#####1}{##2}%
1269       \bbl@tglobal##1%
1270       \expandafter
1271       \bbl@tglobal\csname#####1\string##1\endcsname}}}%
1272   \def\bbl@sctest{%
1273     \bbl@xin@{\bbl@opt@strings,}{,\bbl@sc@label,\bbl@sc@fontenc,}}%
1274 \fi
1275 \ifx\bbl@opt@strings\@nnil % ie, no strings key -> defaults
1276 \else\ifx\bbl@opt@strings\relax % ie, strings=encoded
1277   \let\AfterBabelCommands\bbl@aftercmds
1278   \let\SetString\bbl@setstring
1279   \let\bbl@stringdef\bbl@encstring
1280 \else % ie, strings=value
1281   \bbl@sctest
1282 \fi
1283 \let\AfterBabelCommands\bbl@aftercmds
1284 \let\SetString\bbl@setstring
1285 \let\bbl@stringdef\bbl@provstring
1286 \fi\fi\fi
1287 \bbl@scswitch
1288 \ifx\bbl@G\@empty
1289   \def\SetString##1##2{%
1290     \bbl@error{Missing group for string \string##1}%
1291     {You must assign strings to some category, typically\\%
1292     captions or extras, but you set none}}%
1293 \fi
1294 \ifx\@empty#1%
1295   \bbl@usehooks{defaultcommands}{}%
1296 \else
1297   \@expandtwoargs
1298   \bbl@usehooks{encodedcommands}{\bbl@sc@charset}{\bbl@sc@fontenc}%
1299 \fi}

```

There are two versions of `\bbl@scswitch`. The first version is used when `ldfs` are read, and it makes sure `\group` *(language)* is reset, but only once (`\bbl@screset` is used to keep

track of this). The second version is used in the preamble and packages loaded after babel and does nothing. The macro `\bbl@forlang` loops `\bbl@L` but its body is executed only if the value is in `\BabelLanguages` (inside babel) or `\date<language>` is defined (after babel has been loaded). There are also two version of `\bbl@forlang`. The first one skips the current iteration if the language is not in `\BabelLanguages` (used in ldfs), and the second one skips undefined languages (after babel has been loaded) .

```

1300 \def\bbl@forlang#1#2{%
1301   \bbl@for#1\bbl@L{%
1302     \bbl@xin@{,#1,},{,\BabelLanguages,}%
1303     \ifin@#2\relax\fi}}
1304 \def\bbl@scswitch{%
1305   \bbl@forlang\bbl@tempa{%
1306     \ifx\bbl@G\@empty\else
1307       \ifx\SetString@gobbletwo\else
1308         \edef\bbl@GL{\bbl@G\bbl@tempa}%
1309         \bbl@xin@{,\bbl@GL,},{,\bbl@screset,}%
1310         \ifin@\else
1311           \global\expandafter\let\csname\bbl@GL\endcsname\@undefined
1312           \xdef\bbl@screset{\bbl@screset,\bbl@GL}%
1313         \fi
1314       \fi
1315     \fi}}
1316 \AtEndOfPackage{%
1317   \def\bbl@forlang#1#2{\bbl@for#1\bbl@L{\bbl@ifunset{date#1}{#{2}}}}%
1318   \let\bbl@scswitch\relax}
1319 \@onlypreamble\EndBabelCommands
1320 \def\EndBabelCommands{%
1321   \bbl@usehooks{stopcommands}{}%
1322   \endgroup
1323   \endgroup
1324   \bbl@scafter}

```

Now we define commands to be used inside `\StartBabelCommands`.

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

```

1325 \def\bbl@setstring#1#2{%
1326   \bbl@forlang\bbl@tempa{%
1327     \edef\bbl@LC{\bbl@tempa\bbl@stripslash#1}%
1328     \bbl@ifunset{\bbl@LC}% eg, \germanchaptername
1329     {\global\expandafter % TODO - con \bbl@exp ?
1330      \bbl@add\csname\bbl@G\bbl@tempa\expandafter\endcsname\expandafter
1331      {\expandafter\bbl@scset\expandafter#1\csname\bbl@LC\endcsname}}}%
1332     {}}%
1333   \def\BabelString{#2}%
1334   \bbl@usehooks{stringprocess}{}%
1335   \expandafter\bbl@stringdef
1336   \csname\bbl@LC\expandafter\endcsname\expandafter{\BabelString}}

```

Now, some additional stuff to be used when encoded strings are used. Captions then include `\bbl@encoded` for string to be expanded in case transformations. It is `\relax` by default, but in `\MakeUppercase` and `\MakeLowercase` its value is a modified expandable `\@changed@cmd`.

```

1337 \ifx\bbl@opt@strings\relax

```

```

1338 \def\bbl@scset#1#2{\def#1{\bbl@encoded#2}}
1339 \bbl@patchuclc
1340 \let\bbl@encoded\relax
1341 \def\bbl@encoded@uclc#1{%
1342   \@inmathwarn#1%
1343   \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
1344     \expandafter\ifx\csname ?\string#1\endcsname\relax
1345       \TextSymbolUnavailable#1%
1346     \else
1347       \csname ?\string#1\endcsname
1348     \fi
1349   \else
1350     \csname\cf@encoding\string#1\endcsname
1351   \fi}
1352 \else
1353   \def\bbl@scset#1#2{\def#1{#2}}
1354 \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.

```

1355 <<*Macros local to BabelCommands>> ≡
1356 \def\SetStringLoop##1##2{%
1357   \def\bbl@templ####1{\expandafter\noexpand\csname##1\endcsname}%
1358   \count@\z@
1359   \bbl@loop\bbl@tempa{##2}{% empty items and spaces are ok
1360     \advance\count@ \@ne
1361     \toks@\expandafter{\bbl@tempa}%
1362     \bbl@exp{%
1363       \\SetString\bbl@templ{\romannumeral\count@}{\the\toks@}%
1364       \count@=\the\count@\relax}}}%
1365 <</Macros local to BabelCommands>>

```

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

```

1366 \def\bbl@aftercmds#1{%
1367   \toks@\expandafter{\bbl@scafter#1}%
1368   \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.

```

1369 <<*Macros local to BabelCommands>> ≡
1370 \newcommand\SetCase[3][]{%
1371   \bbl@patchuclc
1372   \bbl@forlang\bbl@tempa{%
1373     \expandafter\bbl@encstring
1374     \csname\bbl@tempa @bbl@uclc\endcsname{\bbl@tempa##1}%
1375     \expandafter\bbl@encstring
1376     \csname\bbl@tempa @bbl@uc\endcsname{##2}%
1377     \expandafter\bbl@encstring
1378     \csname\bbl@tempa @bbl@lc\endcsname{##3}}}%
1379 <</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.

```

1380 <<*Macros local to BabelCommands>> ≡
1381 \newcommand\SetHyphenMap[1]{%
1382   \bbl@forlang\bbl@tempa{%
1383     \expandafter\bbl@stringdef
1384     \csname\bbl@tempa @bbl@hyphenmap\endcsname{##1}}
1385 <</Macros local to BabelCommands>>

```

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

```

1386 \newcommand\BabelLower[2]{% one to one.
1387   \ifnum\lccode#1=#2\else
1388     \babel@savevariable{\lccode#1}%
1389     \lccode#1=#2\relax
1390   \fi}
1391 \newcommand\BabelLowerMM[4]{% many-to-many
1392   \@tempcnta=#1\relax
1393   \@tempcntb=#4\relax
1394   \def\bbl@tempa{%
1395     \ifnum\@tempcnta>#2\else
1396       \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
1397       \advance\@tempcnta#3\relax
1398       \advance\@tempcntb#3\relax
1399       \expandafter\bbl@tempa
1400     \fi}%
1401   \bbl@tempa}
1402 \newcommand\BabelLowerMO[4]{% many-to-one
1403   \@tempcnta=#1\relax
1404   \def\bbl@tempa{%
1405     \ifnum\@tempcnta>#2\else
1406       \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
1407       \advance\@tempcnta#3
1408       \expandafter\bbl@tempa
1409     \fi}%
1410   \bbl@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

1411 <<*More package options>> ≡
1412 \DeclareOption{hyphenmap=off}{\chardef\bbl@opt@hyphenmap\z@}
1413 \DeclareOption{hyphenmap=first}{\chardef\bbl@opt@hyphenmap@ne}
1414 \DeclareOption{hyphenmap=select}{\chardef\bbl@opt@hyphenmap\tw@}
1415 \DeclareOption{hyphenmap=other}{\chardef\bbl@opt@hyphenmap\thr@@}
1416 \DeclareOption{hyphenmap=other*}{\chardef\bbl@opt@hyphenmap4\relax}
1417 <</More package options>>

```

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

```

1418 \AtEndOfPackage{%
1419   \ifx\bbl@opt@hyphenmap\undefined
1420     \bbl@xin@{,}{\bbl@language@opts}%
1421     \chardef\bbl@opt@hyphenmap\ifin@4\else\@ne\fi
1422   \fi}

```

8.10 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.

```

1423 \bbl@trace{Macros related to glyphs}
1424 \def\set@low@box#1{\setbox\tw@hbox{,}\setbox\z@hbox{#1}%
1425   \dimen\z@ht\z@ \advance\dimen\z@ -\ht\tw@%
1426   \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.

```
1427 \def\save@sf@q#1{\leavevmode
1428   \begingroup
1429     \edef\@SF{\spacefactor\the\spacefactor}\@SF
1430   \endgroup}
```

8.11 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`.

8.11.1 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.

```
1431 \ProvideTextCommand{\quotedblbase}{OT1}{%
1432   \save@sf@q{\set@low@box{\textquotedblright\}%
1433     \box\z@\kern-.04em\bbl@allowhyphens}}
```

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

```
1434 \ProvideTextCommandDefault{\quotedblbase}{%
1435   \UseTextSymbol{OT1}{\quotedblbase}}
```

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

```
1436 \ProvideTextCommand{\quotesinglbase}{OT1}{%
1437   \save@sf@q{\set@low@box{\textquoteright\}%
1438     \box\z@\kern-.04em\bbl@allowhyphens}}
```

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

```
1439 \ProvideTextCommandDefault{\quotesinglbase}{%
1440   \UseTextSymbol{OT1}{\quotesinglbase}}
```

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

```
\guillemotright 1441 \ProvideTextCommand{\guillemotleft}{OT1}{%
1442   \ifmmode
1443     \ll
1444   \else
1445     \save@sf@q{\nobreak
1446       \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bbl@allowhyphens}%
1447   \fi}
1448 \ProvideTextCommand{\guillemotright}{OT1}{%
1449   \ifmmode
1450     \gg
1451   \else
1452     \save@sf@q{\nobreak
1453       \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bbl@allowhyphens}%
1454   \fi}
```

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

```
1455 \ProvideTextCommandDefault{\guillemotleft}{%
1456   \UseTextSymbol{OT1}{\guillemotleft}}
1457 \ProvideTextCommandDefault{\guillemotright}{%
1458   \UseTextSymbol{OT1}{\guillemotright}}
```

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

```
1459 \ProvideTextCommand{\guilsinglleft}{OT1}{%
1460   \ifmmode
1461     <%
1462   \else
1463     \save@sf@q{\nobreak
1464       \raise.2ex\hbox{$\scriptscriptstyle<$}\bbl@allowhyphens}%
1465   \fi}
1466 \ProvideTextCommand{\guilsinglright}{OT1}{%
1467   \ifmmode
1468     >%
1469   \else
1470     \save@sf@q{\nobreak
1471       \raise.2ex\hbox{$\scriptscriptstyle>$}\bbl@allowhyphens}%
1472   \fi}
```

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

```
1473 \ProvideTextCommandDefault{\guilsinglleft}{%
1474   \UseTextSymbol{OT1}{\guilsinglleft}}
1475 \ProvideTextCommandDefault{\guilsinglright}{%
1476   \UseTextSymbol{OT1}{\guilsinglright}}
```

8.11.2 Letters

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

```
1477 \DeclareTextCommand{\ij}{OT1}{%
1478   i\kern-0.02em\bbl@allowhyphens j}
1479 \DeclareTextCommand{\IJ}{OT1}{%
1480   I\kern-0.02em\bbl@allowhyphens J}
1481 \DeclareTextCommand{\ij}{T1}{\char188}
1482 \DeclareTextCommand{\IJ}{T1}{\char156}
```

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

```
1483 \ProvideTextCommandDefault{\ij}{%
1484   \UseTextSymbol{OT1}{\ij}}
1485 \ProvideTextCommandDefault{\IJ}{%
1486   \UseTextSymbol{OT1}{\IJ}}
```

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

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

```
1487 \def\crrtic@{\hrule height0.1ex width0.3em}
1488 \def\crrtic@{\hrule height0.1ex width0.33em}
1489 \def\ddj@{%
1490   \setbox0\hbox{d}\dimen@=\ht0
1491   \advance\dimen@1ex
1492   \dimen@.45\dimen@
1493   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
1494   \advance\dimen@ii.5ex
1495   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
1496 \def\DDJ@{%
1497   \setbox0\hbox{D}\dimen@=.55\ht0
1498   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
```

```

1499 \advance\dimen@ii.15ex % correction for the dash position
1500 \advance\dimen@ii-.15\fontdimen7\font % correction for cmtt font
1501 \dimen\thr@@\expandafter\rem@pt\the\fontdimen7\font\dimen@
1502 \leavevmode\rlap{\raise\dimen@hbox{\kern\dimen@ii\vbox{\crttic@}}}}
1503 %
1504 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
1505 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}

```

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

```

1506 \ProvideTextCommandDefault{\dj}{%
1507 \UseTextSymbol{OT1}{\dj}}
1508 \ProvideTextCommandDefault{\DJ}{%
1509 \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.

```

1510 \DeclareTextCommand{\SS}{OT1}{SS}
1511 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}

```

8.11.3 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 1512 \ProvideTextCommandDefault{\glq}{%
1513 \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}

```

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

```

1514 \ProvideTextCommand{\grq}{T1}{%
1515 \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
1516 \ProvideTextCommand{\grq}{TU}{%
1517 \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
1518 \ProvideTextCommand{\grq}{OT1}{%
1519 \save@sf@q{\kern-.0125em
1520 \textormath{\textquoteleft}{\mbox{\textquoteleft}}}%
1521 \kern.07em\relax}}
1522 \ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}

```

\glqq The ‘german’ double quotes.

```

\grqq 1523 \ProvideTextCommandDefault{\glqq}{%
1524 \textormath{\quotedblbase}{\mbox{\quotedblbase}}}

```

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

```

1525 \ProvideTextCommand{\grqq}{T1}{%
1526 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
1527 \ProvideTextCommand{\grqq}{TU}{%
1528 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
1529 \ProvideTextCommand{\grqq}{OT1}{%
1530 \save@sf@q{\kern-.07em
1531 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}%
1532 \kern.07em\relax}}
1533 \ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}

```

`\flq` The ‘french’ single guillemets.
`\frq` 1534 \ProvideTextCommandDefault{\flq}{%
 1535 \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}
 1536 \ProvideTextCommandDefault{\frq}{%
 1537 \textormath{\guilsinglright}{\mbox{\guilsinglright}}}

`\flqq` The ‘french’ double guillemets.
`\frqq` 1538 \ProvideTextCommandDefault{\flqq}{%
 1539 \textormath{\guillemotleft}{\mbox{\guillemotleft}}}
 1540 \ProvideTextCommandDefault{\frqq}{%
 1541 \textormath{\guillemotright}{\mbox{\guillemotright}}}

8.11.4 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).

```
1542 \def\umlauthigh{%
1543   \def\bbl@umlauta##1{\leavevmode\bgroup%
1544     \expandafter\accent\csname\f@encoding dqpos\endcsname
1545     ##1\bbl@allowhyphens\egroup}%
1546   \let\bbl@umlaute\bbl@umlauta}
1547 \def\umlautlow{%
1548   \def\bbl@umlauta{\protect\lower@umlaut}}
1549 \def\umlautelow{%
1550   \def\bbl@umlaute{\protect\lower@umlaut}}
1551 \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.

```
1552 \expandafter\ifx\csname U@D\endcsname\relax
1553   \csname newdimen\endcsname\U@D
1554 \fi
```

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

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

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

```

1563 \fontdimen5\font\U@D #1%
1564 \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).

```

1565 \AtBeginDocument{%
1566 \DeclareTextCompositeCommand{\}{OT1}{a}{\bbl@umlauta{a}}%
1567 \DeclareTextCompositeCommand{\}{OT1}{e}{\bbl@umlaute{e}}%
1568 \DeclareTextCompositeCommand{\}{OT1}{i}{\bbl@umlaute{i}}%
1569 \DeclareTextCompositeCommand{\}{OT1}{\i}{\bbl@umlaute{i}}%
1570 \DeclareTextCompositeCommand{\}{OT1}{o}{\bbl@umlauta{o}}%
1571 \DeclareTextCompositeCommand{\}{OT1}{u}{\bbl@umlauta{u}}%
1572 \DeclareTextCompositeCommand{\}{OT1}{A}{\bbl@umlauta{A}}%
1573 \DeclareTextCompositeCommand{\}{OT1}{E}{\bbl@umlaute{E}}%
1574 \DeclareTextCompositeCommand{\}{OT1}{I}{\bbl@umlaute{I}}%
1575 \DeclareTextCompositeCommand{\}{OT1}{O}{\bbl@umlauta{O}}%
1576 \DeclareTextCompositeCommand{\}{OT1}{U}{\bbl@umlauta{U}}%
1577 }

```

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

```

1578 \ifx\l@english\@undefined
1579 \chardef\l@english\z@
1580 \fi
1581 \main@language{english}

```

8.12 Layout

Work in progress.

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

```

1582 \bbl@trace{Bidi layout}
1583 \providecommand\IfBabelLayout[3]{#3}%
1584 \newcommand\BabelPatchSection[1]{%
1585 \@ifundefined{#1}{%
1586 \bbl@exp{\let\bbl@ss@#1>\<#1>}%
1587 \@namedef{#1}{%
1588 \@ifstar{\bbl@presec@s{#1}}%
1589 {\@dblarg{\bbl@presec@x{#1}}}}}%
1590 \def\bbl@presec@x#1[#2]#3{%
1591 \bbl@exp{%
1592 \\\select@language@x{\bbl@main@language}%
1593 \\\@nameuse{\bbl@sspre@#1}%
1594 \\\@nameuse{\bbl@ss@#1}%
1595 [\\foreignlanguage{\language}{\unexpanded{#2}}}%
1596 {\\foreignlanguage{\language}{\unexpanded{#3}}}%
1597 \\\select@language@x{\language}}}%
1598 \def\bbl@presec@s#1#2{%
1599 \bbl@exp{%
1600 \\\select@language@x{\bbl@main@language}%
1601 \\\@nameuse{\bbl@sspre@#1}%
1602 \\\@nameuse{\bbl@ss@#1}%
1603 {\\foreignlanguage{\language}{\unexpanded{#2}}}%

```

```

1604   \\\select@language@x{\language@name}}
1605 \IfBabelLayout{sectioning}%
1606   {\BabelPatchSection{part}%
1607    \BabelPatchSection{chapter}%
1608    \BabelPatchSection{section}%
1609    \BabelPatchSection{subsection}%
1610    \BabelPatchSection{subsubsection}%
1611    \BabelPatchSection{paragraph}%
1612    \BabelPatchSection{subparagraph}%
1613    \def\babel@toc#1{%
1614      \select@language@x{\bbl@main@language}}}%
1615 \IfBabelLayout{captions}%
1616   {\BabelPatchSection{caption}}}%

```

Now we load definition files for engines.

```

1617 \bbl@trace{Input engine specific macros}
1618 \ifcase\bbl@engine
1619   \input txtbabel.def
1620 \or
1621   \input luababel.def
1622 \or
1623   \input xebabel.def
1624 \fi

```

8.13 Creating languages

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

```

1625 \bbl@trace{Creating languages and reading ini files}
1626 \newcommand\babelprovide[2][{}]{%
1627   \let\bbl@savelangname\language@name
1628   \def\language@name{#2}%
1629   \let\bbl@KVP@captions\@nil
1630   \let\bbl@KVP@import\@nil
1631   \let\bbl@KVP@main\@nil
1632   \let\bbl@KVP@script\@nil
1633   \let\bbl@KVP@language\@nil
1634   \let\bbl@KVP@dir\@nil
1635   \let\bbl@KVP@hyphenrules\@nil
1636   \let\bbl@KVP@mapfont\@nil
1637   \let\bbl@KVP@maparabic\@nil
1638   \bbl@forkv{#1}{\bbl@csarg\def{KVP@##1}{##2}}% TODO - error handling
1639   \ifx\bbl@KVP@captions\@nil
1640     \let\bbl@KVP@captions\bbl@KVP@import
1641   \fi
1642   \bbl@ifunset{date#2}%
1643     {\bbl@provide@new{#2}}%
1644     {\bbl@ifblank{#1}%
1645       {\bbl@error
1646         {If you want to modify `#2' you must tell how in\\
1647          the optional argument. Currently there are three\\
1648          options: captions=lang-tag, hyphenrules=lang-list\\
1649          import=lang-tag}%
1650         {Use this macro as documented}}}%
1651     {\bbl@provide@renew{#2}}}%
1652 \bbl@exp{\babelensure[exclude=\\today]{#2}}%

```

```

1653 \bbl@ifunset{bbl@ensure@\language\name}%
1654 {\bbl@exp{%
1655     \\\DeclareRobustCommand\<bbl@ensure@\language\name>[1]{%
1656         \\\foreignlanguage{\language\name}%
1657         {###1}}}%
1658 }%
1659 \ifx\bbl@KVP@script\@nil\else
1660     \bbl@csarg\edef{sname@#2}{\bbl@KVP@script}%
1661 \fi
1662 \ifx\bbl@KVP@language\@nil\else
1663     \bbl@csarg\edef{lname@#2}{\bbl@KVP@language}%
1664 \fi
1665 \ifx\bbl@KVP@mapfont\@nil\else
1666     \bbl@ifsamestring{\bbl@KVP@mapfont}{direction}}{%
1667         {\bbl@error{Option '\bbl@KVP@mapfont' unknown for\%
1668             mapfont. Use 'direction'.%
1669             {See the manual for details.}}}%
1670 \bbl@ifunset{bbl@lsys@\language\name}{\bbl@provide@lsys{\language\name}}{%
1671 \bbl@ifunset{bbl@wdir@\language\name}{\bbl@provide@dirs{\language\name}}{%
1672 \ifx\bbl@mapselect\@undefined
1673     \AtBeginDocument{%
1674         \expandafter\bbl@add\csname selectfont \endcsname{\bbl@mapselect}%
1675         {\selectfont}}%
1676     \def\bbl@mapselect{%
1677         \let\bbl@mapselect\relax
1678         \edef\bbl@prefontid{\fontid\font}}%
1679     \def\bbl@mapdir##1{%
1680         {\def\language\name{##1}\bbl@switchfont
1681         \directlua{Babel.fontmap
1682             [\the\csname bbl@wdir@##1\endcsname]%
1683             [\bbl@prefontid]=\fontid\font}}}%
1684     \fi
1685     \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language\name}}}%
1686 \fi
1687 \ifcase\bbl@engine\else
1688     \bbl@ifunset{bbl@dgnat@\language\name}{%
1689         {\expandafter\ifx\csname bbl@dgnat@\language\name\endcsname\@empty\else
1690             \expandafter\expandafter\expandafter
1691             \bbl@setdigits\csname bbl@dgnat@\language\name\endcsname
1692             \ifx\bbl@KVP@maparabic\@nil\else
1693                 \expandafter\let\expandafter\@arabic
1694                 \csname bbl@counter@\language\name\endcsname
1695             \fi
1696             \fi}%
1697 \fi
1698 \let\language\name\bbl@savelangname}
1699 \def\bbl@setdigits#1#2#3#4#5{%
1700     \bbl@exp{%
1701         \def\<\language\name digits>###1{% ie, \langdigits
1702             \<bbl@digits@\language\name>###1\@nil}%
1703         \def\<\language\name counter>###1{% ie, \langcounter
1704             \\\expandafter\<bbl@counter@\language\name>%
1705             \\\csname c@###1\endcsname}%
1706         \def\<bbl@counter@\language\name>###1{% ie, \bbl@counter@lang
1707             \\\expandafter\<bbl@digits@\language\name>%
1708             \\\number###1\@nil}}%
1709     \def\bbl@tempa##1##2##3##4##5{%
1710         \bbl@exp{% Wow, quite a lot of hashes! :-(
1711             \def\<bbl@digits@\language\name>#####1{%

```

[illegible]

```

1729 \def\bbbl@provide@new#1{%
1730   \@namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
1731   \@namedef{extras#1}{}%
1732   \@namedef{noextras#1}{}%
1733   \StartBabelCommands*{#1}{captions}%
1734   \ifx\bbbl@KVP@captions\@nil % and also if import, implicit
1735     \def\bbbl@tempb##1{% elt for \bbbl@captionslist
1736       \ifx##1\@empty\else
1737         \bbbl@exp{%
1738           \\SetString\\##1{%
1739             \\bbbl@nocaption{\bbbl@stripslash##1}{\<#1\bbbl@stripslash##1>}}}%
1740           \expandafter\bbbl@tempb
1741         \fi}%
1742       \expandafter\bbbl@tempb\bbbl@captionslist\@empty
1743     \else
1744       \bbbl@read@ini{\bbbl@KVP@captions}% Here all letters cat = 11
1745       \bbbl@after@ini
1746       \bbbl@savestrings
1747     \fi
1748   \StartBabelCommands*{#1}{date}%
1749   \ifx\bbbl@KVP@import\@nil
1750     \bbbl@exp{%
1751       \\SetString\\today{\bbbl@nocaption{today}{\<#1today>}}}%
1752     \else
1753       \bbbl@savetoday
1754       \bbbl@savedate
1755     \fi
1756   \EndBabelCommands
1757   \bbbl@exp{%
1758     \def\<#1hyphenmins>{%
1759       {\bbbl@ifunset{\bbbl@lfthm#1}{2}{\@nameuse{\bbbl@lfthm#1}}}%
1760       {\bbbl@ifunset{\bbbl@rgthm#1}{3}{\@nameuse{\bbbl@rgthm#1}}}}}%
1761   \bbbl@provide@hyphens{#1}%
1762   \ifx\bbbl@KVP@main\@nil\else
1763     \expandafter\main@language\expandafter{#1}%
1764   \fi}
1765 \def\bbbl@provide@renew#1{%
1766   \ifx\bbbl@KVP@captions\@nil\else
1767     \StartBabelCommands*{#1}{captions}%
1768     \bbbl@read@ini{\bbbl@KVP@captions}% Here all letters cat = 11

```



```

1769 \bbl@after@ini
1770 \bbl@savestrings
1771 \EndBabelCommands
1772 \fi
1773 \ifx\bbl@KVP@import\@nil\else
1774 \StartBabelCommands*{#1}{date}%
1775 \bbl@savetoday
1776 \bbl@savedate
1777 \EndBabelCommands
1778 \fi
1779 \bbl@provide@hyphens{#1}}

```

The hyphenrules option is handled with an auxiliary macro.

```

1780 \def\bbl@provide@hyphens#1{%
1781 \let\bbl@tempa\relax
1782 \ifx\bbl@KVP@hyphenrules\@nil\else
1783 \bbl@replace\bbl@KVP@hyphenrules{ }{,}%
1784 \bbl@foreach\bbl@KVP@hyphenrules{%
1785 \ifx\bbl@tempa\relax % if not yet found
1786 \bbl@ifsamestring{##1}{+}%
1787 {{\bbl@exp{\\addlanguage\<l@##1>}}}%
1788 }%
1789 \bbl@ifunset{l@##1}%
1790 }%
1791 {\bbl@exp{\let\bbl@tempa\<l@##1>}}%
1792 \fi}%
1793 \fi
1794 \ifx\bbl@tempa\relax % if no opt or no language in opt found
1795 \ifx\bbl@KVP@import\@nil\else % if importing
1796 \bbl@exp{% and hyphenrules is not empty
1797 \\bbl@ifblank{\@nameuse{bbl@hyphr@#1}}%
1798 }%
1799 {\let\\bbl@tempa\<l@\@nameuse{bbl@hyphr@\language}\>}}%
1800 \fi
1801 \fi
1802 \bbl@ifunset{bbl@tempa}% ie, relax or undefined
1803 {\bbl@ifunset{l@#1}% no hyphenrules found - fallback
1804 {\bbl@exp{\\adddialect\<l@#1>\language}}%
1805 }% so, l@<lang> is ok - nothing to do
1806 {\bbl@exp{\\adddialect\<l@#1>\bbl@tempa}}% found in opt list or ini

```

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

```

1807 \def\bbl@read@ini#1{%
1808 \openin1=babel-#1.ini
1809 \ifeof1
1810 \bbl@error
1811 {There is no ini file for the requested language\\%
1812 (#1). Perhaps you misspelled it or your installation\\%
1813 is not complete.}%
1814 {Fix the name or reinstall babel.}%
1815 \else
1816 \let\bbl@section\@empty
1817 \let\bbl@savestrings\@empty
1818 \let\bbl@savetoday\@empty
1819 \let\bbl@savedate\@empty
1820 \let\bbl@inireader\bbl@iniskip
1821 \bbl@info{Importing data from babel-#1.ini for \language}%
1822 \loop

```

```

1823 \if T\ifeof1F\fi T\relax % Trick, because inside \loop
1824 \endlinechar\m@ne
1825 \read1 to \bbl@line
1826 \endlinechar\^^M
1827 \ifx\bbl@line\empty\else
1828 \expandafter\bbl@iniline\bbl@line\bbl@iniline
1829 \fi
1830 \repeat
1831 \fi}
1832 \def\bbl@iniline#1\bbl@iniline{%
1833 \@ifnextchar[\bbl@inisec{\@ifnextchar;\bbl@iniskip\bbl@inireader}#1\@@}% ]

```

The special cases for comment lines and sections are handled by the two following commands. In sections, we provide the 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.

```

1834 \def\bbl@iniskip#1\@@{%      if starts with ;
1835 \def\bbl@inisec[#1]#2\@@{%   if starts with opening bracket
1836 \@nameuse{\bbl@secpost\bbl@section}% ends previous section
1837 \def\bbl@section{#1}%
1838 \@nameuse{\bbl@secpref\bbl@section}% starts current section
1839 \bbl@ifunset{\bbl@secline@#1}%
1840 {\let\bbl@inireader\bbl@iniskip}%
1841 {\bbl@exp{\let\\bbl@inireader\<bbl@secline@#1>}}}

```

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

```

1842 \def\bbl@inikv#1=#2\@@{%    key=value
1843 \bbl@trim\def\bbl@tempa{#1}%
1844 \bbl@trim\toks@{#2}%
1845 \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.

```

1846 \def\bbl@exportkey#1#2#3{%
1847 \bbl@ifunset{\bbl@kv@#2}%
1848 {\bbl@csarg\gdef{#1\language}{#3}}%
1849 {\expandafter\ifx\csname\bbl@kv@#2\endcsname\empty
1850 \bbl@csarg\gdef{#1\language}{#3}}%
1851 \else
1852 \bbl@exp{\global\let\<bbl@#1\language>\<bbl@kv@#2>}%
1853 \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.

```

1854 \let\bbl@secline@identification\bbl@inikv
1855 \def\bbl@secpost@identification{%
1856 \bbl@exportkey{lname}{identification.name.english}{}}%
1857 \bbl@exportkey{lbcpr}{identification.tag.bcp47}{}}%
1858 \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
1859 \bbl@exportkey{sname}{identification.script.name}{}}%
1860 \bbl@exportkey{sbcpr}{identification.script.tag.bcp47}{}}%
1861 \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}}
1862 \let\bbl@secline@typography\bbl@inikv
1863 \let\bbl@secline@numbers\bbl@inikv
1864 \def\bbl@after@ini{%
1865 \bbl@exportkey{lftm}{typography.lefthyphenmin}{2}}%
1866 \bbl@exportkey{rgtm}{typography.righthyphenmin}{3}}%
1867 \bbl@exportkey{hyphr}{typography.hyphenrules}{}}%
1868 \bbl@exportkey{dgnat}{numbers.digits.native}{}}%
1869 \bbl@xin@{0.9}{\@nameuse{\bbl@kv@identification.version}}%

```

```

1870 \ifin@
1871 \bbl@warning{%
1872     The '\language' date format may not be suitable\\%
1873     for proper typesetting, and therefore it very likely will\\%
1874     change in a future release. Reported}%
1875 \fi
1876 \bbl@toglobal\bbl@savetoday
1877 \bbl@toglobal\bbl@savestate}

```

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

```

1878 \ifcase\bbl@engine
1879 \bbl@csarg\def{secline@captions.licr}#1=#2\@@{%
1880     \bbl@ini@captions@aux{#1}{#2}}
1881 \bbl@csarg\def{secline@date.gregorian}#1=#2\@@{%           for defaults
1882     \bbl@ini@dategreg#1...\relax{#2}}
1883 \bbl@csarg\def{secline@date.gregorian.licr}#1=#2\@@{%      override
1884     \bbl@ini@dategreg#1...\relax{#2}}
1885 \else
1886 \def\bbl@secline@captions#1=#2\@@{%
1887     \bbl@ini@captions@aux{#1}{#2}}
1888 \bbl@csarg\def{secline@date.gregorian}#1=#2\@@{%
1889     \bbl@ini@dategreg#1...\relax{#2}}
1890 \fi

```

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

```

1891 \def\bbl@ini@captions@aux#1#2{%
1892     \bbl@trim\def\bbl@tempa{#1}%
1893     \bbl@ifblank{#2}%
1894     {\bbl@exp{%
1895         \toks@{\bbl@nocaption{\bbl@tempa}\<\language\bbl@tempa name>}}}%
1896     {\bbl@trim\toks@{#2}}}%
1897 \bbl@exp{%
1898     \bbl@add\bbl@savestrings{%
1899         \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.

```

1900 \bbl@csarg\def{secpredate.gregorian.licr}{%
1901     \ifcase\bbl@engine\let\bbl@savestate\empty\fi}
1902 \def\bbl@ini@dategreg#1.#2.#3.#4\relax#5% TODO - ignore with 'captions'
1903     \bbl@trim\def\bbl@tempa{#1.#2}%
1904     \bbl@ifsamestring{\bbl@tempa}{months.wide}%
1905     {\bbl@trim\def\bbl@tempa{#3}%
1906         \bbl@trim\toks@{#5}%
1907         \bbl@exp{%
1908             \bbl@add\bbl@savestate{%
1909                 \SetString\<month\romannumeral\bbl@tempa name>{\the\toks@}}}%
1910         {\bbl@ifsamestring{\bbl@tempa}{date.long}%
1911             {\bbl@trim\def\bbl@toreplace{#5}%
1912                 \bbl@TG@date
1913                 \global\bbl@csarg\let{date@\language}\bbl@toreplace
1914                 \bbl@exp{%
1915                     \gdef\<\language date>{\protect\<\language date >}}%
1916                     \gdef\<\language date >####1####2####3%
1917                     \bbl@usedategrouptrue
1918                     \<\language date>{%
1919                         \<\language date>{####1}{####2}{####3}}}%
1920                     \bbl@add\bbl@savetoday}%

```

```

1921          \\SetString\\today{%
1922          <\language name date>{\\the\year}{\\the\month}{\\the\day}}}%
1923      {}

```

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.

```

1924 \newcommand\BabelDateSpace{\nobreakspace}
1925 \newcommand\BabelDateDot{. \@}
1926 \newcommand\BabelDated[1]{\number#1}
1927 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}
1928 \newcommand\BabelDateM[1]{\number#1}
1929 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
1930 \newcommand\BabelDateMMM[1]{%
1931   \csname month\romannumeral#1name\endcsname}%
1932 \newcommand\BabelDatey[1]{\number#1}%
1933 \newcommand\BabelDateyy[1]{%
1934   \ifnum#1<10 0\number#1 %
1935   \else\ifnum#1<100 \number#1 %
1936   \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
1937   \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
1938   \else
1939     \bbl@error
1940     {Currently two-digit years are restricted to the\
1941       range 0-9999.}%
1942     {There is little you can do. Sorry.}%
1943     \fi\fi\fi\fi}}
1944 \newcommand\BabelDateyyy[1]{\number#1}
1945 \def\bbl@replace@finish@iii#1{%
1946   \bbl@exp{\def\#1####1####2####3{\the\toks@}}
1947 \def\bbl@TG@date{%
1948   \bbl@replace\bbl@toreplace{[ ]}{\BabelDateSpace}}%
1949   \bbl@replace\bbl@toreplace{[.]}{\BabelDateDot}}%
1950   \bbl@replace\bbl@toreplace{[d]}{\BabelDated{####3}}%
1951   \bbl@replace\bbl@toreplace{[dd]}{\BabelDatedd{####3}}%
1952   \bbl@replace\bbl@toreplace{[M]}{\BabelDateM{####2}}%
1953   \bbl@replace\bbl@toreplace{[MM]}{\BabelDateMM{####2}}%
1954   \bbl@replace\bbl@toreplace{[MMM]}{\BabelDateMMM{####2}}%
1955   \bbl@replace\bbl@toreplace{[y]}{\BabelDatey{####1}}%
1956   \bbl@replace\bbl@toreplace{[yy]}{\BabelDateyy{####1}}%
1957   \bbl@replace\bbl@toreplace{[yyy]}{\BabelDateyyy{####1}}%
1958 % Note after \bbl@replace \toks@ contains the resulting string.
1959 % TODO - Using this implicit behavior doesn't seem a good idea.
1960   \bbl@replace@finish@iii\bbl@toreplace}

```

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

```

1961 \def\bbl@provide@lsys#1{%
1962   \bbl@ifunset{\bbl@lname@#1}%
1963   {\bbl@ini@ids{#1}}%
1964   {}%
1965   \bbl@csarg\let{lsys@#1}\@empty
1966   \bbl@ifunset{\bbl@sname@#1}{\bbl@csarg\gdef{sname@#1}{Default}}}%
1967   \bbl@ifunset{\bbl@sotf@#1}{\bbl@csarg\gdef{sotf@#1}{DFLT}}}%
1968   \bbl@csarg\bbl@add@list{lsys@#1}{Script=\bbl@cs{sname@#1}}%
1969   \bbl@ifunset{\bbl@lname@#1}}%
1970   {\bbl@csarg\bbl@add@list{lsys@#1}{Language=\bbl@cs{lname@#1}}}%
1971   \bbl@csarg\bbl@to@global{lsys@#1}}%
1972 % \bbl@exp{% TODO - should be global

```

```

1973 % \<keys_if_exist:nnF>{fontspec-opentype/Script}{\bbl@cs{sname@#1}}}%
1974 % {\newfontscript{\bbl@cs{sname@#1}}{\bbl@cs{sotf@#1}}}%
1975 % \<keys_if_exist:nnF>{fontspec-opentype/Language}{\bbl@cs{lname@#1}}}%
1976 % {\newfontlanguage{\bbl@cs{lname@#1}}{\bbl@cs{lotf@#1}}}%

```

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

```

1977 \def\bbl@ini@ids#1{%
1978   \def\BabelBeforeIni##1##2{%
1979     \begingroup
1980       \bbl@add\bbl@secpst@identification{\closein1 }%
1981       \catcode`\[=12 \catcode`\]=12 \catcode`\==12
1982       \bbl@read@ini{##1}%
1983     \endgroup}% boxed, to avoid extra spaces:
1984   {\setbox\z@\hbox{\InputIfFileExists{babel-#1.tex}{}}}%

```

9 The kernel of Babel (babel.def, only L^AT_EX)

9.1 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`.

```

1985 {\def\format{plain}
1986 \ifx\fmtname\format
1987 \else
1988   \def\format{LaTeX2e}
1989   \ifx\fmtname\format
1990   \else
1991     \aftergroup\endinput
1992   \fi
1993 \fi}

```

9.2 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.

```
1994 %\bbl@redefine\newlabel#1#2{%
1995 % \@safe@activestruelorgnewlabel{#1}{#2}\@safe@activesfalse}
```

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

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

```
1996 <<{*More package options}>> ≡
1997 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
1998 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
1999 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
2000 <</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.

```
2001 \bbl@trace{Cross referencing macros}
2002 \ifx\bbl@opt@safe\@empty\else
2003   \def\@newl@bel#1#2#3{%
2004     {\@safe@activestruel
2005       \bbl@ifunset{#1@#2}%
2006       \relax
2007       {\gdef\@multiplelabels{%
2008         \@latex@warning@no@line{There were multiply-defined labels}}%
2009       \@latex@warning@no@line{Label `#2' multiply defined}}%
2010     \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.

```
2011 \CheckCommand*\@testdef[3]{%
2012   \def\reserved@a{#3}%
2013   \expandafter\ifx\csname#1@#2\endcsname\reserved@a
2014   \else
2015     \@tempwattrue
2016   \fi}
```

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

```
2017 \def\@testdef#1#2#3{%
2018   \@safe@activestruel
```

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

```
2019 \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname
```

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

```
2020 \def\bbl@tempb{#3}%
2021 \@safe@activesfalse
```

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

```
2022 \ifx\bbl@tempa\relax
2023 \else
2024   \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
2025 \fi
```

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

```
2026 \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
```

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

```
2027 \ifx\bbl@tempa\bbl@tempb
2028 \else
2029 \@tempswatrue
2030 \fi}
2031 \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.

```
2032 \bbl@xin@{R}\bbl@opt@safe
2033 \ifin@
2034 \bbl@redefineroast\bbl@ref#1{%
2035   \@safe@activetrue\org@ref{#1}\@safe@activesfalse}
2036 \bbl@redefineroast\bbl@pageref#1{%
2037   \@safe@activetrue\org@pageref{#1}\@safe@activesfalse}
2038 \else
2039 \let\org@ref\ref
2040 \let\org@pageref\pageref
2041 \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.

```
2042 \bbl@xin@{B}\bbl@opt@safe
2043 \ifin@
2044 \bbl@redefine\@citex[#1]#2{%
2045   \@safe@activetrue\edef\@tempa{#2}\@safe@activesfalse
2046   \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.

```
2047 \AtBeginDocument{%
2048   \@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.)

```
2049 \def\@citex[#1][#2]#3{%
2050   \@safe@activetrue\edef\@tempa{#3}\@safe@activesfalse
2051   \org@@citex[#1][#2]{\@tempa}}%
2052 }{}}
```

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

```
2053 \AtBeginDocument{%
2054   \@ifpackageloaded{cite}{%
2055     \def\@citex[#1]#2{%
```

```

2056      \@safe@activetrue\org@@citex[#1]{#2}\@safe@activfalse}%
2057    }{}}

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

2058    \bbl@redefine\nocite#1{%
2059      \@safe@activetrue\org@nocite{#1}\@safe@activfalse}

\bibcite The macro that is used in the .aux file to define citation labels. When packages such as
        natbib or cite are not loaded its second argument is used to typeset the citation label. In
        that case, this second argument can contain active characters but is used in an
        environment where \@safe@activetrue is in effect. This switch needs to be reset inside
        the \hbox which contains the citation label. In order to determine during .aux file
        processing which definition of \bibcite is needed we define \bibcite in such a way that
        it redefines itself with the proper definition.

2060    \bbl@redefine\bibcite{%

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

2061      \bbl@cite@choice
2062      \bibcite}

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

2063    \def\bbl@bibcite#1#2{%
2064      \org@bibcite{#1}{\@safe@activfalse#2}}

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

2065    \def\bbl@cite@choice{%

        First we give \bibcite its default definition.

2066      \global\let\bibcite\bbl@bibcite

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

2067      \@ifpackageloaded{natbib}{\global\let\bibcite\org@bibcite}{}%

        For cite we do the same.

2068      \@ifpackageloaded{cite}{\global\let\bibcite\org@bibcite}{}%

        Make sure this only happens once.

2069      \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.

2070    \AtBeginDocument{\bbl@cite@choice}

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

2071    \bbl@redefine\@bibitem#1{%
2072      \@safe@activetrue\org@@bibitem{#1}\@safe@activfalse}
2073  \else
2074    \let\org@nocite\nocite
2075    \let\org@@citex\@citex
2076    \let\org@bibcite\bibcite
2077    \let\org@@bibitem\@bibitem
2078  \fi

```


9.3 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.

```
2079 \bbl@trace{Marks}
2080 \IfBabelLayout{sectioning}
2081   {\ifx\bbl@opt@headfoot\@nnil
2082     \g@addto@macro\@resetactivechars{%
2083       \set@typeset@protect
2084       \expandafter\select@language@x\expandafter{\bbl@main@language}%
2085       \let\protect\noexpand}%
2086   \fi}
2087   {\bbl@redefine\markright#1{%
2088     \bbl@ifblank{#1}%
2089     {\org@markright{}}%
2090     {\toks@{#1}%
2091       \bbl@exp{%
2092         \\org@markright{\\protect\\foreignlanguage{\language}%
2093           {\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 needed to do that again with the new definition of `\markboth`.

`\@mkboth`

```
2094 \ifx\@mkboth\markboth
2095   \def\bbl@tempc{\let\@mkboth\markboth}
2096 \else
2097   \def\bbl@tempc{}
2098 \fi
```

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

```
2099 \bbl@redefine\markboth#1#2{%
2100   \protected@edef\bbl@tempb##1{%
2101     \protect\foreignlanguage{\language}{\protect\bbl@restore@actives##1}}%
2102   \bbl@ifblank{#1}%
2103   {\toks@{}}%
2104   {\toks@\expandafter{\bbl@tempb{#1}}}%
2105   \bbl@ifblank{#2}%
2106   {\@temptokena{}}%
2107   {\@temptokena\expandafter{\bbl@tempb{#2}}}%
2108   \bbl@exp{\\org@markboth{\the\toks@}{\the\@temptokena}}}
```

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

```
2109 \bbl@tempc} % end \IfBabelLayout
```

9.4 Preventing clashes with other packages

9.4.1 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.

```
2110 \bbl@trace{Preventing clashes with other packages}%
2111 \bbl@xin@{R}\bbl@opt@safe
2112 \ifin@
2113   \AtBeginDocument{%
2114     \@ifpackageloaded{ifthen}{%
```

Then we can redefine `\ifthenelse`:

```
2115       \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.

```
2116       \let\bbl@temp@pref\pageref
2117       \let\pageref\bbl@temp@pref
2118       \let\bbl@temp@ref\ref
2119       \let\ref\bbl@temp@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.

```
2120       \@safe@activestrue
2121       \org@ifthenelse{#1}%
2122       {\let\pageref\bbl@temp@pref
2123        \let\ref\bbl@temp@ref
2124        \@safe@activesfalse
2125        #2}%
2126       {\let\pageref\bbl@temp@pref
2127        \let\ref\bbl@temp@ref
2128        \@safe@activesfalse
2129        #3}%
2130     }%
2131   }{}%
2132 }
```

9.4.2 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 2133 \AtBeginDocument{%
2134   \@ifpackageloaded{varioref}{%
2135     \bbl@redefine\@@vpageref#1[#2]#3{%
```

```

2136      \@safe@activetrue
2137      \org@@@vpageref{#1}{#2}{#3}%
2138      \@safe@activesfalse}%

```

The same needs to happen for \vrefpagenum.

```

2139      \bbl@redefine\vrefpagenum#1#2{%
2140      \@safe@activetrue
2141      \org@vrefpagenum{#1}{#2}%
2142      \@safe@activesfalse}%

```

The package varioref defines \Ref to be a robust command wich uppercases the first character of the reference text. In order to be able to do that it needs to access the 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 derfinition of \Ref changes, this definition needs to be updated as well.

```

2143      \expandafter\def\csname Ref \endcsname#1{%
2144      \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
2145      }{}%
2146      }
2147 \fi

```

9.4.3 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.

```

2148 \AtEndOfPackage{%
2149 \AtBeginDocument{%
2150 \ifpackageloaded{hhline}%

```

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

```

2151      {\expandafter\ifx\csname normal@char\string\endcsname\relax
2152      \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.

```

2153      \makeatletter
2154      \def\@currname{hhline}\input{hhline.sty}\makeatother
2155      \fi}%
2156      {}}}

```

9.4.4 hyperref

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

```

2157 \AtBeginDocument{%
2158 \ifx\pdfstringdefDisableCommands\undefined\else
2159 \pdfstringdefDisableCommands{\languageshortands{system}}%
2160 \fi}

```

9.4.5 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.

```
2161 \DeclareRobustCommand{\FOREIGNLANGUAGE}[1]{%
2162   \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.

```
2163 \def\substitutefontfamily#1#2#3{%
2164   \lowercase{\immediate\openout15=#1#2.fd\relax}%
2165   \immediate\write15{%
2166     \string\ProvidesFile{#1#2.fd}%
2167     [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
2168     \space generated font description file]^{}
2169     \string\DeclareFontFamily{#1}{#2}{}^{}
2170     \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{}^{}
2171     \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{}^{}
2172     \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{}^{}
2173     \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{}^{}
2174     \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{}^{}
2175     \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{}^{}
2176     \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{}^{}
2177     \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{}^{}
2178   }%
2179   \closeout15
2180 }
```

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

```
2181 \@onlypreamble\substitutefontfamily
```

9.5 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
```

```
2182 \bbl@trace{Encoding and fonts}
2183 \newcommand\BabelNonASCII{LGR,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU,}
2184 \let\org@TeX\TeX
2185 \let\org@LaTeX\LaTeX
2186 \let\ensureascii@firstofone
2187 \AtBeginDocument{%
2188   \in@false
2189   \bbl@foreach\BabelNonASCII{% is there a non-ascii enc?
2190     \ifin@false
2191       \lowercase{\bbl@xin@{, #1enc.def,}{, \@filelist,}}%
2192     \fi}%
2193   \ifin@ % if a non-ascii has been loaded
2194     \def\ensureascii#1{{\fontencoding{OT1}\selectfont#1}}%
```

```

2195 \DeclareTextCommandDefault{\TeX}{\org@TeX}%
2196 \DeclareTextCommandDefault{\LaTeX}{\org@LaTeX}%
2197 \def\bbl@tempb#1\@@{\uppercase{\bbl@tempc#1}ENC.DEF\@empty\@@}%
2198 \def\bbl@tempc#1ENC.DEF#2\@@{\%
2199 \ifx\@empty#2\else
2200 \bbl@ifunset{T@#1}%
2201 {}%
2202 {\bbl@xin@{, #1, }{, \BabelNonASCII, }%
2203 \ifin@
2204 \DeclareTextCommand{\TeX}{#1}{\ensureascii{\org@TeX}}%
2205 \DeclareTextCommand{\LaTeX}{#1}{\ensureascii{\org@LaTeX}}%
2206 \else
2207 \def\ensureascii##1{{\fontencoding{#1}\selectfont##1}}%
2208 \fi}%
2209 \fi}%
2210 \bbl@foreach\@filelist{\bbl@tempb#1\@@}% TODO - \@@ de mas??
2211 \bbl@xin@{, \cf@encoding, }{, \BabelNonASCII, }%
2212 \ifin@ \else
2213 \edef\ensureascii#1{%
2214 \noexpand\fontencoding{\cf@encoding}\noexpand\selectfont#1}}%
2215 \fi
2216 \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.

```

2217 \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.

```

2218 \AtBeginDocument{%
2219 \@ifpackageloaded{fontspec}%
2220 {\xdef\latinencoding{%
2221 \ifx\UTFencname\@undefined
2222 EU\ifcase\bbl@engine\or2\or1\fi
2223 \else
2224 \UTFencname
2225 \fi}}%
2226 {\gdef\latinencoding{OT1}%
2227 \ifx\cf@encoding\bbl@t@one
2228 \xdef\latinencoding{\bbl@t@one}%
2229 \else
2230 \@ifl@aded{def}{t1enc}{\xdef\latinencoding{\bbl@t@one}}}%
2231 \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.

```

2232 \DeclareRobustCommand{\latintext}{%
2233 \fontencoding{\latinencoding}\selectfont
2234 \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.

```

2235 \ifx\undefined\DeclareTextFontCommand
2236 \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}
2237 \else
2238 \DeclareTextFontCommand{\textlatin}{\latintext}
2239 \fi

```

9.6 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>>).

```

2240 \bbl@trace{Basic (internal) bidi support}
2241 \def\bbl@alscripts{,Arabic,Syriac,Thaana,}
2242 \def\bbl@rscripts{%
2243   ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
2244   Old Hungarian,Old Hungarian,Lydian,Mandaean,Manichaeen,%
2245   Manichaeen,Meroitic Cursive,Meroitic,Old North Arabian,%
2246   Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
2247   Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%
2248   Old South Arabian,%
2249 \def\bbl@provide@dirs#1{%
2250   \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts\bbl@rscripts}%
2251   \ifin@
2252     \global\bbl@csarg\chardef{wdir@#1}\@ne
2253     \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts}%
2254     \ifin@
2255       \global\bbl@csarg\chardef{wdir@#1}\two  % useless in xetex
2256     \fi
2257   \else
2258     \global\bbl@csarg\chardef{wdir@#1}\z@
2259   \fi}
2260 \def\bbl@switchdir{%

```

```

2261 \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
2262 \bbl@ifunset{bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{}%
2263 \bbl@exp{\bbl@setdirs\bbl@cs{wdir@\languagename}}{}
2264 \def\bbl@setdirs#1{% TODO - math
2265 \ifcase\bbl@select@type % TODO - strictly, not the right test
2266 \bbl@bodydir{#1}%
2267 \bbl@pdir{#1}%
2268 \fi
2269 \bbl@texdir{#1}}
2270 \ifodd\bbl@engine % luatex=1
2271 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
2272 \DisableBabelHook{babel-bidi}
2273 \chardef\bbl@thepardir\z@
2274 \def\bbl@getluadir#1{%
2275 \directlua{
2276 if tex.#1dir == 'TLT' then
2277 tex.sprint('0')
2278 elseif tex.#1dir == 'TRT' then
2279 tex.sprint('1')
2280 end}}
2281 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\texdir.. 3=0 lr/1 rl
2282 \ifcase#3\relax
2283 \ifcase\bbl@getluadir{#1}\relax\else
2284 #2 TLT\relax
2285 \fi
2286 \else
2287 \ifcase\bbl@getluadir{#1}\relax
2288 #2 TRT\relax
2289 \fi
2290 \fi}
2291 \def\bbl@texdir#1{%
2292 \bbl@setluadir{tex}\texdir{#1}% TODO - ?\linedir
2293 \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*3+#1}}
2294 \def\bbl@pdir#1{\bbl@setluadir{par}\pardir{#1}%
2295 \chardef\bbl@thepardir#1\relax}
2296 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}
2297 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}
2298 \def\bbl@dirparastext{\pardir\the\texdir\relax}% %%%
2299 \else % pdftex=0, xetex=2
2300 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
2301 \DisableBabelHook{babel-bidi}
2302 \newcount\bbl@dirlevel
2303 \chardef\bbl@thetexdir\z@
2304 \chardef\bbl@thepardir\z@
2305 \def\bbl@texdir#1{%
2306 \ifcase#1\relax
2307 \chardef\bbl@thetexdir\z@
2308 \bbl@texdir@i\beginL\endL
2309 \else
2310 \chardef\bbl@thetexdir@ne
2311 \bbl@texdir@i\beginR\endR
2312 \fi}
2313 \def\bbl@texdir@i#1#2{%
2314 \ifhmode
2315 \ifnum\currentgrouplevel>\z@
2316 \ifnum\currentgrouplevel=\bbl@dirlevel
2317 \bbl@error{Multiple bidi settings inside a group}%
2318 {I'll insert a new group, but expect wrong results.}%
2319 \bgroup\aftergroup#2\aftergroup\egroup

```

```

2320     \else
2321     \ifcase\currentgrouptype\or % 0 bottom
2322     \aftergroup#2% 1 simple {}
2323     \or
2324     \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
2325     \or
2326     \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
2327     \or\or\or % vbox vtop align
2328     \or
2329     \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
2330     \or\or\or\or\or\or % output math disc insert vcent mathchoice
2331     \or
2332     \aftergroup#2% 14 \begingroup
2333     \else
2334     \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
2335     \fi
2336     \fi
2337     \bbl@dirlevel\currentgrouplevel
2338     \fi
2339     #1%
2340     \fi}
2341 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
2342 \let\bbl@bodydir\@gobble
2343 \let\bbl@pagedir\@gobble
2344 \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).

```

2345 \def\bbl@xebidipar{%
2346   \let\bbl@xebidipar\relax
2347   \TeXeTstate\@ne
2348   \def\bbl@xeverypar{%
2349     \ifcase\bbl@thepardir
2350     \ifcase\bbl@thetextdir\else\beginR\fi
2351     \else
2352     {\setbox\z@\lastbox\beginR\box\z@}%
2353     \fi}%
2354   \let\bbl@severypar\everypar
2355   \newtoks\everypar
2356   \everypar=\bbl@severypar
2357   \bbl@severypar{\bbl@xeverypar\the\everypar}}
2358 \fi

```

A tool for weak L (mainly digits).

```

2359 \DeclareRobustCommand\babelsublr[1]{\leavevmode{\bbl@textdir\z@#1}}

```

9.7 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`.

```

2360 \bbl@trace{Local Language Configuration}
2361 \ifx\loadlocalcfg\undefined

```



```

2362 \ifpackagewith{babel}{noconfigs}%
2363 {\let\loadlocalcfg@gobble}%
2364 {\def\loadlocalcfg#1{%
2365   \InputIfFileExists{#1.cfg}%
2366   {\typeout{*****^J%
2367             * Local config file #1.cfg used^^J%
2368             *}}}%
2369   \@empty}}
2370 \fi

```

Just to be compatible with L^AT_EX 2.09 we add a few more lines of code:

```

2371 \ifx\@unexpandable@protect\@undefined
2372 \def\@unexpandable@protect{\noexpand\protect\noexpand}
2373 \long\def\protected@write#1#2#3{%
2374   \begingroup
2375     \let\thepage\relax
2376     #2%
2377     \let\protect\@unexpandable@protect
2378     \edef\reserved@a{\write#1{#3}}%
2379     \reserved@a
2380   \endgroup
2381   \if@nobreak\ifvmode\nobreak\fi\fi}
2382 \fi
2383 </core>
2384 <*kernel>

```

10 Multiple languages (switch.def)

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

```

2385 <<Make sure ProvidesFile is defined>>
2386 \ProvidesFile{switch.def}[\<date>] [\<version>] Babel switching mechanism]
2387 <<Load macros for plain if not LaTeX>>
2388 <<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.

```

2389 \def\bbl@version{\<version>}
2390 \def\bbl@date{\<date>}
2391 \def\adddialect#1#2{%
2392   \global\chardef#1#2\relax
2393   \bbl@usehooks{adddialect}{\#1}{\#2}}%
2394   \wlog{\string#1 = a dialect from \string\language#2}}

```

`\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.

```

2395 \def\bbl@fixname#1{%
2396   \begingroup
2397     \def\bbl@tempe{l@}%
2398     \edef\bbl@tempd{\noexpand\@ifundefined{\noexpand\bbl@tempe#1}}%

```

```

2399 \bbl@tempd
2400 {\lowercase\expandafter{\bbl@tempd}%
2401 {\uppercase\expandafter{\bbl@tempd}%
2402 \@empty
2403 {\edef\bbl@tempd{\def\noexpand#1{#1}}%
2404 {\uppercase\expandafter{\bbl@tempd}}}%
2405 {\edef\bbl@tempd{\def\noexpand#1{#1}}%
2406 {\lowercase\expandafter{\bbl@tempd}}}%
2407 \@empty
2408 \edef\bbl@tempd{\endgroup\def\noexpand#1{#1}}%
2409 \bbl@tempd}
2410 \def\bbl@iflanguage#1{%
2411 \@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.

```

2412 \def\iflanguage#1{%
2413 \bbl@iflanguage{#1}{%
2414 \ifnum\csgname l@#1\endcsname=\language
2415 \expandafter\@firstoftwo
2416 \else
2417 \expandafter\@secondoftwo
2418 \fi}}

```

10.1 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.

```

2419 \let\bbl@select@type\z@
2420 \edef\selectlanguage{%
2421 \noexpand\protect
2422 \expandafter\noexpand\csgname 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`.

```

2423 \ifx\@undefined\protect\let\protect\relax\fi

```

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

```
2424 \ifx\documentclass\undefined
2425   \def\xstring{\string\string\string}
2426 \else
2427   \let\xstring\string
2428 \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.

```
2429 \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
`\bbl@pop@language` be simple:

```
2430 \def\bbl@push@language{%
2431   \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.

```
2432 \def\bbl@pop@lang#1+#2-#3{%
2433   \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.

```
2434 \let\bbl@ifrestoring\@secondoftwo
2435 \def\bbl@pop@language{%
2436   \expandafter\bbl@pop@lang\bbl@language@stack-\bbl@language@stack
2437   \let\bbl@ifrestoring\@firstoftwo
2438   \expandafter\bbl@set@language\expandafter{\language}%
2439   \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.

```

2440 \expandafter\def\csname selectlanguage \endcsname#1{%
2441   \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\tw\fi
2442   \bbl@push@language
2443   \aftergroup\bbl@pop@language
2444   \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 not well defined. The list of auxiliary files can be extended by redefining \BabelContentsFiles, but make sure they are loaded inside a group (as aux, toc, lof, and lot do) or the last language of the document will remain active afterwards.

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

```

2445 \def\BabelContentsFiles{toc,lof,lot}
2446 \def\bbl@set@language#1{%
2447   \edef\language{%
2448     \ifnum\escapechar=\expandafter`\string#1\@empty
2449     \else\string#1\@empty\fi}%
2450   \select@language{\language}%
2451   \expandafter\ifx\csname date\language\endcsname\relax\else
2452     \if@filesw
2453       \protected@write\@auxout{{}\string\babel@aux{\language}}}%
2454       \bbl@usehooks{write}}}%
2455   \fi
2456 \fi}
2457 \def\select@language#1{%
2458   \ifnum\bbl@hymapsel=\@cclv\chardef\bbl@hymapsel4\relax\fi
2459   \edef\language{#1}%
2460   \bbl@fixname\language
2461   \bbl@iflanguage\language{%
2462     \expandafter\ifx\csname date\language\endcsname\relax
2463       \bbl@error
2464       {Unknown language `#1'. Either you have\\%
2465        misspelled its name, it has not been installed,\\%
2466        or you requested it in a previous run. Fix its name,\\%
2467        install it or just rerun the file, respectively. In\\%
2468        some cases, you may need to remove the aux file}%
2469       {You may proceed, but expect wrong results}%
2470     \else
2471       \let\bbl@select@type\z@
2472       \expandafter\bbl@switch\expandafter{\language}%
2473     \fi}}
2474 \def\babel@aux#1#2{%
2475   \select@language{#1}%
2476   \bbl@foreach\BabelContentsFiles{%
2477     \@writefile{##1}{\babel@toc{#1}{#2}}}% % TODO - ok in plain?
2478 \def\babel@toc#1#2{%
2479   \select@language{#1}}

```

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

```

2480 \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 \language.

Then we have to *redefine* `\originalTeX` to compensate for the things that have been activated. To save memory space for the macro definition of `\originalTeX`, we construct the control sequence name for the `\noextras<lang>` command at definition time by expanding the `\csname` primitive.

Now activate the language-specific definitions. This is done by constructing the names of three macros by concatenating three words with the argument of `\selectlanguage`, and calling these macros.

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

```

2481 \newif\ifbbl@usedategroup
2482 \def\bbl@switch#1{%
2483   \originalTeX
2484   \expandafter\def\expandafter\originalTeX\expandafter{%
2485     \csname noextras#1\endcsname
2486     \let\originalTeX\empty
2487     \babel@beginsave}%
2488   \bbl@usehooks{afterreset}}}%
2489   \languageshorthands{none}%
2490   \ifcase\bbl@select@type
2491     \ifhmode
2492       \hskip\z@skip % trick to ignore spaces
2493       \csname captions#1\endcsname\relax
2494       \csname date#1\endcsname\relax
2495       \loop\ifdim\lastskip>\z@\unskip\repeat\unskip
2496     \else
2497       \csname captions#1\endcsname\relax
2498       \csname date#1\endcsname\relax
2499     \fi
2500   \else\ifbbl@usedategroup
2501     \bbl@usedategroupfalse
2502     \ifhmode
2503       \hskip\z@skip % trick to ignore spaces
2504       \csname date#1\endcsname\relax
2505       \loop\ifdim\lastskip>\z@\unskip\repeat\unskip
2506     \else
2507       \csname date#1\endcsname\relax
2508     \fi
2509   \fi\fi
2510   \bbl@usehooks{beforeextras}}}%
2511   \csname extras#1\endcsname\relax
2512   \bbl@usehooks{afterextras}}}%
2513   \ifcase\bbl@opt@hyphenmap\or
2514     \def\BabelLower##1##2{\lccode##1=##2\relax}%
2515     \ifnum\bbl@hymapsel>4\else
2516       \csname\language\name @bbl@hyphenmap\endcsname
2517     \fi
2518     \chardef\bbl@opt@hyphenmap\z@
2519   \else
2520     \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
2521       \csname\language\name @bbl@hyphenmap\endcsname
2522     \fi
2523   \fi
2524   \global\let\bbl@hymapsel\@cclv
2525   \bbl@patterns{#1}%
2526   \babel@savevariable\lefthyphenmin

```

```

2527 \babel@savevariable\rightthyphenmin
2528 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
2529 \set@hyphenmins\tw@\thr@\relax
2530 \else
2531 \expandafter\expandafter\expandafter\set@hyphenmins
2532 \csname #1hyphenmins\endcsname\relax
2533 \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.

```

2534 \long\def\otherlanguage#1{%
2535 \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\thr@\fi
2536 \csname selectlanguage \endcsname{#1}%
2537 \ignorespaces}

```

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

```

2538 \long\def\endotherlanguage{%
2539 \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`.

```

2540 \expandafter\def\csname otherlanguage*\endcsname#1{%
2541 \ifnum\bbl@hymapsel=\@cclv\chardef\bbl@hymapsel4\relax\fi
2542 \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”.

```

2543 \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`.

```

2544 \providecommand\bb1@beforeforeign{
2545 \edef\foreignlanguage{%
2546 \noexpand\protect
2547 \expandafter\noexpand\csname foreignlanguage \endcsname}
2548 \expandafter\def\csname foreignlanguage \endcsname{%
2549 \@ifstar\bb1@foreign@s\bb1@foreign@x}
2550 \def\bb1@foreign@x#1#2{%
2551 \begingroup
2552 \let\BabelText\@firstofone
2553 \bb1@beforeforeign
2554 \foreign@language{#1}%
2555 \bb1@usehooks{foreign}{}}%
2556 \BabelText{#2}% Now in horizontal mode!
2557 \endgroup}
2558 \def\bb1@foreign@s#1#2{% TODO - \shapemode, \setpar, ?\@par
2559 \begingroup
2560 {\par}%
2561 \let\BabelText\@firstofone
2562 \foreign@language{#1}%
2563 \bb1@usehooks{foreign*}{}}%
2564 \bb1@dirparastext
2565 \BabelText{#2}% Still in vertical mode!
2566 {\par}%
2567 \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 `bb1@switch`.

```

2568 \def\foreign@language#1{%
2569 \edef\language#1}%
2570 \bb1@fixname\language
2571 \bb1@iflanguage\language{%
2572 \expandafter\ifx\csname date\language\endcsname\relax
2573 \bb1@warning
2574 {Unknown language `#1'. Either you have\\%
2575 misspelled its name, it has not been installed,\\%
2576 or you requested it in a previous run. Fix its name,\\%
2577 install it or just rerun the file, respectively.\\%
2578 I'll proceed, but expect wrong results.\\%
2579 Reported}%
2580 \fi
2581 \let\bb1@select@type\@ne
2582 \expandafter\bb1@switch\expandafter{\language}}

```

`\bb1@patterns` This macro selects the hyphenation patterns by changing the `\language` register. If special hyphenation patterns are available specifically for the current font encoding, use them instead of the default.

It also sets hyphenation exceptions, but only once, because they are global (here `language \lccode's` has been set, too). `\bb1@hyphenation@` is set to relax until the very first `\babelhyphenation`, so do nothing with this value. If the exceptions for a language (by its number, not its name, so that `:ENC` is taken into account) has been set, then use `\hyphenation` with both global and language exceptions and empty the latter to mark they must not be set again.

```

2583 \let\bb1@hyphlist\@empty
2584 \let\bb1@hyphenation@relax

```

```

2585 \let\bbl@pttnlist\@empty
2586 \let\bbl@patterns@\relax
2587 \let\bbl@hymapsel=\@cc1v
2588 \def\bbl@patterns#1{%
2589   \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
2590     \csname l@#1\endcsname
2591     \edef\bbl@tempa{#1}%
2592   \else
2593     \csname l@#1:\f@encoding\endcsname
2594     \edef\bbl@tempa{#1:\f@encoding}%
2595   \fi
2596   \@expandtwoargs\bbl@usehooks{patterns}{#1}{\bbl@tempa}}%
2597   \@ifundefined{bbl@hyphenation@}{#1}{% Can be \relax!
2598     \begingroup
2599       \bbl@xin@{,\number\language,}{,\bbl@hyphlist}%
2600       \ifin@else
2601         \@expandtwoargs\bbl@usehooks{hyphenation}{#1}{\bbl@tempa}}%
2602         \hyphenation{%
2603           \bbl@hyphenation@
2604           \@ifundefined{bbl@hyphenation@#1}%
2605             \empty
2606             {\space\csname bbl@hyphenation@#1\endcsname}}%
2607       \xdef\bbl@hyphlist{\bbl@hyphlist\number\language,}%
2608     \fi
2609   \endgroup}}

```

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

```

2610 \def\hyphenrules#1{%
2611   \edef\bbl@tempf{#1}%
2612   \bbl@fixname\bbl@tempf
2613   \bbl@iflanguage\bbl@tempf{%
2614     \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
2615     \languageshortands{none}%
2616     \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
2617       \set@hyphenmins\tw@\thr@@\relax
2618     \else
2619       \expandafter\expandafter\expandafter\set@hyphenmins
2620       \csname\bbl@tempf hyphenmins\endcsname\relax
2621     \fi}}
2622 \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.

```

2623 \def\providehyphenmins#1#2{%
2624   \expandafter\ifx\csname #1hyphenmins\endcsname\relax
2625     \@namedef{#1hyphenmins}{#2}%
2626   \fi}

```

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

```

2627 \def\set@hyphenmins#1#2{%
2628   \lefthyphenmin#1\relax
2629   \righthyphenmin#2\relax}

```


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

```

2630 \ifx\ProvidesFile\@undefined
2631   \def\ProvidesLanguage#1[#2 #3 #4]{%
2632     \wlog{Language: #1 #4 #3 <#2>}%
2633   }
2634 \else
2635   \def\ProvidesLanguage#1{%
2636     \begingroup
2637       \catcode`\ 10 %
2638       \@makeother\/%
2639       \@ifnextchar[%]
2640         {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}}
2641   \def\@provideslanguage#1[#2]{%
2642     \wlog{Language: #1 #2}%
2643     \expandafter\xdef\csname ver@#1.ldf\endcsname{#2}%
2644     \endgroup}
2645 \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`

```

2646 \def\LdfInit{%
2647   \chardef\atcatcode=\catcode`\@
2648   \catcode`\@=11\relax
2649   \input babel.def\relax
2650   \catcode`\@=\atcatcode \let\atcatcode\relax
2651   \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`.

```

2652 \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.

```

2653 \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’:

```

2654 \providecommand\setlocale{%
2655   \bbl@error
2656   {Not yet available}%
2657   {Find an armchair, sit down and wait}}
2658 \let\uselocale\setlocale
2659 \let\locale\setlocale
2660 \let\selectlocale\setlocale
2661 \let\textlocale\setlocale
2662 \let\textlanguage\setlocale
2663 \let\languagetext\setlocale

```

10.2 Errors

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

`\@noopterr` When the package was loaded without options not everything will work as expected. An error message is issued in that case.
When the format knows about `\PackageError` it must be $\text{\LaTeX 2}_{\epsilon}$, so we can safely use its error handling interface. Otherwise we'll have to 'keep it simple'.

```

2664 \edef\bbl@nulllanguage{\string\language=0}
2665 \ifx\PackageError\@undefined
2666   \def\bbl@error#1#2{%
2667     \begingroup
2668       \newlinechar=`^^J
2669       \def\{^^J(babel) }%
2670       \errhelp{#2}\errmessage{\{#1}%
2671     \endgroup}
2672   \def\bbl@warning#1{%
2673     \begingroup
2674       \newlinechar=`^^J
2675       \def\{^^J(babel) }%
2676       \message{\{#1}%
2677     \endgroup}
2678   \def\bbl@info#1{%
2679     \begingroup
2680       \newlinechar=`^^J
2681       \def\{^^J}%
2682       \wlog{#1}%
2683     \endgroup}
2684 \else
2685   \def\bbl@error#1#2{%
2686     \begingroup
2687       \def\{\MessageBreak}%
2688       \PackageError{babel}{#1}{#2}%
2689     \endgroup}
2690   \def\bbl@warning#1{%
2691     \begingroup
2692       \def\{\MessageBreak}%
2693       \PackageWarning{babel}{#1}%
2694     \endgroup}
2695   \def\bbl@info#1{%
2696     \begingroup
2697       \def\{\MessageBreak}%
2698       \PackageInfo{babel}{#1}%
2699     \endgroup}
2700 \fi
2701 \@ifpackagewith{babel}{silent}
2702   {\let\bbl@info\@gobble
2703    \let\bbl@warning\@gobble}
2704   {}
2705 \def\bbl@nocaption#1#2{% 1: text to be printed 2: caption macro \langXname
2706   \gdef#2{\textbf{?#1?}}%
2707   #2%
2708   \bbl@warning{%
2709     \string#2 not set. Please, define\%

```

```

2710     it in the preamble with something like:\\%
2711     \string\renewcommand\string#2{..}\\%
2712     Reported}}
2713 \def\nolanerr#1{%
2714   \bbl@error
2715   {You haven't defined the language #1\space yet}%
2716   {Your command will be ignored, type <return> to proceed}}
2717 \def\nopatterns#1{%
2718   \bbl@warning
2719   {No hyphenation patterns were preloaded for\\%
2720     the language `#1' into the format.\\%
2721     Please, configure your TeX system to add them and\\%
2722     rebuild the format. Now I will use the patterns\\%
2723     preloaded for \bbl@nulllanguage\space instead}}
2724 \let\bbl@usehooks\@gobbletwo
2725 </kernel>
2726 <*patterns>

```

11 Loading hyphenation patterns

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

`toks8` stores info to be shown when the program is run.

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 \LaTeX the above scheme won't work. The reason is that \LaTeX 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.

```

2727 <<Make sure ProvidesFile is defined>>
2728 \ProvidesFile{hyphen.cfg}[\<date>] \<version>] Babel hyphens]
2729 \xdef\bbbl@format{\jobname}
2730 \ifx\AtBeginDocument\@undefined
2731   \def\@empty{}
2732   \let\orig@dump\dump
2733   \def\dump{%
2734     \ifx\@ztryfc\@undefined
2735     \else
2736       \toks0=\expandafter{\@preamblecmds}%
2737       \edef\@preamblecmds{\noexpand\@begindocumenthook\the\toks0}%
2738       \def\@begindocumenthook{}%
2739     \fi
2740     \let\dump\orig@dump\let\orig@dump\@undefined\dump}
2741 \fi
2742 <<Define core switching macros>>
2743 \toks8{Babel <<@version@>> and hyphenation patterns for }%

```

`\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.

```

2744 \def\process@line#1#2 #3 #4 {%
2745   \ifx=#1%
2746     \process@synonym{#2}%
2747   \else
2748     \process@language{#1#2}{#3}{#4}%
2749   \fi
2750   \ignorespaces}

```

`\process@synonym` This macro takes care of the lines which start with an =. It needs an empty token register to begin with. `\bbbl@languages` is also set to empty.

```

2751 \toks@{}
2752 \def\bbbl@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.

```

2753 \def\process@synonym#1{%
2754   \ifnum\last@language=\m@ne
2755     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
2756   \else
2757     \expandafter\chardef\csname l@#1\endcsname\last@language
2758     \wlog{\string\l@#1=\string\language\the\last@language}%
2759     \expandafter\let\csname #1hyphenmins\endcsname\expandafter\endcsname
2760     \csname\language\endcsname hyphenmins\endcsname
2761     \let\bbbl@elt\relax
2762     \edef\bbbl@languages{\bbbl@languages\bbbl@elt{#1}{\the\last@language}}}%
2763   \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 ‘name’ of the language that will be loaded now is added to the token register `\toks8`. and finally the pattern file is read.

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

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

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

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

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

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

```

2764 \def\process@language#1#2#3{%
2765   \expandafter\addlanguage\csname l@#1\endcsname
2766   \expandafter\language\csname l@#1\endcsname
2767   \edef\language#1#2#3{%
2768     \bbl@hook@everylanguage{#1}%
2769     \bbl@get@enc#1::\bbl@hyph@enc
2770   }
2771   \begin{group}
2772     \lefthyphenmin\m@ne
2773     \bbl@hook@loadpatterns{#2}%
2774     \ifnum\lefthyphenmin=\m@ne
2775       \expandafter\edef\csname #1hyphenmins\endcsname{%
2776         \the\lefthyphenmin\the\righthyphenmin}%
2777     \fi
2778   \endgroup
2779   \def\bbl@tempa{#3}%
2780   \ifx\bbl@tempa\@empty\else
2781     \bbl@hook@loadexceptions{#3}%
2782   \fi
2783   \let\bbl@elt\relax
2784   \edef\bbl@languages{%
2785     \bbl@languages\bbl@elt{#1}{\the\language}{#2}{\bbl@tempa}%
2786   }
2787   \ifnum\the\language=\z@
2788     \expandafter\ifx\csname #1hyphenmins\endcsname\relax
2789       \set@hyphenmins\tw@\thr@@\relax
2790     \else
2791       \expandafter\expandafter\expandafter\set@hyphenmins
2792       \csname #1hyphenmins\endcsname
2793     \fi

```

```

2793 \the\toks@
2794 \toks@{}}%
2795 \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.

```

2796 \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.

```

2797 \def\bbl@hook@everylanguage#1{}
2798 \def\bbl@hook@loadpatterns#1{\input #1\relax}
2799 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
2800 \let\bbl@hook@loadkernel\bbl@hook@loadpatterns
2801 \begingroup
2802 \def\AddBabelHook#1#2{%
2803 \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
2804 \def\next{\toks1}%
2805 \else
2806 \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname###1}%
2807 \fi
2808 \next}
2809 \ifx\directlua\@undefined
2810 \ifx\XeTeXinputencoding\@undefined\else
2811 \input xebabel.def
2812 \fi
2813 \else
2814 \input luabel.def
2815 \fi
2816 \openin1 = babel-\bbl@format.cfg
2817 \ifeof1
2818 \else
2819 \input babel-\bbl@format.cfg\relax
2820 \fi
2821 \closein1
2822 \endgroup
2823 \bbl@hook@loadkernel{switch.def}

```

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

```

2824 \openin1 = language.dat

```

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

```

2825 \def\language{english}%
2826 \ifeof1
2827 \message{I couldn't find the file language.dat,\space
2828 I will try the file hyphen.tex}
2829 \input hyphen.tex\relax
2830 \chardef\l@english\z@
2831 \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`.

```

2832 \last@language\m@ne

```

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

```
2833 \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.

```
2834 \endlinechar\m@ne
2835 \read1 to \bbl@line
2836 \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.

```
2837 \if T\ifeof1F\fi T\relax
2838 \ifx\bbl@line\@empty\else
2839 \edef\bbl@line{\bbl@line\space\space\space}%
2840 \expandafter\process@line\bbl@line\relax
2841 \fi
2842 \repeat
```

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

```
2843 \begingroup
2844 \def\bbl@elt#1#2#3#4{%
2845 \global\language=#2\relax
2846 \gdef\language#1}%
2847 \def\bbl@elt##1##2##3##4{}}%
2848 \bbl@languages
2849 \endgroup
2850 \fi
```

and close the configuration file.

```
2851 \closein1
```

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

```
2852 \if/\the\toks@/\else
2853 \errhelp{language.dat loads no language, only synonyms}
2854 \errmessage{Orphan language synonym}
2855 \fi
2856 \advance\last@language\@ne
2857 \edef\bbl@tempa{%
2858 \everyjob{%
2859 \the\everyjob
2860 \ifx\typeout\@undefined
2861 \immediate\write16%
2862 \else
2863 \noexpand\typeout
2864 \fi
2865 {\the\toks8 \the\last@language\space language(s) loaded.}}}
2866 \advance\last@language\m@ne
2867 \bbl@tempa
```

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.

```
2868 \let\bbl@line\@undefined
2869 \let\process@line\@undefined
2870 \let\process@synonym\@undefined
```

```

2871 \let\process@language\@undefined
2872 \let\bbl@get@enc\@undefined
2873 \let\bbl@hyph@enc\@undefined
2874 \let\bbl@tempa\@undefined
2875 \let\bbl@hook@loadkernel\@undefined
2876 \let\bbl@hook@everylanguage\@undefined
2877 \let\bbl@hook@loadpatterns\@undefined
2878 \let\bbl@hook@loadexceptions\@undefined
2879 </patterns>

```

Here the code for `iniTEX` ends.

12 Font handling with fontspec

Add the bidi handler just before `luaotfload`, which is loaded by default by LaTeX. Just in case, consider the possibility it has not been loaded. First, a couple of definitions related to `bidi` [misplaced].

```

2880 <<*More package options>> ≡
2881 \ifodd\bbl@engine
2882   \DeclareOption{bidi=basic-r}%
2883     {\ExecuteOptions{bidi=basic}}
2884   \DeclareOption{bidi=basic}%
2885     {\let\bbl@beforeforeign\leavevmode
2886       \newattribute\bbl@attr@dir
2887       \bbl@exp{\output{\bodydir\pagedir\the\output}}%
2888       \AtEndOfPackage{\EnableBabelHook{babel-bidi}}}
2889 \else
2890   \DeclareOption{bidi=basic-r}%
2891     {\ExecuteOptions{bidi=basic}}
2892   \DeclareOption{bidi=basic}%
2893     {\bbl@error
2894       {The bidi method 'basic' is available only in\\%
2895        luatex. I'll continue with 'bidi=default', so\\%
2896        expect wrong results}%
2897       {See the manual for further details.}%
2898       \let\bbl@beforeforeign\leavevmode
2899       \AtEndOfPackage{%
2900         \EnableBabelHook{babel-bidi}%
2901         \bbl@xebidipar}}
2902 \fi
2903 \DeclareOption{bidi=default}%
2904   {\let\bbl@beforeforeign\leavevmode
2905     \ifodd\bbl@engine
2906       \newattribute\bbl@attr@dir
2907       \bbl@exp{\output{\bodydir\pagedir\the\output}}%
2908     \fi
2909     \AtEndOfPackage{%
2910       \EnableBabelHook{babel-bidi}%
2911       \ifodd\bbl@engine\else
2912         \bbl@xebidipar
2913       \fi}}
2914 <</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.

```

2915 <<*Font selection>> ≡
2916 \bbl@trace{Font handling with fontspec}

```



```

2917 \@onlypreamble\babelfont
2918 \newcommand\babelfont[2][\% 1=langs/scripts 2=fam
2919 \edef\bb1@tempa{#1}%
2920 \def\bb1@tempb{#2}%
2921 \ifx\fontspec\undefined
2922 \usepackage{fontspec}%
2923 \fi
2924 \EnableBabelHook{babel-fontspec}%
2925 \bb1@babelfont}
2926 \newcommand\bb1@babelfont[2][\% 1=features 2=fontname
2927 \bb1@ifunset{\bb1@tempb family}{\bb1@providefam{\bb1@tempb}}{}%
2928 \bb1@ifunset{\bb1@lsys@language}{\bb1@provide@lsys{language}}{}%
2929 \expandafter\bb1@ifblank\expandafter{\bb1@tempa}%
2930 {\bb1@csarg\edef{\bb1@tempb dflt}{<{#1}{#2}}% save \bb1@rmdflt@
2931 \bb1@exp{%
2932 \let<\bb1@bb1@tempb dflt@language>\<\bb1@bb1@tempb dflt@>%
2933 \\\bb1@font@set<\bb1@bb1@tempb dflt@language>%
2934 \<\bb1@tempb default>\<\bb1@tempb family>}}%
2935 {\bb1@foreach\bb1@tempa{% ie \bb1@rmdflt@lang / *scrt
2936 \bb1@csarg\def{\bb1@tempb dflt@##1}{<{#1}{#2}}}}%

```

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

```

2937 \def\bb1@providefam#1{%
2938 \bb1@exp{%
2939 \\\newcommand<#1default>{}% Just define it
2940 \\\bb1@add@list\\bb1@font@fams{#1}%
2941 \\\DeclareRobustCommand<#1family>{%
2942 \\\not@math@alphabet<#1family>\relax
2943 \\\fontfamily<#1default>\selectfont}%
2944 \\\DeclareTextFontCommand{\<text#1>}{<#1family>}}

```

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

```

2945 \def\bb1@switchfont{%
2946 \bb1@ifunset{\bb1@lsys@language}{\bb1@provide@lsys{language}}{}%
2947 \bb1@exp{% eg Arabic -> arabic
2948 \lowercase{\edef\\bb1@tempa{\bb1@cs{sname@language}}}}%
2949 \bb1@foreach\bb1@font@fams{%
2950 \bb1@ifunset{\bb1@##1dflt@language}% (1) language?
2951 {\bb1@ifunset{\bb1@##1dflt@*\bb1@tempa}% (2) from script?
2952 {\bb1@ifunset{\bb1@##1dflt@}% 2=F - (3) from generic?
2953 {}% 123=F - nothing!
2954 {\bb1@exp{% 3=T - from generic
2955 \global\let<\bb1@##1dflt@language>%
2956 \<\bb1@##1dflt@>}}}%
2957 {\bb1@exp{% 2=T - from script
2958 \global\let<\bb1@##1dflt@language>%
2959 \<\bb1@##1dflt@*\bb1@tempa>}}}%
2960 {}% 1=T - language, already defined
2961 \def\bb1@tempa{%
2962 \bb1@warning{The current font is not a standard family:\\%
2963 \fontname\font\\%
2964 Script and Language are not applied. Consider defining a\\%
2965 new family with \string\babelfont. Reported}}%
2966 \bb1@foreach\bb1@font@fams{% don't gather with prev for
2967 \bb1@ifunset{\bb1@##1dflt@language}%
2968 {\bb1@cs{famrst@##1}%
2969 \global\bb1@csarg\let{famrst@##1}\relax}%
2970 {\bb1@exp{% order is relevant
2971 \\\bb1@add\\originalTeX%

```

```

2972      \\bbl@font@rst{\bbl@cs{##1dflt@\languagename}}%
2973      \<##1default>\<##1family>{##1}}%
2974      \\bbl@font@set{\bbl@##1dflt@\languagename}>% the main part!
2975      \<##1default>\<##1family>}}}%
2976      \bbl@ifrestoring{}{\bbl@tempa}}%

```

Now the macros defining the font with fontspec.

When there are repeated keys in fontspec, the last value wins. So, we just place the ini settings at the beginning, and user settings will take precedence. We must deactivate temporarily \bbl@mapselect because \selectfont is called internally when a font is defined.

```

2977 \def\bbl@font@set#1#2#3{% eg \bbl@rmdflt@lang \rmdefault \rmfamily
2978   \bbl@xin@{<>}{#1}%
2979   \ifin@
2980     \bbl@exp{\bbl@fontspec@set\\#1\expandafter\@gobbletwo#1}%
2981     \fi
2982     \bbl@exp{%
2983       \def\\#2{#1}%          eg, \rmdefault{\bbl@rmdflt@lang}
2984       \\bbl@ifsamestring{#2}{\f@family}{\\#3\let\\bbl@tempa\relax}{}}%
2985 \def\bbl@fontspec@set#1#2#3{% eg \bbl@rmdflt@lang fnt-opt fnt-nme
2986   \let\bbl@tempe\bbl@mapselect
2987   \let\bbl@mapselect\relax
2988   \bbl@exp{\<fontspec_set_family:Nnn>\\#1%
2989     {\bbl@cs{lsys@\languagename},#2}}{#3}%
2990   \let\bbl@mapselect\bbl@tempe
2991   \bbl@toggle#1}%

```

font@rst and famrst are only used when there is no global settings, to save and restore de previous families. Not really necessary, but done for optimization.

```

2992 \def\bbl@font@rst#1#2#3#4{%
2993   \bbl@csarg\def{famrst@#4}{\bbl@font@set{#1}#2#3}}

```

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

```

2994 \def\bbl@font@fams{rm,sf,tt}

```

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

```

2995 \newcommand\babelFSstore[2][{}]{%
2996   \bbl@ifblank{#1}%
2997   {\bbl@csarg\def{sname@#2}{Latin}}%
2998   {\bbl@csarg\def{sname@#2}{#1}}%
2999   \bbl@provide@dirs{#2}%
3000   \bbl@csarg\ifnum{wdir@#2}>\z@
3001     \let\bbl@beforeforeign\leavevmode
3002     \EnableBabelHook{babel-bidi}%
3003   \fi
3004   \bbl@foreach{#2}{%
3005     \bbl@FSstore{##1}{rm}\rmdefault\bbl@save@rmdefault
3006     \bbl@FSstore{##1}{sf}\sfdefault\bbl@save@sfdefault
3007     \bbl@FSstore{##1}{tt}\ttdefault\bbl@save@ttdefault}}
3008 \def\bbl@FSstore#1#2#3#4{%
3009   \bbl@csarg\edef{#2default#1}{#3}%
3010   \expandafter\addto\csname extras#1\endcsname{%
3011     \let#4#3%
3012     \ifx#3\f@family
3013       \edef#3{\csname bbl@#2default#1\endcsname}%

```

```

3014     \fontfamily{#3}\selectfont
3015 \else
3016     \edef#3{\csname bbl@#2default#1\endcsname}%
3017     \fi}%
3018 \expandafter\addto\csname noextras#1\endcsname{%
3019     \ifx#3\fontfamily
3020         \fontfamily{#4}\selectfont
3021         \fi
3022     \let#3#4}}
3023 \let\bbl@langfeatures\@empty
3024 \def\babelFSfeatures{% make sure \fontspec is redefined once
3025     \let\bbl@ori@fontspec\fontspec
3026     \renewcommand\fontspec[1][{}]{%
3027         \bbl@ori@fontspec[\bbl@langfeatures##1]}
3028     \let\babelFSfeatures\bbl@FSfeatures
3029     \babelFSfeatures}
3030 \def\bbl@FSfeatures#1#2{%
3031     \expandafter\addto\csname extras#1\endcsname{%
3032         \babel@save\bbl@langfeatures
3033         \edef\bbl@langfeatures{#2,}}
3034 <</Font selection>>

```

13 Hooks for XeTeX and LuaTeX

13.1 XeTeX

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

L^AT_EX 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^AT_EX. Anyway, for consistency LuaT_EX also resets the catcodes.

```

3035 <<(*Restore Unicode catcodes before loading patterns)>> ≡
3036 \begingroup
3037     % Reset chars "80-"C0 to category "other", no case mapping:
3038     \catcode`\@=11 \count@=128
3039     \loop\ifnum\count@<192
3040         \global\uccode\count@=0 \global\lccode\count@=0
3041         \global\catcode\count@=12 \global\sffcode\count@=1000
3042         \advance\count@ by 1 \repeat
3043     % Other:
3044     \def\O ##1 {%
3045         \global\uccode"##1=0 \global\lccode"##1=0
3046         \global\catcode"##1=12 \global\sffcode"##1=1000 }%
3047     % Letter:
3048     \def\L ##1 ##2 ##3 {\global\catcode"##1=11
3049         \global\uccode"##1="##2
3050         \global\lccode"##1="##3
3051         % Uppercase letters have sffcode=999:
3052         \ifnum"##1="##3 \else \global\sffcode"##1=999 \fi }%
3053     % Letter without case mappings:
3054     \def\l ##1 {\L ##1 ##1 ##1 }%
3055     \l 00AA
3056     \L 00B5 039C 00B5
3057     \l 00BA
3058     \O 00D7
3059     \l 00DF

```

```

3060 \O 00F7
3061 \L 00FF 0178 00FF
3062 \endgroup
3063 \input #1\relax
3064 <</Restore Unicode catcodes before loading patterns>>

```

Some more common code.

```

3065 <<{*Footnote changes}>> ≡
3066 \bbl@trace{Bidi footnotes}
3067 \ifx\bbl@beforeforeign\leavevmode
3068 \def\bbl@footnote#1#2#3{%
3069 \ifnextchar[%
3070 {\bbl@footnote@o{#1}{#2}{#3}}%
3071 {\bbl@footnote@x{#1}{#2}{#3}}}
3072 \def\bbl@footnote@x#1#2#3#4{%
3073 \bgroup
3074 \select@language@x{\bbl@main@language}%
3075 \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
3076 \egroup}
3077 \def\bbl@footnote@o#1#2#3[#4]#5{%
3078 \bgroup
3079 \select@language@x{\bbl@main@language}%
3080 \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
3081 \egroup}
3082 \def\bbl@footnotetext#1#2#3{%
3083 \ifnextchar[%
3084 {\bbl@footnotetext@o{#1}{#2}{#3}}%
3085 {\bbl@footnotetext@x{#1}{#2}{#3}}}
3086 \def\bbl@footnotetext@x#1#2#3#4{%
3087 \bgroup
3088 \select@language@x{\bbl@main@language}%
3089 \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
3090 \egroup}
3091 \def\bbl@footnotetext@o#1#2#3[#4]#5{%
3092 \bgroup
3093 \select@language@x{\bbl@main@language}%
3094 \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
3095 \egroup}
3096 \def\BabelFootnote#1#2#3#4{%
3097 \ifx\bbl@fn@footnote\@undefined
3098 \let\bbl@fn@footnote\footnote
3099 \fi
3100 \ifx\bbl@fn@footnotetext\@undefined
3101 \let\bbl@fn@footnotetext\footnotetext
3102 \fi
3103 \bbl@ifblank{#2}%
3104 {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
3105 \namedef{\bbl@stripslash#1text}%
3106 {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
3107 {\def#1{\bbl@exp{\bbl@footnote{\bbl@foreignlanguage{#2}}}{#3}{#4}}%
3108 \namedef{\bbl@stripslash#1text}%
3109 {\bbl@exp{\bbl@footnotetext{\bbl@foreignlanguage{#2}}}{#3}{#4}}}%
3110 \fi
3111 <</Footnote changes>>

```

Now, the code.

```

3112 <{*xetex}>
3113 \def\BabelStringsDefault{unicode}
3114 \let\xebbl@stop\relax

```

```

3115 \AddBabelHook{xetex}{encodedcommands}{%
3116   \def\bbl@tempa{#1}%
3117   \ifx\bbl@tempa@empty
3118     \XeTeXinputencoding"bytes"%
3119   \else
3120     \XeTeXinputencoding"#1"%
3121   \fi
3122   \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
3123 \AddBabelHook{xetex}{stopcommands}{%
3124   \xebbl@stop
3125   \let\xebbl@stop\relax}
3126 \AddBabelHook{xetex}{loadkernel}{%
3127   <<Restore Unicode catcodes before loading patterns>>}
3128 \ifx\DisableBabelHook\undefined\endinput\fi
3129 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
3130 \DisableBabelHook{babel-fontspec}
3131 <<Font selection>>
3132 \input txtbabel.def
3133 </xetex>

```

13.2 Layout

In progress.

Unfortunately, proper support for xetex requires patching somehow lots of macros and packages (and some issues related to \specials remain, like color and hyperlinks). At least at this stage, babel will not do it and therefore a package like bidi (by Vafa Khalighi) would be necessary to overcome the limitations of xetex. Any help in making babel and bidi collaborate will be welcome, although the underlying concepts in both packages seem very different. Note also elements like headlines and margins can be modified easily with packages like fancyhdr, typearea or titleps, and geometry.

\bbl@startskip and \bbl@endskip are available to package authors. Thanks to the T_EX expansion mechanism the following constructs are valid: \adim\bbl@startskip, \advance\bbl@startskip\adim, \bbl@startskip\adim.

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

```

3134 <*texxet>
3135 \bbl@trace{Redefinitions for bidi layout}
3136 \def\bbl@sspre@caption{%
3137   \bbl@exp{\everyhbox{\bbl@texmdir\bbl@cs{wdir@\bbl@main@language}}}}
3138 \ifx\bbl@opt@layout\@nnil\endinput\fi % No layout
3139 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
3140 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}
3141 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
3142   \def\@hangfrom#1{%
3143     \setbox\@tempboxa\hbox{#1}%
3144     \hangindent\ifcase\bbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
3145     \noindent\box\@tempboxa}
3146 \def\raggedright{%
3147   \let\@centercr
3148   \bbl@startskip\z@skip
3149   \@rightskip\@flushglue
3150   \bbl@endskip\@rightskip
3151   \parindent\z@
3152   \parfillskip\bbl@startskip}
3153 \def\raggedleft{%
3154   \let\@centercr
3155   \bbl@startskip\@flushglue

```

```

3156 \bbl@endskip\z@skip
3157 \parindent\z@
3158 \parfillskip\bbl@endskip}
3159 \fi
3160 \IfBabelLayout{lists}
3161 {\def\list#1#2{%
3162 \ifnum \@listdepth >5\relax
3163 \@toodeep
3164 \else
3165 \global\advance\@listdepth\@ne
3166 \fi
3167 \rightmargin\z@
3168 \listparindent\z@
3169 \itemindent\z@
3170 \csname @list\romannumeral\the\@listdepth\endcsname
3171 \def\@itemlabel{#1}%
3172 \let\makelabel\@mklab
3173 \@nmbrrlistfalse
3174 #2\relax
3175 \@trivlist
3176 \parskip\parsep
3177 \parindent\listparindent
3178 \advance\linewidth-\rightmargin
3179 \advance\linewidth-\leftmargin
3180 \advance\@totalleftmargin
3181 \ifcase\bbl@thepardir\leftmargin\else\rightmargin\fi
3182 \parshape\@ne\@totalleftmargin\linewidth
3183 \ignorespaces}%
3184 \ifcase\bbl@engine
3185 \def\labelenumii{}\thenumii{%
3186 \def\p@enumiii{\p@enumii}\thenumii{%
3187 \fi
3188 \def\@verbatim{%
3189 \trivlist \item\relax
3190 \if@minipage\else\vskip\parskip\fi
3191 \bbl@startskip\textwidth
3192 \advance\bbl@startskip-\linewidth
3193 \bbl@endskip\z@skip
3194 \parindent\z@
3195 \parfillskip\@flushglue
3196 \parskip\z@skip
3197 \@@par
3198 \language\l@nohyphenation
3199 \@tempwafalse
3200 \def\par{%
3201 \if@tempwa
3202 \leavevmode\null
3203 \@@par\penalty\interlinepenalty
3204 \else
3205 \@tempwattrue
3206 \ifhmode\@@par\penalty\interlinepenalty\fi
3207 \fi}%
3208 \let\do\@makeother \dospecials
3209 \obeylines \verbatim@font \@noligs
3210 \everypar\expandafter{\the\everypar\unpenalty}}
3211 {}
3212 \IfBabelLayout{contents}
3213 {\def\@dottedtocline#1#2#3#4#5{%
3214 \ifnum#1>\c@tocdepth\else

```

```

3215 \vskip \z@ \@plus.2\p@
3216 {\bbl@startskip#2\relax
3217 \bbl@endskip\@tocrmarg
3218 \parfillskip-\bbl@endskip
3219 \parindent#2\relax
3220 \@afterindenttrue
3221 \interlinepenalty\M
3222 \leavevmode
3223 \@tempdima#3\relax
3224 \advance\bbl@startskip\@tempdima
3225 \null\nobreak\hskip-\bbl@startskip
3226 {#4}\nobreak
3227 \leaders\hbox{%
3228 $ \m@th\mkern\@dotsep mu\hbox{.}\mkern\@dotsep mu$}%
3229 \hfill\nobreak
3230 \hb@xt@\pnumwidth{\hfil\normalfont\normalcolor#5}%
3231 \par}%
3232 \fi}}
3233 {}
3234 \IfBabelLayout{columns}
3235 {\def\@outputdblcol{%
3236 \if@firstcolumn
3237 \global\@firstcolumnfalse
3238 \global\setbox\@leftcolumn\copy\@outputbox
3239 \splitmaxdepth\maxdimen
3240 \vbadness\maxdimen
3241 \setbox\@outputbox\vbox{\unvbox\@outputbox\unskip}%
3242 \setbox\@outputbox\vsplit\@outputbox to\maxdimen
3243 \toks@ \expandafter{\topmark}%
3244 \xdef\@firstcoltopmark{\the\toks@}%
3245 \toks@ \expandafter{\splitfirstmark}%
3246 \xdef\@firstcolfirstmark{\the\toks@}%
3247 \ifx\@firstcolfirstmark\@empty
3248 \global\let\@setmarks\relax
3249 \else
3250 \gdef\@setmarks{%
3251 \let\firstmark\@firstcolfirstmark
3252 \let\topmark\@firstcoltopmark}%
3253 \fi
3254 \else
3255 \global\@firstcolumntrue
3256 \setbox\@outputbox\vbox{%
3257 \hb@xt@\textwidth{%
3258 \hskip\columnwidth
3259 \hfil
3260 {\normalcolor\vrule \@width\columnseprule}%
3261 \hfil
3262 \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
3263 \hskip-\textwidth
3264 \hb@xt@\columnwidth{\box\@outputbox \hss}%
3265 \hskip\columnsep
3266 \hskip\columnwidth}}%
3267 \@combinedblfloats
3268 \@setmarks
3269 \@outputpage
3270 \begingroup
3271 \@dblfloatplacement
3272 \@startdblcolumn
3273 \@whilesw\if@fcolmade \fi{\@outputpage

```

```

3274         \@startdblcolumn}%
3275     \endgroup
3276     \fi}}%
3277     {}
3278     <<Footnote changes>>
3279     \IfBabelLayout{footnotes}%
3280     {\BabelFootnote\footnote\language\language}%
3281     \BabelFootnote\localfootnote\language\language}%
3282     \BabelFootnote\mainfootnote{}{}{}%
3283     {}

```

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.

```

3284 \IfBabelLayout{counters}%
3285 {\let\bbl@latin@arabic=\@arabic
3286  \def\@arabic#1{\babelsublr{\bbl@latin@arabic#1}}%
3287  \let\bbl@asci@roman=\@roman
3288  \def\@roman#1{\babelsublr{\ensureascii{\bbl@asci@roman#1}}}%
3289  \let\bbl@asci@Roman=\@Roman
3290  \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asci@Roman#1}}}%
3291 /texet}

```

13.3 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.

```

3292 <*\luatex>

```



```

3293 \ifx\AddBabelHook\@undefined
3294 \bbl@trace{Read language.dat}
3295 \begingroup
3296 \toks@{}
3297 \count@ \z@ % 0=start, 1=0th, 2=normal
3298 \def\bbl@process@line#1#2 #3 #4 {%
3299   \ifx=#1%
3300     \bbl@process@synonym{#2}%
3301   \else
3302     \bbl@process@language{#1#2}{#3}{#4}%
3303   \fi
3304   \ignorespaces}
3305 \def\bbl@manylang{%
3306   \ifnum\bbl@last>\@ne
3307     \bbl@info{Non-standard hyphenation setup}%
3308   \fi
3309   \let\bbl@manylang\relax}
3310 \def\bbl@process@language#1#2#3{%
3311   \ifcase\count@
3312     \@ifundefined{zth#1}{\count@\tw@}{\count@\@ne}%
3313   \or
3314     \count@\tw@
3315   \fi
3316   \ifnum\count@=\tw@
3317     \expandafter\addlanguage\csname l@#1\endcsname
3318     \language\allocationnumber
3319     \chardef\bbl@last\allocationnumber
3320     \bbl@manylang
3321     \let\bbl@elt\relax
3322     \xdef\bbl@languages{%
3323       \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
3324   \fi
3325   \the\toks@
3326   \toks@{}}
3327 \def\bbl@process@synonym@aux#1#2{%
3328   \global\expandafter\chardef\csname l@#1\endcsname#2\relax
3329   \let\bbl@elt\relax
3330   \xdef\bbl@languages{%
3331     \bbl@languages\bbl@elt{#1}{#2}{}}}%
3332 \def\bbl@process@synonym#1{%
3333   \ifcase\count@
3334     \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
3335   \or
3336     \@ifundefined{zth#1}{\bbl@process@synonym@aux{#1}{0}}{}%
3337   \else
3338     \bbl@process@synonym@aux{#1}{\the\bbl@last}%
3339   \fi}
3340 \ifx\bbl@languages\@undefined % Just a (sensible?) guess
3341   \chardef\l@english\z@
3342   \chardef\l@USenglish\z@
3343   \chardef\bbl@last\z@
3344   \global\@namedef{bbl@hyphendata@0}{{hyphen.tex}}
3345   \gdef\bbl@languages{%
3346     \bbl@elt{english}{0}{hyphen.tex}}%
3347     \bbl@elt{USenglish}{0}{}%
3348 \else
3349   \global\let\bbl@languages@format\bbl@languages
3350   \def\bbl@elt#1#2#3#4{% Remove all except language 0
3351     \ifnum#2>\z@\else

```

```

3352     \noexpand\bb1@elt{#1}{#2}{#3}{#4}%
3353     \fi}%
3354     \xdef\bb1@languages{\bb1@languages}%
3355     \fi
3356     \def\bb1@elt#1#2#3#4{\@namedef{zth@#1}{}} % Define flags
3357     \bb1@languages
3358     \openin1=language.dat
3359     \ifeof1
3360         \bb1@warning{I couldn't find language.dat. No additional\%
3361             patterns loaded. Reported}%
3362     \else
3363         \loop
3364             \endlinechar\m@ne
3365             \read1 to \bb1@line
3366             \endlinechar\^^M
3367             \if T\ifeof1F\fi T\relax
3368                 \ifx\bb1@line\@empty\else
3369                     \edef\bb1@line{\bb1@line\space\space\space}%
3370                     \expandafter\bb1@process@line\bb1@line\relax
3371                 \fi
3372         \repeat
3373     \fi
3374 \endgroup
3375 \bb1@trace{Macros for reading patterns files}
3376 \def\bb1@get@enc#1:#2:#3\@@{\def\bb1@hyph@enc{#2}}
3377 \ifx\babelcatcodetablenum\undefined
3378     \def\babelcatcodetablenum{5211}
3379 \fi
3380 \def\bb1@luapatterns#1#2{%
3381     \bb1@get@enc#1::\@@@
3382     \setbox\z@\hbox\bgroup
3383         \begingroup
3384             \ifx\catcodetable\@undefined
3385                 \let\savecatcodetable\luatexsavecatcodetable
3386                 \let\initcatcodetable\luatexinitcatcodetable
3387                 \let\catcodetable\luatexcatcodetable
3388             \fi
3389             \savecatcodetable\babelcatcodetablenum\relax
3390             \initcatcodetable\numexpr\babelcatcodetablenum+1\relax
3391             \catcodetable\numexpr\babelcatcodetablenum+1\relax
3392             \catcode`\#6 \catcode`\$3 \catcode`\&4 \catcode`\^7
3393             \catcode`\_8 \catcode`\{1 \catcode`\}=2 \catcode`\~13
3394             \catcode`\@11 \catcode`\^^I10 \catcode`\^^J12
3395             \catcode`\<12 \catcode`\>12 \catcode`\*12 \catcode`\.=12
3396             \catcode`\-=12 \catcode`\/=12 \catcode`\[12 \catcode`\]=12
3397             \catcode`\`=12 \catcode`\'=12 \catcode`\`=12
3398             \input #1\relax
3399             \catcodetable\babelcatcodetablenum\relax
3400         \endgroup
3401         \def\bb1@tempa{#2}%
3402         \ifx\bb1@tempa\@empty\else
3403             \input #2\relax
3404         \fi
3405     \egroup}%
3406 \def\bb1@patterns@lua#1{%
3407     \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
3408         \csname l@#1\endcsname
3409         \edef\bb1@tempa{#1}%
3410     \else

```

```

3411 \csname l@#1:\f@encoding\endcsname
3412 \edef\bbl@tempa{#1:\f@encoding}%
3413 \fi\relax
3414 \@namedef{lu@texhyphen@loaded@the\language}{}% Temp
3415 \@ifundefined{bbl@hyphendata@the\language}%
3416 {\def\bbl@elt##1##2##3##4{%
3417 \ifnum##2=\csname l@\bbl@tempa\endcsname % #2=spanish, dutch:OT1...
3418 \def\bbl@tempb{##3}%
3419 \ifx\bbl@tempb@empty\else % if not a synonymous
3420 \def\bbl@tempc{##3}##4}%
3421 \fi
3422 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
3423 \fi}%
3424 \bbl@languages
3425 \@ifundefined{bbl@hyphendata@the\language}%
3426 {\bbl@info{No hyphenation patterns were set for\%
3427 language '\bbl@tempa'. Reported}}%
3428 {\expandafter\expandafter\expandafter\bbl@luapatterns
3429 \csname bbl@hyphendata@the\language\endcsname}}}%
3430 \endinput\fi
3431 \begingroup
3432 \catcode`\%=12
3433 \catcode`\'=12
3434 \catcode`\%=12
3435 \catcode`\:=12
3436 \directlua{
3437 Babel = Babel or {}
3438 function Babel.bytes(line)
3439 return line:gsub(".",
3440 function (chr) return unicode.utf8.char(string.byte(chr)) end)
3441 end
3442 function Babel.begin_process_input()
3443 if luatexbase and luatexbase.add_to_callback then
3444 luatexbase.add_to_callback('process_input_buffer',
3445 Babel.bytes, 'Babel.bytes')
3446 else
3447 Babel.callback = callback.find('process_input_buffer')
3448 callback.register('process_input_buffer', Babel.bytes)
3449 end
3450 end
3451 function Babel.end_process_input ()
3452 if luatexbase and luatexbase.remove_from_callback then
3453 luatexbase.remove_from_callback('process_input_buffer', 'Babel.bytes')
3454 else
3455 callback.register('process_input_buffer', Babel.callback)
3456 end
3457 end
3458 function Babel.addpatterns(pp, lg)
3459 local lg = lang.new(lg)
3460 local pats = lang.patterns(lg) or ''
3461 lang.clear_patterns(lg)
3462 for p in pp:gmatch('[^%s]+') do
3463 ss = ''
3464 for i in string.utfcharacters(p:gsub('%d', '')) do
3465 ss = ss .. '%d?' .. i
3466 end
3467 ss = ss:gsub('^%%d%?%', '%%.') .. '%d?'
3468 ss = ss:gsub('%.%%d%?$', '%%.')
3469 pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')

```

```

3470     if n == 0 then
3471         tex.sprint(
3472             [[\string\csname\space bbl@info\endcsname{New pattern: }]]
3473             .. p .. [[]])
3474         pats = pats .. ' ' .. p
3475     else
3476         tex.sprint(
3477             [[\string\csname\space bbl@info\endcsname{Renew pattern: }]]
3478             .. p .. [[]])
3479     end
3480 end
3481 lang.patterns(lg, pats)
3482 end
3483 }
3484 \endgroup
3485 \def\BabelStringsDefault{unicode}
3486 \let\luabbl@stop\relax
3487 \AddBabelHook{luatex}{encodedcommands}{%
3488     \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
3489     \ifx\bbl@tempa\bbl@tempb\else
3490         \directlua{Babel.begin_process_input()}%
3491         \def\luabbl@stop{%
3492             \directlua{Babel.end_process_input()}}%
3493     \fi}%
3494 \AddBabelHook{luatex}{stopcommands}{%
3495     \luabbl@stop
3496     \let\luabbl@stop\relax}
3497 \AddBabelHook{luatex}{patterns}{%
3498     \@ifundefined{bbl@hyphendata@the\language}%
3499     {\def\bbl@elt##1##2##3##4{%
3500         \ifnum##2=\csname l@##2\endcsname % #2=spanish, dutch:OT1...
3501         \def\bbl@tempb{##3}%
3502         \ifx\bbl@tempb@empty\else % if not a synonymous
3503             \def\bbl@tempc{##3}{##4}%
3504         \fi
3505         \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
3506     \fi}%
3507     \bbl@languages
3508     \@ifundefined{bbl@hyphendata@the\language}%
3509     {\bbl@info{No hyphenation patterns were set for\%
3510         language '#2'. Reported}}%
3511     {\expandafter\expandafter\expandafter\bbl@luapatterns
3512         \csname bbl@hyphendata@the\language\endcsname}}}%
3513 \@ifundefined{bbl@patterns@}{}%
3514 \begingroup
3515     \bbl@xin@{,\number\language,}{,\bbl@pttnlist}%
3516     \ifin@else
3517         \ifx\bbl@patterns@empty\else
3518             \directlua{ Babel.addpatterns(
3519                 [[\bbl@patterns@]], \number\language) }%
3520         \fi
3521         \@ifundefined{bbl@patterns@#1}%
3522         \@empty
3523         {\directlua{ Babel.addpatterns(
3524             [[\space\csname bbl@patterns@#1\endcsname]],
3525             \number\language) }}%
3526         \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
3527     \fi
3528 \endgroup}}

```

```

3529 \AddBabelHook{luatex}{everylanguage}{%
3530   \def\process@language##1##2##3{%
3531     \def\process@line####1####2 ####3 ####4 {}}}
3532 \AddBabelHook{luatex}{loadpatterns}{%
3533   \input #1\relax
3534   \expandafter\gdef\csname bbl@hyphendata@the\language\endcsname
3535     {{#1}{}}}
3536 \AddBabelHook{luatex}{loadexceptions}{%
3537   \input #1\relax
3538   \def\bbl@tempb##1##2{{##1}{#1}}%
3539   \expandafter\xdef\csname bbl@hyphendata@the\language\endcsname
3540     {\expandafter\expandafter\expandafter\bbl@tempb
3541       \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.

```

3542 \@onlypreamble\babelpatterns
3543 \AtEndOfPackage{%
3544   \newcommand\babelpatterns[2][\@empty]{%
3545     \ifx\bbl@patterns@\relax
3546       \let\bbl@patterns@\@empty
3547     \fi
3548     \ifx\bbl@pttnlist\@empty\else
3549       \bbl@warning{%
3550         You must not intermingle \string\selectlanguage\space and\%
3551         \string\babelpatterns\space or some patterns will not\%
3552         be taken into account. Reported}%
3553     \fi
3554     \ifx\@empty#1%
3555       \protected@edef\bbl@patterns@{\bbl@patterns@\space#2}%
3556     \else
3557       \edef\bbl@tempb{\zap@space#1 \@empty}%
3558       \bbl@for\bbl@tempa\bbl@tempb{%
3559         \bbl@fixname\bbl@tempa
3560         \bbl@iflanguage\bbl@tempa{%
3561           \bbl@csarg\protected@edef{patterns@\bbl@tempa}{%
3562             \@ifundefined{bbl@patterns@\bbl@tempa}%
3563               \@empty
3564               {\csname bbl@patterns@\bbl@tempa\endcsname\space}%
3565             #2}}}%
3566     \fi}}

```

Common stuff.

```

3567 \AddBabelHook{luatex}{loadkernel}{%
3568   <<Restore Unicode catcodes before loading patterns>>}
3569 \ifx\DisableBabelHook\undefined\endinput\fi
3570 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
3571 \DisableBabelHook{babel-fontspec}
3572 <<Font selection>>

```

13.4 Layout

Work in progress.

Unlike xetex, luatex requires only minimal changes for right-to-left layouts, particularly in monolingual documents (the engine itself reverses boxes – including column order or headings –, margins, etc.) and with `bidi=basic-r`, without having to patch almost any macro where text direction is relevant.

`\@hangfrom` is useful in many contexts and it is redefined always with the `layout` option. There are, however, a number of issues when the text direction is not the same as the box direction (as set by `\bodydir`), and when `\parbox` and `\hangindent` are involved. Fortunately, latest releases of `luatex` simplify a lot the solution with `\shapemode`.

```

3573 \bbl@trace{Redefinitions for bidi layout}
3574 \ifx\@eqnnum\undefined\else
3575   \edef\@eqnnum{%
3576     \unexpanded{\ifcase\bbl@attr@dir\else\bbl@textdir\@ne\fi}%
3577     \unexpanded\expandafter{\@eqnnum}}
3578 \fi
3579 \ifx\bbl@opt@layout\@nnil\endinput\fi % if no layout
3580 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
3581   \def\bbl@nextfake#1{%
3582     \mathdir\bodydir % non-local, use always inside a group!
3583     \bbl@exp{%
3584       #1%           Once entered in math, set boxes to restore values
3585       \everyvbox{%
3586         \the\everyvbox
3587         \bodydir\the\bodydir
3588         \mathdir\the\mathdir
3589         \everyhbox{\the\everyhbox}%
3590         \everyvbox{\the\everyvbox}}%
3591       \everyhbox{%
3592         \the\everyhbox
3593         \bodydir\the\bodydir
3594         \mathdir\the\mathdir
3595         \everyhbox{\the\everyhbox}%
3596         \everyvbox{\the\everyvbox}}}%
3597   \def\@hangfrom#1{%
3598     \setbox\@tempboxa\hbox{#1}%
3599     \hangindent\wd\@tempboxa
3600     \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
3601       \shapemode\@ne
3602     \fi
3603     \noindent\box\@tempboxa}
3604 \fi
3605 \IfBabelLayout{tabular}
3606   {\def\@tabular{%
3607     \leavevmode\hbox\bgroup\bbl@nextfake$% %$
3608     \let\@acol\@tabacol \let\@classz\@tabclassz
3609     \let\@classiv\@tabclassiv \let\@tabularcr\@tabarray}}
3610   {}
3611 \IfBabelLayout{lists}
3612   {\def\list#1#2{%
3613     \ifnum \@listdepth >5\relax
3614       \@toodeep
3615     \else
3616       \global\advance\@listdepth\@ne
3617     \fi
3618     \rightmargin\z@
3619     \listparindent\z@
3620     \itemindent\z@
3621     \csname @list\romannumeral\the\@listdepth\endcsname
3622     \def\@itemlabel{#1}%
3623     \let\makelabel\@mklab
3624     \@nmbrrlistfalse
3625     #2\relax
3626     \@trivlist

```

```

3627 \parskip\parsep
3628 \parindent\listparindent
3629 \advance\linewidth -\rightmargin
3630 \advance\linewidth -\leftmargin
3631 \advance\@totalleftmargin \leftmargin
3632 \parshape \@ne
3633 \@totalleftmargin \linewidth
3634 \ifnum\bbbl@getluadir{page}=\bbbl@getluadir{par}\else
3635   \shapemode\tw@
3636   \fi
3637   \ignorespaces}}
3638 {}

```

Implicitly reverses sectioning labels in bidi=basic-r, because the full stop is not in contact with L numbers any more. I think there must be a better way. Assumes bidi=basic-r, but there are some additional readjustments for bidi=default.

```

3639 \IfBabelLayout{counters}%
3640 {\def\@textsuperscript#1{{% lua has separate settings for math
3641   \m@th
3642   \mathdir\pagedir % required with basic-r; ok with default, too
3643   \ensuremath{^{\mbox{\fontsize\sf@size\z@ #1}}}}}%
3644 \let\bbbl@latinarabic=\@arabic
3645 \def\@arabic#1{\babelsublr{\bbbl@latinarabic#1}}%
3646 \@ifpackagewith{babel}{bidi=default}%
3647 {\let\bbbl@asciroman=\@roman
3648   \def\@roman#1{\babelsublr{\ensureascii{\bbbl@asciroman#1}}}%
3649   \let\bbbl@asciiRoman=\@Roman
3650   \def\@Roman#1{\babelsublr{\ensureascii{\bbbl@asciiRoman#1}}}%
3651   \def\labelenumii{}\theenumii}%
3652   \def\p@enumiii{\p@enumii}\theenumii{}\}}{}
3653 <<Footnote changes>>
3654 \IfBabelLayout{footnotes}%
3655 {\BabelFootnote\footnote\languagename{}\}%
3656 \BabelFootnote\localfootnote\languagename{}\}%
3657 \BabelFootnote\mainfootnote{}\}\}}
3658 {}

```

Some \LaTeX macros use internally the math mode for text formatting. They have very little in common and are grouped here, as a single option.

```

3659 \IfBabelLayout{extras}%
3660 {\def\underline#1{%
3661   \relax
3662   \ifmmode\@underline{#1}%
3663   \else\bbbl@nextfake$\@underline{\hbox{#1}}\m@th$\relax\fi}%
3664 \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
3665   \if b\expandafter\@car\@series\@nil\boldmath\fi
3666   \babelsublr{%
3667     \LaTeX\kern.15em2\bbbl@nextfake$_{\textstyle\varepsilon}$}}}%
3668 {}
3669 </luatex>

```

13.5 Auto bidi with basic-r

The file babel-bidi.lua currently only contains data. It is a large and boring file and it's not shown here. See the generated file.

Now the basic-r bidi mode. One of the aims is to implement a fast and simple bidi algorithm, with a single loop. I managed to do it for R texts, with a second smaller loop for a special case. The code is still somewhat chaotic, but its behavior is essentially correct. I

cannot resist copying the following text from Emacs `bidi.c` (which also attempts to implement the bidi algorithm with a single loop):

Arrrrgh!! The UAX#9 algorithm is too deeply entrenched in the assumption of batch-style processing [...]. May the fleas of a thousand camels infest the armpits of those who design supposedly general-purpose algorithms by looking at their own implementations, and fail to consider other possible implementations!

Well, it took me some time to guess what the batch rules in UAX#9 actually mean (in other word, *what* they do and *why*, and not only *how*), but I think (or I hope) I've managed to understand them.

In some sense, there are two bidi modes, one for numbers, and the other for text. Furthermore, setting just the direction in R text is not enough, because there are actually *two* R modes (set explicitly in Unicode with RLM and ALM). In babel the dir is set by a higher protocol based on the language/script, which in turn sets the correct dir (<l>, <r> or <al>).

From UAX#9: "Where available, markup should be used instead of the explicit formatting characters". So, this simple version just ignores formatting characters. Actually, most of that annex is devoted to how to handle them.

BD14-BD16 are not implemented. Unicode (and the W3C) are making a great effort to deal with some special problematic cases in "streamed" plain text. I don't think this is the way to go – particular issues should be fixed by a high level interface taking into account the needs of the document. And here is where `luatex` excels, because everything related to bidi writing is under our control.

TODO: math mode (as weak L?)

```
3670 (*basic-r)
3671 Babel = Babel or {}
3672
3673 require('babel-bidi.lua')
3674
3675 local characters = Babel.characters
3676 local ranges = Babel.ranges
3677
3678 local DIR = node.id("dir")
3679
3680 local function dir_mark(head, from, to, outer)
3681   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
3682   local d = node.new(DIR)
3683   d.dir = '+' .. dir
3684   node.insert_before(head, from, d)
3685   d = node.new(DIR)
3686   d.dir = '-' .. dir
3687   node.insert_after(head, to, d)
3688 end
3689
3690 function Babel.pre_otfload_v(head)
3691   -- head = Babel.numbers(head)
3692   head = Babel.bidi(head, true)
3693   return head
3694 end
3695
3696 function Babel.pre_otfload_h(head)
3697   -- head = Babel.numbers(head)
3698   head = Babel.bidi(head, false)
3699   return head
3700 end
3701
```



```

3702 function Babel.bidi(head, ispar)
3703   local first_n, last_n          -- first and last char with nums
3704   local last_es                  -- an auxiliary 'last' used with nums
3705   local first_d, last_d          -- first and last char in L/R block
3706   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):

```

3707   local strong = ('TRT' == tex.pardir) and 'r' or 'l'
3708   local strong_lr = (strong == 'l') and 'l' or 'r'
3709   local outer = strong
3710
3711   local new_dir = false
3712   local first_dir = false
3713
3714   local last_lr
3715
3716   local type_n = ''
3717
3718   for item in node.traverse(head) do
3719
3720     -- three cases: glyph, dir, otherwise
3721     if item.id == node.id'glyph'
3722       or (item.id == 7 and item.subtype == 2) then
3723
3724       local itemchar
3725       if item.id == 7 and item.subtype == 2 then
3726         itemchar = item.replace.char
3727       else
3728         itemchar = item.char
3729       end
3730       local chardata = characters[itemchar]
3731       dir = chardata and chardata.d or nil
3732       if not dir then
3733         for nn, et in ipairs(ranges) do
3734           if itemchar < et[1] then
3735             break
3736           elseif itemchar <= et[2] then
3737             dir = et[3]
3738             break
3739           end
3740         end
3741       end
3742       dir = dir or 'l'

```

Next is based on the assumption babel sets the language AND switches the script with its dir. We treat a language block as a separate Unicode sequence. The following piece of code is executed at the first glyph after a 'dir' node. We don't know the current language until then.

```

3743   if new_dir then
3744     attr_dir = 0
3745     for at in node.traverse(item.attr) do
3746       if at.number == luatexbase.registernumber'bbl@attr@dir' then
3747         attr_dir = at.value % 3
3748       end
3749     end
3750     if attr_dir == 1 then
3751       strong = 'r'

```

```

3752     elseif attr_dir == 2 then
3753         strong = 'al'
3754     else
3755         strong = 'l'
3756     end
3757     strong_lr = (strong == 'l') and 'l' or 'r'
3758     outer = strong_lr
3759     new_dir = false
3760 end
3761
3762 if dir == 'nsm' then dir = strong end          -- W1

```

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

```

3763     dir_real = dir          -- We need dir_real to set strong below
3764     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:

```

3765     if strong == 'al' then
3766         if dir == 'en' then dir = 'an' end          -- W2
3767         if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
3768         strong_lr = 'r'          -- W3
3769     end

```

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

```

3770     elseif item.id == node.id'dir' then
3771         new_dir = true
3772         dir = nil
3773     else
3774         dir = nil          -- Not a char
3775     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>.

```

3776     if dir == 'en' or dir == 'an' or dir == 'et' then
3777         if dir ~= 'et' then
3778             type_n = dir
3779         end
3780         first_n = first_n or item
3781         last_n = last_es or item
3782         last_es = nil
3783     elseif dir == 'es' and last_n then -- W3+W6
3784         last_es = item
3785     elseif dir == 'cs' then          -- it's right - do nothing
3786     elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
3787         if strong_lr == 'r' and type_n ~= '' then
3788             dir_mark(head, first_n, last_n, 'r')
3789         elseif strong_lr == 'l' and first_d and type_n == 'an' then
3790             dir_mark(head, first_n, last_n, 'r')
3791             dir_mark(head, first_d, last_d, outer)
3792             first_d, last_d = nil, nil
3793         elseif strong_lr == 'l' and type_n ~= '' then
3794             last_d = last_n

```

```

3795     end
3796     type_n = ''
3797     first_n, last_n = nil, nil
3798 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:

```

3799   if dir == 'l' or dir == 'r' then
3800     if dir ~= outer then
3801       first_d = first_d or item
3802       last_d = item
3803     elseif first_d and dir ~= strong_lr then
3804       dir_mark(head, first_d, last_d, outer)
3805       first_d, last_d = nil, nil
3806     end
3807   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.

```

3808   if dir and not last_lr and dir ~= 'l' and outer == 'r' then
3809     item.char = characters[item.char] and
3810               characters[item.char].m or item.char
3811   elseif (dir or new_dir) and last_lr ~= item then
3812     local mir = outer .. strong_lr .. (dir or outer)
3813     if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
3814       for ch in node.traverse(node.next(last_lr)) do
3815         if ch == item then break end
3816         if ch.id == node.id'glyph' then
3817           ch.char = characters[ch.char].m or ch.char
3818         end
3819       end
3820     end
3821   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).

```

3822   if dir == 'l' or dir == 'r' then
3823     last_lr = item
3824     strong = dir_real          -- Don't search back - best save now
3825     strong_lr = (strong == 'l') and 'l' or 'r'
3826   elseif new_dir then
3827     last_lr = nil
3828   end
3829 end

```

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

```

3830   if last_lr and outer == 'r' then
3831     for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
3832       ch.char = characters[ch.char].m or ch.char
3833     end
3834   end
3835   if first_n then
3836     dir_mark(head, first_n, last_n, outer)

```

```

3837 end
3838 if first_d then
3839     dir_mark(head, first_d, last_d, outer)
3840 end

```

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

```

3841 return node.prev(head) or head
3842 end
3843 </basic-r>

```

And here the Lua code for bidi=basic:

```

3844 <(*basic)
3845 Babel = Babel or {}
3846
3847 Babel.fontmap = Babel.fontmap or {}
3848 Babel.fontmap[0] = {}      -- l
3849 Babel.fontmap[1] = {}      -- r
3850 Babel.fontmap[2] = {}      -- al/an
3851
3852 function Babel.pre_otfload_v(head)
3853     -- head = Babel.numbers(head)
3854     head = Babel.bidi(head, true)
3855     return head
3856 end
3857
3858 function Babel.pre_otfload_h(head, gc, sz, pt, dir)
3859     -- head = Babel.numbers(head)
3860     head = Babel.bidi(head, false, dir)
3861     return head
3862 end
3863
3864 require('babel-bidi.lua')
3865
3866 local characters = Babel.characters
3867 local ranges = Babel.ranges
3868
3869 local DIR = node.id('dir')
3870 local GLYPH = node.id('glyph')
3871
3872 local function insert_implicit(head, state, outer)
3873     local new_state = state
3874     if state.sim and state.eim and state.sim ~= state.eim then
3875         dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
3876         local d = node.new(DIR)
3877         d.dir = '+' .. dir
3878         node.insert_before(head, state.sim, d)
3879         local d = node.new(DIR)
3880         d.dir = '-' .. dir
3881         node.insert_after(head, state.eim, d)
3882     end
3883     new_state.sim, new_state.eim = nil, nil
3884     return head, new_state
3885 end
3886
3887 local function insert_numeric(head, state)
3888     local new
3889     local new_state = state
3890     if state.san and state.ean and state.san ~= state.ean then

```

```

3891     local d = node.new(DIR)
3892     d.dir = '+TLT'
3893     _, new = node.insert_before(head, state.san, d)
3894     if state.san == state.sim then state.sim = new end
3895     local d = node.new(DIR)
3896     d.dir = '-TLT'
3897     _, new = node.insert_after(head, state.ean, d)
3898     if state.ean == state.eim then state.eim = new end
3899 end
3900 new_state.san, new_state.ean = nil, nil
3901 return head, new_state
3902 end
3903
3904 -- \hbox with an explicit dir can lead to wrong results
3905 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>
3906
3907 function Babel.bidi(head, ispar, hdir)
3908     local d -- d is used mainly for computations in a loop
3909     local prev_d = ''
3910     local new_d = false
3911
3912     local nodes = {}
3913     local outer_first = nil
3914
3915     local has_en = false
3916     local first_et = nil
3917
3918     local ATDIR = luatexbase.registernumber'bbl@attr@dir'
3919
3920     local save_outer
3921     local temp = node.get_attribute(head, ATDIR)
3922     if temp then
3923         temp = temp % 3
3924         save_outer = (temp == 0 and 'l') or
3925                     (temp == 1 and 'r') or
3926                     (temp == 2 and 'al')
3927     elseif ispar then -- Or error? Shouldn't happen
3928         save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
3929     else
3930         save_outer = ('TRT' == hdir) and 'r' or 'l'
3931     end
3932     local outer = save_outer
3933     local last = outer
3934     -- 'al' is only taken into account in the first, current loop
3935     if save_outer == 'al' then save_outer = 'r' end
3936
3937     local fontmap = Babel.fontmap
3938
3939     for item in node.traverse(head) do
3940
3941         -- In what follows, #node is the last (previous) node, because the
3942         -- current one is not added until we start processing the neutrals.
3943
3944         -- three cases: glyph, dir, otherwise
3945         if item.id == GLYPH
3946             or (item.id == 7 and item.subtype == 2) then
3947
3948             local d_font = nil
3949             local item_r

```

```

3950     if item.id == 7 and item.subtype == 2 then
3951         item_r = item.replace    -- automatic discs have just 1 glyph
3952     else
3953         item_r = item
3954     end
3955     local chardata = characters[item_r.char]
3956     d = chardata and chardata.d or nil
3957     if not d or d == 'nsm' then
3958         for nn, et in ipairs(ranges) do
3959             if item_r.char < et[1] then
3960                 break
3961             elseif item_r.char <= et[2] then
3962                 if not d then d = et[3]
3963                 elseif d == 'nsm' then d_font = et[3]
3964                 end
3965                 break
3966             end
3967         end
3968     end
3969     d = d or 'l'
3970     d_font = d_font or d
3971
3972     d_font = (d_font == 'l' and 0) or
3973             (d_font == 'nsm' and 0) or
3974             (d_font == 'r' and 1) or
3975             (d_font == 'al' and 2) or
3976             (d_font == 'an' and 2) or nil
3977     if d_font and fontmap and fontmap[d_font][item_r.font] then
3978         item_r.font = fontmap[d_font][item_r.font]
3979     end
3980
3981     if new_d then
3982         table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
3983         attr_d = node.get_attribute(item, ATDIR)
3984         attr_d = attr_d % 3
3985         if attr_d == 1 then
3986             outer_first = 'r'
3987             last = 'r'
3988         elseif attr_d == 2 then
3989             outer_first = 'r'
3990             last = 'al'
3991         else
3992             outer_first = 'l'
3993             last = 'l'
3994         end
3995         outer = last
3996         has_en = false
3997         first_et = nil
3998         new_d = false
3999     end
4000
4001     elseif item.id == DIR then
4002         d = nil
4003         new_d = true
4004
4005     else
4006         d = nil
4007     end
4008

```

```

4009 -- AL <= EN/ET/ES      -- W2 + W3 + W6
4010 if last == 'al' and d == 'en' then
4011     d = 'an'            -- W3
4012 elseif last == 'al' and (d == 'et' or d == 'es') then
4013     d = 'on'            -- W6
4014 end
4015
4016 -- EN + CS/ES + EN      -- W4
4017 if d == 'en' and #nodes >= 2 then
4018     if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
4019         and nodes[#nodes-1][2] == 'en' then
4020         nodes[#nodes][2] = 'en'
4021     end
4022 end
4023
4024 -- AN + CS + AN          -- W4 too, because uax9 mixes both cases
4025 if d == 'an' and #nodes >= 2 then
4026     if (nodes[#nodes][2] == 'cs')
4027         and nodes[#nodes-1][2] == 'an' then
4028         nodes[#nodes][2] = 'an'
4029     end
4030 end
4031
4032 -- ET/EN                  -- W5 + W7->1 / W6->on
4033 if d == 'et' then
4034     first_et = first_et or (#nodes + 1)
4035 elseif d == 'en' then
4036     has_en = true
4037     first_et = first_et or (#nodes + 1)
4038 elseif first_et then      -- d may be nil here !
4039     if has_en then
4040         if last == 'l' then
4041             temp = 'l'    -- W7
4042         else
4043             temp = 'en'   -- W5
4044         end
4045     else
4046         temp = 'on'      -- W6
4047     end
4048     for e = first_et, #nodes do
4049         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
4050     end
4051     first_et = nil
4052     has_en = false
4053 end
4054
4055 if d then
4056     if d == 'al' then
4057         d = 'r'
4058         last = 'al'
4059     elseif d == 'l' or d == 'r' then
4060         last = d
4061     end
4062     prev_d = d
4063     table.insert(nodes, {item, d, outer_first})
4064 else
4065     -- Not sure about the following. Looks too 'ad hoc', but it's
4066     -- required for numbers, so that 89 19 becomes 19 89. It also
4067     -- affects n+cs/es+n.

```

```

4068     if prev_d == 'an' or prev_d == 'en' then
4069         table.insert(nodes, {item, 'on', nil})
4070     end
4071 end
4072
4073     outer_first = nil
4074
4075 end
4076
4077 -- TODO -- repeated here in case EN/ET is the last node. Find a
4078 -- better way of doing things:
4079 if first_et then      -- dir may be nil here !
4080     if has_en then
4081         if last == 'l' then
4082             temp = 'l'      -- W7
4083         else
4084             temp = 'en'     -- W5
4085         end
4086     else
4087         temp = 'on'        -- W6
4088     end
4089     for e = first_et, #nodes do
4090         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
4091     end
4092 end
4093
4094 -- dummy node, to close things
4095 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
4096
4097 ----- NEUTRAL -----
4098
4099 outer = save_outer
4100 last = outer
4101
4102 local first_on = nil
4103
4104 for q = 1, #nodes do
4105     local item
4106
4107     local outer_first = nodes[q][3]
4108     outer = outer_first or outer
4109     last = outer_first or last
4110
4111     local d = nodes[q][2]
4112     if d == 'an' or d == 'en' then d = 'r' end
4113     if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
4114
4115     if d == 'on' then
4116         first_on = first_on or q
4117     elseif first_on then
4118         if last == d then
4119             temp = d
4120         else
4121             temp = outer
4122         end
4123         for r = first_on, q - 1 do
4124             nodes[r][2] = temp
4125             item = nodes[r][1]      -- MIRRORING
4126             if item.id == GLYPH and temp == 'r' then

```



```

4127         item.char = characters[item.char].m or item.char
4128     end
4129 end
4130 first_on = nil
4131 end
4132
4133 if d == 'r' or d == 'l' then last = d end
4134 end
4135
4136 ----- IMPLICIT, REORDER -----
4137
4138 outer = save_outer
4139 last = outer
4140
4141 local state = {}
4142 state.has_r = false
4143
4144 for q = 1, #nodes do
4145
4146     local item = nodes[q][1]
4147
4148     outer = nodes[q][3] or outer
4149
4150     local d = nodes[q][2]
4151
4152     if d == 'nsm' then d = last end          -- W1
4153     if d == 'en' then d = 'an' end
4154     local isdir = (d == 'r' or d == 'l')
4155
4156     if outer == 'l' and d == 'an' then
4157         state.san = state.san or item
4158         state.ean = item
4159     elseif state.san then
4160         head, state = insert_numeric(head, state)
4161     end
4162
4163     if outer == 'l' then
4164         if d == 'an' or d == 'r' then      -- im -> implicit
4165             if d == 'r' then state.has_r = true end
4166             state.sim = state.sim or item
4167             state.eim = item
4168         elseif d == 'l' and state.sim and state.has_r then
4169             head, state = insert_implicit(head, state, outer)
4170         elseif d == 'l' then
4171             state.sim, state.eim, state.has_r = nil, nil, false
4172         end
4173     else
4174         if d == 'an' or d == 'l' then
4175             state.sim = state.sim or item
4176             state.eim = item
4177         elseif d == 'r' and state.sim then
4178             head, state = insert_implicit(head, state, outer)
4179         elseif d == 'r' then
4180             state.sim, state.eim = nil, nil
4181         end
4182     end
4183
4184     if isdir then
4185         last = d          -- Don't search back - best save now

```

```

4186     elseif d == 'on' and state.san then
4187         state.san = state.san or item
4188         state.ean = item
4189     end
4190
4191 end
4192
4193 return node.prev(head) or head
4194 end
4195 </basic>

```

14 The ‘nil’ language

This ‘language’ does nothing, except setting the hyphenation patterns to nohyphenation. For this language currently no special definitions are needed or available. The macro `\LdfInit` takes care of preventing that this file is loaded more than once, checking the category code of the `@` sign, etc.

```

4196 <*nil>
4197 \ProvidesLanguage{nil}[<<date>>] <<version>> Nil language]
4198 \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.

```

4199 \ifx\l@nohyphenation\@undefined
4200     \@nopatterns{nil}
4201     \adddialect\l@nil0
4202 \else
4203     \let\l@nil\l@nohyphenation
4204 \fi

```

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

```

4205 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}

```

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

```

\captionnil
\datenil
4206 \let\captionnil\@empty
4207 \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.

```

4208 \ldf@finish{nil}
4209 </nil>

```

15 Support for Plain T_EX (plain.def)

15.1 Not renaming hyphen.tex

As Don Knuth has declared that the filename `hyphen.tex` may only be used to designate *his* version of the american English hyphenation patterns, a new solution has to be found in order to be able to load hyphenation patterns for other languages in a plain-based T_EX-format. When asked he responded:

That file name is “sacred”, and if anybody changes it they will cause severe upward/downward compatibility headaches.

People can have a file `locallyhyphen.tex` or whatever they like, but they mustn’t diddle with `hyphen.tex` (or `plain.tex` except to preload additional fonts).

The files `bplain.tex` and `blplain.tex` can be used as replacement wrappers around `plain.tex` and `lplain.tex` to achieve the desired effect, based on the `babel` package. If you load each of them with `iniTEX`, you will get a file called either `bplain.fmt` or `blplain.fmt`, which you can use as replacements for `plain.fmt` and `lplain.fmt`. As these files are going to be read as the first thing `iniTEX` sees, we need to set some category codes just to be able to change the definition of `\input`

```
4210 (*bplain | blplain)
4211 \catcode`\{=1 % left brace is begin-group character
4212 \catcode`\}=2 % right brace is end-group character
4213 \catcode`\#=6 % hash mark is macro parameter character
```

Now let’s see if a file called `hyphen.cfg` can be found somewhere on T_EX’s input path by trying to open it for reading...

```
4214 \openin 0 hyphen.cfg
```

If the file wasn’t found the following test turns out true.

```
4215 \ifeof0
4216 \else
```

When `hyphen.cfg` could be opened we make sure that *it* will be read instead of the file `hyphen.tex` which should (according to Don Knuth’s ruling) contain the american English hyphenation patterns and nothing else.

We do this by first saving the original meaning of `\input` (and I use a one letter control sequence for that so as not to waste multi-letter control sequence on this in the format).

```
4217 \let\input
```

Then `\input` is defined to forget about its argument and load `hyphen.cfg` instead.

```
4218 \def\input #1 {%
4219 \let\input\input\input
4220 \input hyphen.cfg
```

Once that’s done the original meaning of `\input` can be restored and the definition of `\input` can be forgotten.

```
4221 \let\input\undefined
4222 }
4223 \fi
4224 (/bplain | blplain)
```

Now that we have made sure that `hyphen.cfg` will be loaded at the right moment it is time to load `plain.tex`.

```
4225 (bplain)\input plain.tex
4226 (blplain)\input lplain.tex
```

Finally we change the contents of `\fmtname` to indicate that this is *not* the plain format, but a format based on plain with the `babel` package preloaded.

```
4227 (bplain)\def\fmtname{babel-plain}
4228 (blplain)\def\fmtname{babel-lplain}
```

When you are using a different format, based on `plain.tex` you can make a copy of `blplain.tex`, rename it and replace `plain.tex` with the name of your format file.

15.2 Emulating some L^AT_EX features

The following code duplicates or emulates parts of L^AT_EX 2_ε that are needed for babel.

```
4229 <{*plain}
4230 \def\@empty{}
4231 \def\loadlocalcfg#1{%
4232   \openin0#1.cfg
4233   \ifeof0
4234     \closein0
4235   \else
4236     \closein0
4237     {\immediate\write16{*****}%
4238      \immediate\write16{* Local config file #1.cfg used}%
4239      \immediate\write16{*}%
4240     }
4241     \input #1.cfg\relax
4242   \fi
4243   \@endoflfd}
```

15.3 General tools

A number of L^AT_EX macro's that are needed later on.

```
4244 \long\def\@firstofone#1{#1}
4245 \long\def\@firstoftwo#1#2{#1}
4246 \long\def\@secondoftwo#1#2{#2}
4247 \def\@nnil{\@nil}
4248 \def\@gobbletwo#1#2{}
4249 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
4250 \def\@star@or@long#1{%
4251   \@ifstar
4252   {\let\l@ngrel@x\relax#1}%
4253   {\let\l@ngrel@x\long#1}}
4254 \let\l@ngrel@x\relax
4255 \def\@car#1#2\@nil{#1}
4256 \def\@cdr#1#2\@nil{#2}
4257 \let\@typeset@protect\relax
4258 \let\protected@edef\edef
4259 \long\def\@gobble#1{}
4260 \edef\@backslashchar{\expandafter\@gobble\string\}
4261 \def\strip@prefix#1>{}
4262 \def\g@addto@macro#1#2{%
4263   \toks@\expandafter{#1#2}%
4264   \xdef#1{\the\toks@}}
4265 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
4266 \def\@nameuse#1{\csname #1\endcsname}
4267 \def\@ifundefined#1{%
4268   \expandafter\ifx\csname#1\endcsname\relax
4269     \expandafter\@firstoftwo
4270   \else
4271     \expandafter\@secondoftwo
4272   \fi}
4273 \def\@expandtwoargs#1#2#3{%
4274   \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
4275 \def\zap@space#1 #2{%
4276   #1%
4277   \ifx#2\@empty\else\expandafter\zap@space\fi
4278   #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}`.

```
4279 \ifx\@preamblecmds\undefined
4280   \def\@preamblecmds{}
4281 \fi
4282 \def\@onlypreamble#1{%
4283   \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
4284     \@preamblecmds\do#1}}
4285 \@onlypreamble\@onlypreamble
```

Mimick L^AT_EX's `\AtBeginDocument`; for this to work the user needs to add `\begin{document}` to his file.

```
4286 \def\begin{document}{%
4287   \@begin{document}hook
4288   \global\let\@begin{document}hook\undefined
4289   \def\do##1{\global\let##1\undefined}%
4290   \@preamblecmds
4291   \global\let\do\noexpand}

4292 \ifx\@begin{document}hook\undefined
4293   \def\@begin{document}hook{}
4294 \fi
4295 \@onlypreamble\@begin{document}hook
4296 \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`.

```
4297 \def\AtEndOfPackage#1{\g@addto@macro\@endoflfd{#1}}
4298 \@onlypreamble\AtEndOfPackage
4299 \def\@endoflfd{}
4300 \@onlypreamble\@endoflfd
4301 \let\bbl@afterlang\empty
4302 \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.

```
4303 \ifx\if@filesw\undefined
4304   \expandafter\let\csname if@filesw\expandafter\endcsname
4305     \csname iffalse\endcsname
4306 \fi
```

Mimick L^AT_EX's commands to define control sequences.

```
4307 \def\newcommand{\@star@or@long\new@command}
4308 \def\new@command#1{%
4309   \@testopt{\@newcommand#1}0}
4310 \def\@newcommand#1[#2]{%
4311   \@ifnextchar [{\@xargdef#1[#2]}%
4312     {\@argdef#1[#2]}}
4313 \long\def\@argdef#1[#2]#3{%
4314   \@yargdef#1\@ne{#2}{#3}}
4315 \long\def\@xargdef#1[#2][#3]#4{%
4316   \expandafter\def\expandafter#1\expandafter{%
4317     \expandafter\@protected@testopt\expandafter #1%
4318     \csname\string#1\expandafter\endcsname{#3}}%
4319   \expandafter\@yargdef \csname\string#1\endcsname
4320   \tw@{#2}{#4}}
4321 \long\def\@yargdef#1#2#3{%
4322   \@tempcnta#3\relax
4323   \advance \@tempcnta \@ne
```

```

4324 \let\@hash@relax
4325 \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
4326 \@tempcntb #2%
4327 \@whilenum\@tempcntb <\@tempcnta
4328 \do{%
4329   \edef\reserved@a{\reserved@a\@hash@the\@tempcntb}%
4330   \advance\@tempcntb \@ne}%
4331 \let\@hash@###
4332 \l@ngrel@x\expandafter\def\expandafter#1\reserved@a}
4333 \def\providecommand{\@star@or@long\provide@command}
4334 \def\provide@command#1{%
4335   \begingroup
4336     \escapechar\m@ne\xdef\@gtempa{\string#1}%
4337   \endgroup
4338   \expandafter\@ifundefined\@gtempa
4339     {\def\reserved@a{\new@command#1}}%
4340     {\let\reserved@a\relax
4341      \def\reserved@a{\new@command\reserved@a}}%
4342   \reserved@a}%
4343 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
4344 \def\declare@robustcommand#1{%
4345   \edef\reserved@a{\string#1}%
4346   \def\reserved@b{#1}%
4347   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
4348   \edef#1{%
4349     \ifx\reserved@a\reserved@b
4350       \noexpand\x@protect
4351       \noexpand#1%
4352     \fi
4353     \noexpand\protect
4354     \expandafter\noexpand\csname\bbl@stripslash#1 \endcsname
4355   }%
4356   \expandafter\new@command\csname\bbl@stripslash#1 \endcsname
4357 }
4358 \def\x@protect#1{%
4359   \ifx\protect\@typeset@protect\else
4360     \@x@protect#1%
4361   \fi
4362 }
4363 \def\@x@protect#1\fi#2#3{%
4364   \fi\protect#1%
4365 }

```

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`.

```

4366 \def\bbl@tempa{\csname newif\endcsname\ifin@}
4367 \ifx\in@\@undefined
4368   \def\in@#1#2{%
4369     \def\in@@##1#1##2##3\in@@{%
4370       \ifx\in@##2\in@false\else\in@true\fi}%
4371     \in@@#2#1\in@\in@@}
4372 \else
4373   \let\bbl@tempa\@empty
4374 \fi
4375 \bbl@tempa

```

\LaTeX has a macro to check whether a certain package was loaded with specific options. The

command has two extra arguments which are code to be executed in either the true or false case. This is used to detect whether the document needs one of the accents to be activated (activegrave and activeacute). For plain \TeX we assume that the user wants them to be active by default. Therefore the only thing we do is execute the third argument (the code for the true case).

```
4376 \def\ifpackagewith#1#2#3#4{#3}
```

The \LaTeX macro `\ifl@aded` checks whether a file was loaded. This functionality is not needed for plain \TeX but we need the macro to be defined as a no-op.

```
4377 \def\ifl@aded#1#2#3#4{}
```

For the following code we need to make sure that the commands `\newcommand` and `\providecommand` exist with some sensible definition. They are not fully equivalent to their $\LaTeX 2_{\epsilon}$ versions; just enough to make things work in plain \TeX environments.

```
4378 \ifx\@tempcnta\@undefined
4379   \csname newcount\endcsname\@tempcnta\relax
4380 \fi
4381 \ifx\@tempcntb\@undefined
4382   \csname newcount\endcsname\@tempcntb\relax
4383 \fi
```

To prevent wasting two counters in $\LaTeX 2.09$ (because counters with the same name are allocated later by it) we reset the counter that holds the next free counter (`\count10`).

```
4384 \ifx\bye\@undefined
4385   \advance\count10 by -2\relax
4386 \fi
4387 \ifx\@ifnextchar\@undefined
4388   \def\@ifnextchar#1#2#3{%
4389     \let\reserved@d=#1%
4390     \def\reserved@a{#2}\def\reserved@b{#3}%
4391     \futurelet\@let@token\@ifnch}
4392   \def\@ifnch{%
4393     \ifx\@let@token\sptoken
4394       \let\reserved@c\@xifnch
4395     \else
4396       \ifx\@let@token\reserved@d
4397         \let\reserved@c\reserved@a
4398       \else
4399         \let\reserved@c\reserved@b
4400       \fi
4401     \fi
4402     \reserved@c}
4403   \def\:{\let\sptoken= } \: % this makes \sptoken a space token
4404   \def\:{\@xifnch} \expandafter\def\:{\futurelet\@let@token\@ifnch}
4405 \fi
4406 \def\@testopt#1#2{%
4407   \@ifnextchar[#{#1}{#1[#2]}}
4408 \def\@protected@testopt#1{%
4409   \ifx\protect\@typeset@protect
4410     \expandafter\@testopt
4411   \else
4412     \@x@protect#1%
4413   \fi}
4414 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
4415   #2\relax}\fi}
4416 \long\def\@iwhilenum#1{\ifnum #1\relax\expandafter\@iwhilenum
4417   \else\expandafter\@gobble\fi{#1}}
```

15.4 Encoding related macros

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

```
4418 \def\DeclareTextCommand{%
4419   \@dec@text@cmd\providecommand
4420 }
4421 \def\ProvideTextCommand{%
4422   \@dec@text@cmd\providecommand
4423 }
4424 \def\DeclareTextSymbol#1#2#3{%
4425   \@dec@text@cmd\chardef#1{#2}#3\relax
4426 }
4427 \def\@dec@text@cmd#1#2#3{%
4428   \expandafter\def\expandafter#2%
4429     \expandafter{%
4430       \csname#3-cmd\expandafter\endcsname
4431       \expandafter#2%
4432       \csname#3\string#2\endcsname
4433     }%
4434 %   \let\@ifdefinable\rc@ifdefinable
4435   \expandafter#1\csname#3\string#2\endcsname
4436 }
4437 \def\@current@cmd#1{%
4438   \ifx\protect\@typeset@protect\else
4439     \noexpand#1\expandafter\@gobble
4440   \fi
4441 }
4442 \def\@changed@cmd#1#2{%
4443   \ifx\protect\@typeset@protect
4444     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
4445       \expandafter\ifx\csname ?\string#1\endcsname\relax
4446         \expandafter\def\csname ?\string#1\endcsname{%
4447           \@changed@x@err{#1}%
4448         }%
4449       \fi
4450       \global\expandafter\let
4451         \csname\cf@encoding \string#1\expandafter\endcsname
4452         \csname ?\string#1\endcsname
4453     \fi
4454     \csname\cf@encoding\string#1%
4455       \expandafter\endcsname
4456   \else
4457     \noexpand#1%
4458   \fi
4459 }
4460 \def\@changed@x@err#1{%
4461   \errhelp{Your command will be ignored, type <return> to proceed}%
4462   \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
4463 \def\DeclareTextCommandDefault#1{%
4464   \DeclareTextCommand#1?%
4465 }
4466 \def\ProvideTextCommandDefault#1{%
4467   \ProvideTextCommand#1?%
4468 }
4469 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
4470 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
4471 \def\DeclareTextAccent#1#2#3{%
4472   \DeclareTextCommand#1{#2}[1]{\accent#3 #1}
4473 }
```



```

4474 \def\DeclareTextCompositeCommand#1#2#3#4{%
4475   \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
4476   \edef\reserved@b{\string##1}%
4477   \edef\reserved@c{%
4478     \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
4479   \ifx\reserved@b\reserved@c
4480     \expandafter\expandafter\expandafter\ifx
4481       \expandafter\@car\reserved@a\relax\relax\@nil
4482       \@text@composite
4483     \else
4484       \edef\reserved@b##1{%
4485         \def\expandafter\noexpand
4486           \csname#2\string#1\endcsname####1{%
4487             \noexpand\@text@composite
4488             \expandafter\noexpand\csname#2\string#1\endcsname
4489             ####1\noexpand\@empty\noexpand\@text@composite
4490             {##1}%
4491           }%
4492       }%
4493       \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
4494     \fi
4495     \expandafter\def\csname\expandafter\string\csname
4496       #2\endcsname\string#1-\string#3\endcsname{##4}
4497   \else
4498     \errhelp{Your command will be ignored, type <return> to proceed}%
4499     \errmessage{\string\DeclareTextCompositeCommand\space used on
4500       inappropriate command \protect#1}
4501   \fi
4502 }
4503 \def\@text@composite#1#2#3\@text@composite{%
4504   \expandafter\@text@composite@x
4505     \csname\string#1-\string#2\endcsname
4506 }
4507 \def\@text@composite@x#1#2{%
4508   \ifx#1\relax
4509     #2%
4510   \else
4511     #1%
4512   \fi
4513 }
4514 %
4515 \def\@strip@args#1:#2-#3\@strip@args{#2}
4516 \def\DeclareTextComposite#1#2#3#4{%
4517   \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
4518   \bgroup
4519     \lcode`\@=#4%
4520     \lowercase{%
4521       \egroup
4522       \reserved@a \@
4523     }%
4524 }
4525 %
4526 \def\UseTextSymbol#1#2{%
4527 %   \let\@curr@enc\cf@encoding
4528 %   \@use@text@encoding{#1}%
4529 %   #2%
4530 %   \@use@text@encoding\@curr@enc
4531 }
4532 \def\UseTextAccent#1#2#3{%

```

```

4533 % \let\@curr@enc\cf@encoding
4534 % \@use@text@encoding{#1}%
4535 % #2{\@use@text@encoding\@curr@enc\selectfont#3}%
4536 % \@use@text@encoding\@curr@enc
4537 }
4538 \def\@use@text@encoding#1{%
4539 % \edef\f@encoding{#1}%
4540 % \xdef\font@name{%
4541 % \csname\curr@fontshape/\f@size\endcsname
4542 % }%
4543 % \pickup@font
4544 % \font@name
4545 % \@@enc@update
4546 }
4547 \def\DeclareTextSymbolDefault#1#2{%
4548 % \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
4549 }
4550 \def\DeclareTextAccentDefault#1#2{%
4551 % \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
4552 }
4553 \def\cf@encoding{OT1}

```

Currently we only use the $\text{\LaTeX} 2_{\epsilon}$ method for accents for those that are known to be made active in *some* language definition file.

```

4554 \DeclareTextAccent{"}{OT1}{127}
4555 \DeclareTextAccent{'}{OT1}{19}
4556 \DeclareTextAccent{^}{OT1}{94}
4557 \DeclareTextAccent`}{OT1}{18}
4558 \DeclareTextAccent~}{OT1}{126}

```

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

```

4559 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
4560 \DeclareTextSymbol{\textquotedblright}{OT1}{`\"}
4561 \DeclareTextSymbol{\textquoteleft}{OT1}{`\'}
4562 \DeclareTextSymbol{\textquoteright}{OT1}{`\' }
4563 \DeclareTextSymbol{\i}{OT1}{16}
4564 \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`.

```

4565 \ifx\scriptsize\undefined
4566 % \let\scriptsize\sevenrm
4567 \fi
4568 </plain>

```

16 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] Joachim Schrod, *International L^AT_EX is ready to use*, *TUGboat* 11 (1990) #1, p. 87–90.
- [10] Apostolos Syropoulos, Antonis Tsolomitis and Nick Sofroniu, *Digital typography using L^AT_EX*, Springer, 2002, p. 301–373.