

Babel

Version 3.43.1998
2020/05/05

Original author
Johannes L. Braams

Current maintainer
Javier Bezos

Localization and
internationalization

Unicode

T_EX

pdfT_EX

LuaT_EX

XeT_EX

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Part I

User guide

- This user guide focuses on internationalization and localization with \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**, and there are some notes for the latest versions in the babel wiki. The most recent features could be still unstable. Please, report any issues you find in GitHub, which is better than just complaining on an e-mail list or a web forum.
- If you are interested in the \TeX multilingual support, please join the kadingira mail list. You can follow the development of babel in GitHub (which provides many sample files, too). If you are the author of a package, feel free to send to me a few test files which I'll add to mine, so that possible issues could be caught in the development phase.
- See section 3.1 for contributing a language.
- The first sections describe the traditional way of loading a language (with `ldf` files). The alternative way based on `ini` files, which complements the previous one (it does *not* replace it), is described below.

1 The user interface

1.1 Monolingual documents

In most cases, a single language is required, and then all you need in \LaTeX is to load the package using its standard mechanism for this purpose, namely, passing that language as an optional argument. In addition, you may want to set the font and input encodings. Many languages are compatible with xetex and luatex. With them you can use babel to localize the documents. When these engines are used, the Latin script is covered by default in current \LaTeX (provided the document encoding is UTF-8), because the font loader is preloaded and the font is switched to `lmroman`. Other scripts require loading `fontspec`. You may want to set the font attributes with `fontspec`, too.

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

PDFTEX

```
\documentclass{article}

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

\usepackage[french]{babel}

\begin{document}

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

\end{document}
```

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

LUATEX/XETEX

```
\documentclass{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}
```

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

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

Or the more explanatory:

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

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

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, T_EXLive, etc.) for further info about how to configure it.

1.2 Multilingual documents

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

EXAMPLE In L^AT_EX, the preamble of the document:

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

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

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

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

Examples of cases where main is useful are the following.

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

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

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

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

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

To switch the language there are two basic macros, described below in detail: `\selectlanguage` is used for blocks of text, while `\foreignlanguage` is for chunks of text inside paragraphs.

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

PDFTEX

```
\documentclass{article}

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

\usepackage[english,french]{babel}

\begin{document}

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

\selectlanguage{english}

And an English paragraph, with a short text in
\foreignlanguage{french}{français}.

\end{document}
```

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

LUATEX/XETEX

```
\documentclass{article}

\usepackage[vietnamese,danish]{babel}

\begin{document}

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

\selectlanguage{vietnamese}

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

\end{document}
```

1.3 Mostly monolingual documents

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

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

EXAMPLE A trivial document is:


```

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

\babelfont[russian]{rm}{FreeSerif}

\begin{document}

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

\end{document}

```

1.4 Modifiers

New 3.9c The basic behavior of some languages can be modified when loading babel by means of *modifiers*. They are set after the language name, and are prefixed with a dot (only when the language is set as package option – neither global options nor the main key accepts them). An example is (spaces are not significant and they can be added or removed):¹

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

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

1.5 Troubleshooting

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

```

! Package babel Error: You are loading directly a language style.
(babel)                This syntax is deprecated and you must use
(babel)                \usepackage[language]{babel}.

```

- Another typical error when using babel is the following:³

```

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

```

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

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

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

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

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.

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

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

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

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

\foreignlanguage `{\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.,

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

the surrounding language is still in force), and (3) it works even if the language has not been set as package option (but in such a case it only sets the hyphenation patterns and a warning is shown). With the `bidi` option, it also enters in horizontal mode (this is not done always for backwards compatibility).

1.8 Auxiliary language selectors

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

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

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

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

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

Spaces after the environment are ignored.

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

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

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

`\begin{hyphenrules}` $\langle\text{language}\rangle$... `\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` $\langle\text{tag1}\rangle = \langle\text{language1}\rangle, \langle\text{tag2}\rangle = \langle\text{language2}\rangle, \dots$

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

EXAMPLE With

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

you can write

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

and

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

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

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

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

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

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

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

```
\babelensure{polish}
```

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

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

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

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

1.10 Shorthands

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

NOTE Note the following:

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

TROUBLESHOOTING A typical error when using shorthands is the following:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

`\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 german with

⁶Actually, any name not corresponding to a language group does the same as none. However, follow this convention because it might be enforced in future releases of babel to catch possible errors.

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

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

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

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

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

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

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

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

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

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

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

Basque " ' ~

Breton : ; ? !

Catalan " ' `

Czech " -

Esperanto ^

Estonian " ~

French (all varieties) : ; ? !

Galician " . ' ~ < >

Greek ~

Hungarian `

Kurmanji ^

Latin " ^ =

Slovak " ^ ' -

Spanish " . < > ' ~

Turkish : ! =

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

⁷Thanks to Enrico Gregorio

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

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

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

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

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

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

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

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

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

1.11 Package options

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

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

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

activegrave Same for ```.

shorthands= $\langle char \rangle \langle char \rangle \dots \mid \text{off}$

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

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

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

safe=	none ref bib
	Some L ^A T _E X macros are redefined so that using shorthands is safe. With safe=bib only \nocite, \bibcite and \bibitem are redefined. With safe=ref only \newlabel, \ref and \pageref are redefined (as well as a few macros from varioref and ifthen). With safe=none no macro is redefined. This option is strongly recommended, because a good deal of incompatibilities and errors are related to these redefinitions. As of New 3.34 , in e _T _E X based engines (ie, almost every engine except the oldest ones) shorthands can be used in these macros (formerly you could not).
math=	active normal
	Shorthands are mainly intended for text, not for math. By setting this option with the value normal they are deactivated in math mode (default is active) and things like $\{a\}$ (a closing brace after a shorthand) are not a source of trouble anymore.
config=	<i><file></i>
	Load <i><file></i> .cfg instead of the default config file bblotps.cfg (the file is loaded even with noconfigs).
main=	<i><language></i>
	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=	<i><language></i>
	By default, headlines and footlines are not touched (only marks), and if they contain language-dependent macros (which is not usual) there may be unexpected results. With this option you may set the language in heads and foots.
noconfigs	Global and language default config files are not loaded, so you can make sure your document is not spoilt by an unexpected .cfg file. However, if the key config is set, this file is loaded.
showlanguages	Prints to the log the list of languages loaded when the format was created: number (remember dialects can share it), name, hyphenation file and exceptions file.
nocase	New 3.9l Language settings for uppercase and lowercase mapping (as set by \SetCase) are ignored. Use only if there are incompatibilities with other packages.
silent	New 3.9l No warnings and no <i>infos</i> are written to the log file. ⁹
strings=	generic unicode encoded <i><label></i> <i></i>
	Selects the encoding of strings in languages supporting this feature. Predefined labels are generic (for traditional T _E X, 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 L ^A T _E X tools, so use it only as a last resort).
hyphenmap=	off first select other other*

⁹You can use alternatively the package silence.

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

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

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

New 3.14 Selects the bidi algorithm to be used in `luatex` and `xetex`. See sec. 1.22.

layout=

New 3.16 Selects which layout elements are adapted in bidi documents. See sec. 1.22.

1.12 The base option

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

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

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

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

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

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

¹⁰Turned off in plain.

¹¹Duplicated options count as several ones.

¹²Providing `foreign` is pointless, because the case mapping applied is that at the end of the paragraph, but if either `xetex` or `luatex` change this behavior it might be added. On the other hand, `other` is provided even if I [JBL] think it isn't really useful, but who knows.

```

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

```

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

1.13 ini files

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

ini files are not meant only for babel, and they have been devised as a resource for other packages. To ease interoperability between T_EX and other systems, they are identified with the BCP 47 codes as preferred by the Unicode Common Language Data Repository, which was used as source for most of the data provided by these files, too (the main exception being the \ldots name strings).

Most of them set the date, and many also the captions (Unicode and LICR). They will be evolving with the time to add more features (something to keep in mind if backward compatibility is important). The following section shows how to make use of them currently (by means of \babelprovide), but a higher interface, based on package options, is under study. In other words, \babelprovide is mainly meant for auxiliary tasks.

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

LUATEX/XETEX

```

\documentclass{book}

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

\babelfont{rm}{DejaVu Sans}

\begin{document}

\tableofcontents

\chapter{სამზარეულო და სუფრის ტრადიციები}

ქართული ტრადიციული სამზარეულო ერთ-ერთი უმდიდრესია მთელ მსოფლიოში.

\end{document}

```

NOTE The ini files just define and set some parameters, but the corresponding behavior is not always implemented. Also, there are some limitations in the engines. A few remarks follow:

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

Hebrew Niqud marks seem to work in both engines, but cantillation marks are misplaced (xetex or luatex with Harfbuzz seems better, but still problematic).

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

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

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

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

```
\babelprovide[import,hyphenrules=+]{lao}
\babelpatterns[lao]{໐໑ ໑໒ ໑໓ ໑໔ ໑໕ ໑໖} % Random
```

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

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

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

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

af	Afrikaans ^{ul}	az-Latn	Azerbaijani
agg	Aghem	az	Azerbaijani ^{ul}
ak	Akan	bas	Basaa
am	Amharic ^{ul}	be	Belarusian ^{ul}
ar	Arabic ^{ul}	bem	Bemba
ar-DZ	Arabic ^{ul}	bez	Bena
ar-MA	Arabic ^{ul}	bg	Bulgarian ^{ul}
ar-SY	Arabic ^{ul}	bm	Bambara
as	Assamese	bn	Bangla ^{ul}
asa	Asu	bo	Tibetan ^u
ast	Asturian ^{ul}	brx	Bodo
az-Cyrl	Azerbaijani	bs-Cyrl	Bosnian

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

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

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

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

aghem	brazilian
akan	breton
albanian	british
american	bulgarian
amharic	burmese
arabic	canadian
arabic-algeria	cantonese
arabic-DZ	catalan
arabic-morocco	centralatlastamazight
arabic-MA	centralkurdish
arabic-syria	chechen
arabic-SY	cherokee
armenian	chiga
assamese	chinese-hans-hk
asturian	chinese-hans-mo
asu	chinese-hans-sg
australian	chinese-hans
austrian	chinese-hant-hk
azerbaijani-cyrillic	chinese-hant-mo
azerbaijani-cyrl	chinese-hant
azerbaijani-latin	chinese-simplified-hongkongsarchina
azerbaijani-latn	chinese-simplified-macausarchina
azerbaijani	chinese-simplified-singapore
bafia	chinese-simplified
bambara	chinese-traditional-hongkongsarchina
basaa	chinese-traditional-macausarchina
basque	chinese-traditional
belarusian	chinese
bemba	churchslavic
bena	churchslavic-cyrs
bengali	churchslavic-oldcyrillic ¹³
bodo	churchsslavic-glag
bosnian-cyrillic	churchsslavic-glagolitic
bosnian-cyrl	colognian
bosnian-latin	cornish
bosnian-latn	croatian
bosnian	czech

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

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

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

mazanderani
meru
meta
mexican
mongolian
morisyen
mundang
nama
nepali
newzealand
ngiemboon
ngomba
norsk
northernluri
northern sami
northndebele
norwegianbokmal
norwegiannynorsk
nswissgerman
nuer
nyankole
nynorsk
occitan
oriya
oromo
ossetic
pashto
persian
piedmontese
polish
portuguese-br
portuguese-brazil
portuguese-portugal
portuguese-pt
portuguese
punjabi-arab
punjabi-arabic
punjabi-gurmukhi
punjabi-guru
punjabi
quechua
romanian
romansh
rombo
rundi
russian
rwa
sakha
samburu
samin
sango
sangu
sanskrit-beng
sanskrit-bengali

sanskrit-deva
sanskrit-devanagari
sanskrit-gujarati
sanskrit-gujr
sanskrit-kannada
sanskrit-knda
sanskrit-malayalam
sanskrit-mlym
sanskrit-telu
sanskrit-telugu
sanskrit
scottishgaelic
sena
serbian-cyrillic-bosniaherzegovina
serbian-cyrillic-kosovo
serbian-cyrillic-montenegro
serbian-cyrillic
serbian-cyrl-ba
serbian-cyrl-me
serbian-cyrl-xk
serbian-cyrl
serbian-latin-bosniaherzegovina
serbian-latin-kosovo
serbian-latin-montenegro
serbian-latin
serbian-latn-ba
serbian-latn-me
serbian-latn-xk
serbian-latn
serbian
shambala
shona
sichuanyi
sinhala
slovak
slovene
slovenian
soga
somali
spanish-mexico
spanish-mx
spanish
standardmoroccantamazight
swahili
swedish
swissgerman
tachelhit-latin
tachelhit-latn
tachelhit-tfng
tachelhit-tifinagh
tachelhit
taita
tamil
tasawaq

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

Modifying and adding values to ini files

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

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

1.14 Selecting fonts

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

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

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

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

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

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

Babel takes care of the font language and the font script when languages are selected (as well as the writing direction); see the recognized languages above. In most cases, you will

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

not need *font-options*, which is the same as in fontspec, but you may add further key/value pairs if necessary.

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

LUATEX/XETEX

```
\documentclass{article}

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

\babelprovide[import]{hebrew}

\babelfont{rm}{FreeSerif}

\begin{document}

Svenska \foreignlanguage{hebrew}{עברית} svenska.

\end{document}
```

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

LUATEX/XETEX

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

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

EXAMPLE Here is how to do it:

LUATEX/XETEX

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

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

NOTE You may load fontspec explicitly. For example:

LUATEX/XETEX

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

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

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

NOTE `\fontspec` is not touched at all, only the preset font families (`rm`, `sf`, `tt`, and the like). If a language is switched when an *ad hoc* font is active, or you select the font with this command, neither the script nor the language is passed. You must add them by hand. This is by design, for several reasons—for example, each font has its own set of features and a generic setting for several of them 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 Using `\setxxxxfont` and `\babelfont` at the same time is discouraged, but very often works as expected. However, be aware with `\setxxxxfont` the language system will not be set by `babel` and should be set with `fontspec` if necessary.

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

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

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

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

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

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

1.15 Modifying a language

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

- 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 so.

- 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⟩`.

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

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

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

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

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

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

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

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

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

first loads `danish.ldf`, and then redefines the captions for danish (as provided by the ini file) and prevents hyphenation. The rest of the language definitions are not touched.

1.16 Creating a language

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

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

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

If no ini file is imported with `import`, `⟨language-name⟩` is still relevant because in such a case the hyphenation and like breaking rules (including those for South East Asian and

CJK) are based on it as provided in the ini file corresponding to that name; the same applies to OpenType language and script. Conveniently, some options allow to fill the language, and babel warns you about what to do if there is a missing string. Very likely you will find alerts like that in the log file:

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

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

EXAMPLE If you need a language named arhinish:

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

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

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

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

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

import= *<language-tag>*

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

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

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

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

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

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

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

captions= *<language-tag>*

Loads only the strings. For example:

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

hyphenrules= *<language-list>*

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

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

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

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

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

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

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

script= *<script-name>*

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

language= *<language-name>*

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

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

onchar= ids | fonts

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

mapfont= direction

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

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

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

intrapenalty= $\langle penalty \rangle$

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

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

1.17 Digits and counters

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

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

Languages providing native digits in all or some variants are:

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

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

New 4.41 Many ‘ini’ locale files has been extended with information about non-positional numerical systems, based on those predefined in CSS. They only work with `xetex` and `luatex` and are fully expendable (even inside an `\edef`). Currently, they are limited to numbers below 10000.

There are several ways to use them (for the available styles in each language, see the list below):

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

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

The styles are:

Ancient Greek `lower.ancient`, `upper.ancient`

Arabic `abjad`, `maghrebi.abjad`

Belarusan, Bulgarian, Macedonian, Serbian `lower`, `upper`

Hebrew `letters` (neither `geresh` nor `gershayim yet`)

Hindi `alphabetic`

Armenian `lower.letter`, `upper.letter`

Japanese `hiragana`, `hiragana.iroha`, `katakana`, `katakana.iroha`, `circled.katakana`, `informal`, `formal`, `cjk-earthly-branch`, `cjk-heavenly-stem`, `fullwidth.lower.alpha`, `fullwidth.upper.alpha`

Georgian `letters`

Greek `lower.modern`, `upper.modern`, `lower.ancient`, `upper.ancient` (all with `keraia`)

Khmer `consonant`

Korean `consonant`, `syllabe`, `hanja.informal`, `hanja.formal`, `hangul.formal`, `cjk-earthly-branch`, `cjk-heavenly-stem`, `fullwidth.lower.alpha`, `fullwidth.upper.alpha`

Persian `abjad`, `alphabetic`

Russian `lower`, `lower.full`, `upper`, `upper.full`

Tamil `ancient`

Thai `alphabetic`

Ukrainian `lower`, `lower.full`, `upper`, `upper.full`

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

1.18 Accessing language info

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

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

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

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

\localeinfo `{\field}`

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

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

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

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

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

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

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

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

\getlocaleproperty `{\macro}{\locale}{\property}`

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

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

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

Babel remembers which ini files have been loaded. There is a loop named

`\LocaleForEach` to traverse the list, where #1 is the name of the current item, so that

`\LocaleForEach{\message{ **#1** }}` just shows the loaded ini's.

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

\localeid

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

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

1.19 Hyphenation and line breaking

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

New 3.37-3.39 With *luatex* it is now possible to define non-standard hyphenation rules, like `f-f` \rightarrow `ff-f`, repeated hyphens, ranked ruled (or more precisely, ‘penalized’ hyphenation points), and so on. No rules are currently provided by default, but they can be defined as shown in the following example, where `{1}` is the first captured char (between `()` in the pattern):

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

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

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

¹⁵With *luatex* exceptions and patterns can be modified almost freely. However, this is very likely a task for a separate package and `babel` only provides the most basic tools.

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

EXAMPLE Although the main purpose of this command is non-standard hyphenation, it may actually be used for other transformations (after hyphenation is applied, so you must take discretionaries into account). For example, you can use the `string` replacement to replace a character (or series of them) by another character (or series of them). Thus, to enter *ž* as *zh* and *š* as *sh* in a newly created locale for transliterated Russian:

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

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

1.20 Selection based on BCP 47 tags

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

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

Here is a minimal example:

```
\documentclass{article}

\usepackage[danish]{babel}

\babeladjust{ autload.bcp47 = on }

\begin{document}

\today

\selectlanguage{fr-CA}

\today

\end{document}
```

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

`autoload.bcp47` with values on and off.

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

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

1.21 Selecting scripts

Currently `babel` provides no standard interface to select scripts, because they are best selected with either `\fontencoding` (low-level) or a language name (high-level). Even the Latin script may require different encodings (ie, sets of glyphs) depending on the language, and therefore such a switch would be in a sense incomplete.¹⁶

Some languages sharing the same script define macros to switch it (eg, `\textcyrillic`), but be aware they may also set the language to a certain default. Even the `babel` core defined `\textlatin`, but it was somewhat buggy because in some cases it messed up encodings and fonts (for example, if the main Latin encoding was `LY1`), and therefore it has been deprecated.¹⁷

`\ensureascii` `{\text}`

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

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

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

1.22 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

¹⁶The so-called Unicode fonts do not improve the situation either. So, a font suited for Vietnamese is not necessarily suited for, say, the romanization of Indic languages, and the fact it contains glyphs for Modern Greek does not mean it includes them for Classic Greek.

¹⁷But still defined for backwards compatibility.

dummy one). Furthermore, there are in fact two right-to-left modes, depending on the language, which differ in the way ‘weak’ numeric characters are ordered (eg, Arabic %123 vs Hebrew 123%).

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

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

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

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

There are some package options controlling **bidi** writing.

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

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

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

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

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

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

```
\documentclass{article}

\usepackage[bidi=basic]{babel}

\babelprovide[import, main]{arabic}

\babelfont{rm}{FreeSerif}

\begin{document}
```

وقد عرفت شبه جزيرة العرب طيلة العصر الهليني (الغريقي) بـ

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

\end{document}

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

```
\documentclass{book}

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

\babelprovide[onchar=ids fonts]{arabic}

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

\begin{document}

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

\end{document}
```

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

EXAMPLE Typically, in an Arabic document you would need:

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

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

Digits in `pdftex` must be marked up explicitly (unlike `luatex` with `bidi=basic` or `bidi=basic-r` and, usually, `xetex`). This command is provided to set `{\lr-text}` in L mode

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

if necessary. It's intended for what Unicode calls weak characters, because words are best set with the corresponding language. For this reason, there is no `rl` counterpart. Any `\babelsublr` in *explicit* L mode is ignored. However, with `bidi=basic` and *implicit* L, it first returns to R and then switches to explicit L. To clarify this point, consider, in an R context:

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

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

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

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

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

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

New 3.17 Something like:

```
\BabelFootnote{\parsfootnote}{\language\language}{\footnote}
```

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

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

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

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

(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.

1.23 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).

1.24 Hooks

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

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

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

Names containing the string `babel` are reserved (they are used, for example, by `\useshortands*` to add a hook for the event `afterextras`). **New 3.33** They may be also applied to a specific language with the optional argument; language-specific settings are executed after global ones.

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

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

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

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

defaultcommands Used (locally) in `\StartBabelCommands`.

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

stopcommands Used to reset the above, if necessary.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.25 Languages supported by babel with ldf files

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

Afrikaans afrikaans

Azerbaijani azerbaijani

Basque basque

Breton breton

Bulgarian bulgarian

Catalan catalan

Croatian croatian

Czech czech

Danish danish

Dutch dutch

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

Esperanto esperanto

Estonian estonian

Finnish finnish

French french, francais, canadien, acadian

Galician galician

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

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

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

```

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

```

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

1.26 Unicode character properties in luatex

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

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

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

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

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

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

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

1.27 Tweaking some features

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

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

1.28 Tips, workarounds, known issues and notes

- If you use the document class book *and* you use \ref inside the argument of \chapter (or just use \ref inside \MakeUppercase), L^AT_EX will keep complaining about an undefined label. To prevent such problems, you 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 T_EX only takes into account the values when the paragraph is hyphenated, i.e., when it has been finished.²⁰ So, if you write a chunk of French text with `\foreignlanguage`, the apostrophes might not be taken into account. This is a limitation of T_EX, not of babel. Alternatively, you may use `\usesshorthands` to activate ' and `\definesshorthand`, or redefine `\textquoteright` (the latter is called by the non-ASCII right quote).
- `\bibitem` is out of sync with `\selectlanguage` in the .aux file. The reason is `\bibitem` uses `\immediate` (and others, in fact), while `\selectlanguage` doesn't. There is no known workaround.
- Babel does not take into account `\normalsfcodes` and (non-)French spacing is not always properly (un)set by languages. However, problems are unlikely to happen and therefore this part remains untouched in version 3.9 (but it is in the 'to do' list).
- Using a character mathematically active (ie, with math code "8000) as a shorthand can make T_EX enter in an infinite loop in some rare cases. (Another issue in the 'to do' list, although there is a partial solution.)

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

csquotes Logical markup for quotes.

iflang Tests correctly the current language.

hyphsubst Selects a different set of patterns for a language.

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

siunitx Typesetting of numbers and physical quantities.

biblatex Programmable bibliographies and citations.

bicaption Bilingual captions.

babelbib Multilingual bibliographies.

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

substitutefont Combines fonts in several encodings.

mkpattern Generates hyphenation patterns.

tracklang Tracks which languages have been requested.

ucharclasses (xetex) Switches fonts when you switch from one Unicode block to another.

zhspacing Spacing for CJK documents in xetex.

1.29 Current and future work

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

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

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

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

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

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

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

1.30 Tentative and experimental code

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

Old and deprecated 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}
```

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

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.

exceptions are stored in a separate file this can be indicated by naming that file *after* the file with the hyphenation patterns.

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

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

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

You may also set the font encoding the patterns are intended for by following the language name by a colon and the encoding code.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 \TeX users, so the files have to be coded so that they can be read by both \LaTeX and plain \TeX . The current format can be checked by looking at the value of the macro `\fmtname`.
- The common part of the babel system redefines a number of macros and environments (defined previously in the document style) to put in the names of macros that replace the previously hard-wired texts. These macros have to be defined in the language definition files.

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

- The language definition files must define five macros, used to activate and deactivate the language-specific definitions. These macros are `\langle lang \rangle hyphenmins`, `\captions\langle lang \rangle`, `\date\langle lang \rangle`, `\extras\langle lang \rangle` and `\noextras\langle lang \rangle` (the last two may be left empty); where `\langle lang \rangle` is either the name of the language definition file or the name of the \LaTeX option that is to be used. These macros and their functions are discussed below. You must define all or none for a language (or a dialect); defining, say, `\date\langle lang \rangle` but not `\captions\langle lang \rangle` does not raise an error but can lead to unexpected results.
- When a language definition file is loaded, it can define `\l@⟨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\langle lang \rangle` except for `umlauthigh` and friends, `\bbl@deactivate`, `\bbl@(non)frenchspacing`, and language-specific macros. Use always, if possible, `\bbl@save` and `\bbl@savevariable` (except if you still want to have access to the previous value). Do not reset a macro or a setting to a hardcoded value. Never. Instead save its value in `\extras\langle lang \rangle`.
- Do not switch scripts. If you want to make sure a set of glyphs is used, switch either the font encoding (low-level) or the language (high-level, which in turn may switch the font encoding). Usage of things like `\latintext` is deprecated.²⁶
- Please, for “private” internal macros do not use the `\bbl@` prefix. It is used by babel and it can lead to incompatibilities.

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

3.1 Guidelines for contributed languages

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

²⁶But not removed, for backward compatibility.

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

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

3.2 Basic macros

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

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

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

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

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

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

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

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

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

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

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

\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 \TeX command `\ProvidesPackage`.

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

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

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

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

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

3.3 Skeleton

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

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

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

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

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

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

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

\StartBabelCommands*{<language>}{date}
\SetString\monthinname{<name of first month>}
```

```

% More strings

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

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

\EndBabelCommands

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

\ldf@finish{<language>}

```

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

```

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

```

3.4 Support for active characters

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

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

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

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

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

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

3.5 Support for saving macro definitions

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

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

`\babel@savevariable` A second macro is provided to save the current value of a variable. In this context, anything that is allowed after the `\the` primitive is considered to be a variable. The macro takes one argument, the `\variable`.
The effect of the preceding macros is to append a piece of code to the current definition of `\originalTeX`. When `\originalTeX` is expanded, this code restores the previous definition of the control sequence or the previous value of the variable.

3.6 Support for extending macros

`\addto` The macro `\addto{<control sequence>}{<TeX code>}` can be used to extend the definition of a macro. The macro need not be defined (ie, it can be undefined or `\relax`). This macro can, for instance, be used in adding instructions to a macro like `\extrasenglish`. Be careful when using this macro, because depending on the case the assignment 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

²⁷This mechanism was introduced by Bernd Raichle.

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

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

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

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

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

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

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

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

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

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

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

\EndBabelCommands
```

A real example is:

²⁸In future releases further categories may be added.

```

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

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

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

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


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

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

\EndBabelCommands

```

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

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

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

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

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

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

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

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

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

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

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

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

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

#1 is replaced by the roman numeral.

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

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

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

\StartBabelCommands{turkish}{}[unicode, fontenc=TU EU1 EU2, charset=utf8]
\SetCase
{\uccode`i=`I\relax
 \uccode`1=`I\relax}
{\lccode`I=`i\relax
 \lccode`I=`1\relax}

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

\EndBabelCommands
```

(Note the mapping for OT1 is not complete.)

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

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

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

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

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

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

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

4 Changes

4.1 Changes in babel version 3.9

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

- `\select@language` did not set `\language`. This meant the language in force when auxiliary files were loaded was the one used in, for example, shorthands – if the language was `german`, a `\select@language{spanish}` had no effect.
- `\foreignlanguage` and `otherlanguage*` messed up `\extras<language>`. Scripts, encodings and many other things were not switched correctly.
- The `:ENC` mechanism for hyphenation patterns used the encoding of the *previous* language, not that of the language being selected.
- `'` (with `activeacute`) had the original value when writing to an auxiliary file, and things like an infinite loop could happen. It worked incorrectly with `^` (if activated) and also if deactivated.
- Active chars were not reset at the end of language options, and that led to incompatibilities between languages.
- `\textormath` raised an error with a conditional.
- `\aliasshorthand` didn't work (or only in a few and very specific cases).
- `\l@english` was defined incorrectly (using `\let` instead of `\chardef`).
- `ldf` files not bundled with `babel` were not recognized when called as global options.

Part II

Source code

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

5 Identification and loading of required files

Code documentation is still under revision.

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

The babel package after unpacking consists of the following files:

switch.def defines macros to set and switch languages.

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

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

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

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

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

6 locale directory

A required component of babel is a set of ini files with basic definitions for about 200 languages. They are distributed as a separate zip file, not packed as dtx. With them, babel will fully support Unicode engines.

Most of them are essentially finished (except bugs and mistakes, of course). Some of them are still incomplete (but they will be usable), and there are some omissions (eg, Latin and polytonic Greek, and there are no geographic areas in Spanish). Hindi, French, Occitan and Breton will show a warning related to dates. Not all include LICR variants.

This is a preliminary documentation.

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

Most keys are self-explanatory.

charset the encoding used in the ini file.

version of the ini file

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

encodings a descriptive list of font encodings.

[captions] section of captions in the file charset

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

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

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

7 Tools

```
1 <<version=3.43.1998>>
2 <<date=2020/05/05>>
```

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

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

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

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

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

\bbl@afterelse \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.

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

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

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

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

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

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

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

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

```
68 \def\bbl@ifblank#1{%
69   \bbl@ifblank@i#1\@nil\@nil\@secondoftwo\@firstoftwo\@nil}
70 \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).

```

71 \def\bbl@forkv#1#2{%
72   \def\bbl@kvcmd##1##2##3{#2}%
73   \bbl@kvnext#1,\@nil,}
74 \def\bbl@kvnext#1,{%
75   \ifx\@nil#1\relax\else
76     \bbl@ifblank{#1}{\bbl@forkv@eq#1=\@empty=\@nil{#1}}%
77     \expandafter\bbl@kvnext
78   \fi}
79 \def\bbl@forkv@eq#1=#2=#3\@nil#4{%
80   \bbl@trim@def\bbl@forkv@a{#1}%
81   \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).

```

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

```

\bbl@replace

```

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

```

An extension to the previous macro. It takes into account the parameters, and it is string based (ie, if you replace elax by ho, then \relax becomes \rho). No checking is done at all, because it is not a general purpose macro, and it is used by babel only when it works (an example where it does *not* work is in \bbl@TG@@date, and also fails if there are macros with spaces, because they are retokenized). It may change! (or even merged with \bbl@replace; I'm not sure ckecking the replacement is really necessary or just paranoia).

```

103 \ifx\detokenize\undefined\else % Unused macros if old Plain TeX
104   \bbl@exp{\def\\bbl@parsedef##1\detokenize{macro:}}#2->#3\relax{%
105     \def\bbl@tempa{#1}%
106     \def\bbl@tempb{#2}%
107     \def\bbl@tempe{#3}}
108   \def\bbl@sreplace#1#2#3{%
109     \begingroup
110     \expandafter\bbl@parsedef\meaning#1\relax
111     \def\bbl@tempc{#2}%
112     \edef\bbl@tempc{\expandafter\strip@prefix\meaning\bbl@tempc}%
113     \def\bbl@tempd{#3}%

```

```

114 \edef\bbl@tempd{\expandafter\strip@prefix\meaning\bbl@tempd}%
115 \bbl@xin@{\bbl@tempc}{\bbl@tempe}% If not in macro, do nothing
116 \ifin@
117 \bbl@exp{\bbl@replace\bbl@tempe{\bbl@tempc}{\bbl@tempd}}%
118 \def\bbl@tempc{% Expanded an executed below as 'uplevel'
119 \\\makeatletter % "internal" macros with @ are assumed
120 \\\scantokens{%
121 \bbl@tempa\\@namedef{\bbl@stripslash#1}\bbl@tempb{\bbl@tempe}}%
122 \catcode64=\the\catcode64\relax}% Restore @
123 \else
124 \let\bbl@tempc\@empty % Not \relax
125 \fi
126 \bbl@exp{% For the 'uplevel' assignments
127 \endgroup
128 \bbl@tempc}} % empty or expand to set #1 with changes
129 \fi

```

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

```

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

```

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

```

7.1 Multiple languages

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

160 <<*Define core switching macros>> ≡
161 \ifx\language\@undefined
162 \csname newcount\endcsname\language
163 \fi
164 <</Define core switching macros>>

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

165 <<*Define core switching macros>> ≡
166 \ifx\newlanguage\@undefined
167   \csname newcount\endcsname\last@language
168   \def\addlanguage#1{%
169     \global\advance\last@language\@ne
170     \ifnum\last@language<\@ccclvi
171       \else
172         \errmessage{No room for a new \string\language!}%
173       \fi
174     \global\chardef#1\last@language
175     \wlog{\string#1 = \string\language\the\last@language}}
176   \else
177     \countdef\last@language=19
178     \def\addlanguage{\alloc@9\language\chardef\@ccclvi}
179   \fi
180 <</Define core switching macros>>

```

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

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

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

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

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

The first two options are for debugging.

```

181 (*package)
182 \NeedsTeXFormat{LaTeX2e}[2005/12/01]
183 \ProvidesPackage{babel}[\langle date \rangle \langle version \rangle The Babel package]
184 \@ifpackagewith{babel}{debug}
185   {\providecommand\bbl@trace[1]{\message{^^J[ #1 ]}}%
186    \let\bbl@debug\@firstofone}
187   {\providecommand\bbl@trace[1]{}%
188    \let\bbl@debug\gobble}
189 \langle Basic macros \rangle
190 % Temporarily repeat here the code for errors
191 \def\bbl@error#1#2{%
192   \begingroup
193     \def\{\MessageBreak}%
194     \PackageError{babel}{#1}{#2}%
195   \endgroup}
196 \def\bbl@warning#1{%
197   \begingroup
198     \def\{\MessageBreak}%
199     \PackageWarning{babel}{#1}%
200   \endgroup}
201 \def\bbl@infowarn#1{%
202   \begingroup
203     \def\{\MessageBreak}%
204     \GenericWarning
205       {(babel) \@spaces\@spaces\@spaces}%
206       {Package babel Info: #1}%
207   \endgroup}
208 \def\bbl@info#1{%
209   \begingroup
210     \def\{\MessageBreak}%
211     \PackageInfo{babel}{#1}%
212   \endgroup}
213 \def\bbl@nocaption{\protect\bbl@nocaption@i}
214 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
215   \global\@namedef{#2}{\textbf{?#1?}}%
216   \@nameuse{#2}%
217   \bbl@warning{%
218     \@backslashchar#2 not set. Please, define\%
219     it in the preamble with something like:\%
220     \string\renewcommand\@backslashchar#2{..}\%
221     Reported}}
222 \def\bbl@tentative{\protect\bbl@tentative@i}
223 \def\bbl@tentative@i#1{%
224   \bbl@warning{%
225     Some functions for '#1' are tentative.\%
226     They might not work as expected and their behavior\%
227     could change in the future.\%
228     Reported}}
229 \def\@nolanerr#1{%
230   \bbl@error
231     {You haven't defined the language #1\space yet.\%
232     Perhaps you misspelled it or your installation\%
233     is not complete}%
234   {Your command will be ignored, type <return> to proceed}}

```

```

235 \def\@nopatterns#1{%
236   \bbl@warning
237   {No hyphenation patterns were preloaded for\\%
238     the language `#1' into the format.\\%
239     Please, configure your TeX system to add them and\\%
240     rebuild the format. Now I will use the patterns\\%
241     preloaded for \bbl@nulllanguage\space instead}}
242   % End of errors
243 \@ifpackagewith{babel}{silent}
244   {\let\bbl@info\@gobble
245    \let\bbl@infowarn\@gobble
246    \let\bbl@warning\@gobble}
247   {}
248 %
249 \def\AfterBabelLanguage#1{%
250   \global\expandafter\bbl@add\csname#1.ldf-h@@k\endcsname}%

```

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

```

251 \ifx\bbl@languages\undefined\else
252   \begingroup
253     \catcode`\^^I=12
254     \@ifpackagewith{babel}{showlanguages}{%
255       \begingroup
256         \def\bbl@elt#1#2#3#4{\wlog{#2^^I#1^^I#3^^I#4}}%
257         \wlog{<*languages>}%
258         \bbl@languages
259         \wlog{</languages>}%
260       \endgroup}{%
261     \endgroup
262     \def\bbl@elt#1#2#3#4{%
263       \ifnum#2=\z@
264         \gdef\bbl@nulllanguage{#1}%
265         \def\bbl@elt##1##2##3##4{}}%
266     \fi}%
267   \bbl@languages
268 \fi%

```

7.3 base

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

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

```

269 \bbl@trace{Defining option 'base'}
270 \@ifpackagewith{babel}{base}{%
271   \let\bbl@onlyswitch\@empty
272   \let\bbl@provide@locale\relax
273   \input babel.def
274   \let\bbl@onlyswitch\@undefined
275   \ifx\directlua\@undefined
276     \DeclareOption*{\bbl@patterns{\CurrentOption}}%
277   \else
278     \input luababel.def
279     \DeclareOption*{\bbl@patterns@lua{\CurrentOption}}%
280   \fi

```

```

281 \DeclareOption{base}{}%
282 \DeclareOption{showlanguages}{}%
283 \ProcessOptions
284 \global\expandafter\let\csname opt@babel.sty\endcsname\relax
285 \global\expandafter\let\csname ver@babel.sty\endcsname\relax
286 \global\let@ifl@ter@@\@ifl@ter
287 \def@ifl@ter#1#2#3#4#5{\global\let@ifl@ter\@ifl@ter@@}%
288 \endinput}{}%
289 %
290 %
291 % \subsection{\texttt{key=value} options and other general option}
292 %
293 % The following macros extract language modifiers, and only real
294 % package options are kept in the option list. Modifiers are saved
295 % and assigned to |\BabelModifiers| at |\bbl@load@language|; when
296 % no modifiers have been given, the former is |\relax|. How
297 % modifiers are handled are left to language styles; they can use
298 % |\in@|, loop them with |\@for| or load |keyval|, for example.
299 %
300 % \begin{macrocode}
301 \bbl@trace{key=value and another general options}
302 \bbl@csarg\let{tempa\expandafter}\csname opt@babel.sty\endcsname
303 \def\bbl@tempb#1.#2{%
304   #1\ifx\@empty#2\else,\bbl@afterfi\bbl@tempb#2\fi}%
305 \def\bbl@tempd#1.#2\@nnil{%
306   \ifx\@empty#2%
307     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
308   \else
309     \in@{=}{#1}\ifin@
310     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.#2}%
311   \else
312     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
313     \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}%
314   \fi
315 \fi}
316 \let\bbl@tempc\@empty
317 \bbl@foreach\bbl@tempa{\bbl@tempd#1.\@empty\@nnil}
318 \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.

```

319 \DeclareOption{KeepShorthandsActive}{}
320 \DeclareOption{activeacute}{}
321 \DeclareOption{activegrave}{}
322 \DeclareOption{debug}{}
323 \DeclareOption{noconfigs}{}
324 \DeclareOption{showlanguages}{}
325 \DeclareOption{silent}{}
326 \DeclareOption{mono}{}
327 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
328 % Don't use. Experimental. TODO.
329 \newif\ifbbl@single
330 \DeclareOption{selectors=off}{\bbl@singletrue}
331 <<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.

```
332 \let\bbl@opt@shorthands\@nnil
333 \let\bbl@opt@config\@nnil
334 \let\bbl@opt@main\@nnil
335 \let\bbl@opt@headfoot\@nnil
336 \let\bbl@opt@layout\@nnil
```

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

```
337 \def\bbl@tempa#1=#2\bbl@tempa{%
338   \bbl@csarg\ifx{opt@#1}\@nnil
339     \bbl@csarg\edef{opt@#1}{#2}%
340   \else
341     \bbl@error
342     {Bad option `#1=#2'. Either you have misspelled the\\%
343     key or there is a previous setting of `#1'. Valid\\%
344     keys are, among others, `shorthands', `main', `bidi',\\%
345     `strings', `config', `headfoot', `safe', `math'.}%
346     {See the manual for further details.}
347   \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.

```
348 \let\bbl@language@opts\@empty
349 \DeclareOption*{%
350   \bbl@xin@{\string=}{\CurrentOption}%
351   \ifin@
352     \expandafter\bbl@tempa\CurrentOption\bbl@tempa
353   \else
354     \bbl@add@list\bbl@language@opts{\CurrentOption}%
355   \fi}
```

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

```
356 \ProcessOptions*
```

7.4 Conditional loading of shorthands

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

```
357 \bbl@trace{Conditional loading of shorthands}
358 \def\bbl@sh@string#1{%
359   \ifx#1\@empty\else
360     \ifx#1t\string~%
361     \else\ifx#1c\string,%
362     \else\string#1%
363     \fi\fi
364     \expandafter\bbl@sh@string
365   \fi}
366 \ifx\bbl@opt@shorthands\@nnil
367   \def\bbl@ifshorthand#1#2#3{#2}%
368 \else\ifx\bbl@opt@shorthands\@empty
```

```

369 \def\bbl@ifshorthand#1#2#3{#3}%
370 \else

```

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

```

371 \def\bbl@ifshorthand#1{%
372   \bbl@xin@{\string#1}{\bbl@opt@shorthands}%
373   \ifin@
374     \expandafter\@firstoftwo
375   \else
376     \expandafter\@secondoftwo
377   \fi}

```

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

```

378 \edef\bbl@opt@shorthands{%
379   \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.

```

380 \bbl@ifshorthand{'}%
381   {\PassOptionsToPackage{activeacute}{babel}}{}
382 \bbl@ifshorthand{'}%
383   {\PassOptionsToPackage{activegrave}{babel}}{}
384 \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.

```

385 \ifx\bbl@opt@headfoot\@nnil\else
386   \g@addto@macro\@resetactivechars{%
387     \set@typeset@protect
388     \expandafter\select@language@x\expandafter{\bbl@opt@headfoot}%
389     \let\protect\noexpand}
390 \fi

```

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

```

391 \ifx\bbl@opt@safe\@undefined
392   \def\bbl@opt@safe{BR}
393 \fi
394 \ifx\bbl@opt@main\@nnil\else
395   \edef\bbl@language@opts{%
396     \ifx\bbl@language@opts\@empty\else\bbl@language@opts,\fi
397     \bbl@opt@main}
398 \fi

```

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

```

399 \bbl@trace{Defining IfBabelLayout}
400 \ifx\bbl@opt@layout\@nnil
401   \newcommand\IfBabelLayout[3]{#3}%
402 \else
403   \newcommand\IfBabelLayout[1]{%
404     \@expandtwoargs\in@{.#1.}{.\bbl@opt@layout.}%
405     \ifin@
406       \expandafter\@firstoftwo
407     \else
408       \expandafter\@secondoftwo
409     \fi}
410 \fi

```

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

```
411 \input babel.def
```

7.5 Cross referencing macros

The \LaTeX book states:

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

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

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

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

```
412 <<(*More package options)>> ≡
413 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
414 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
415 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
416 <</More package options>>
```

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

```
417 \bbl@trace{Cross referencing macros}
418 \ifx\bbl@opt@safe\@empty\else
419   \def\@newl@bel#1#2#3{%
420     {\@safe@activestrue
421       \bbl@ifunset{#1@#2}%
422         \relax
423         {\gdef\@multiplelabels{%
424           \@latex@warning@no@line{There were multiply-defined labels}}}%
425           \@latex@warning@no@line{Label `#2' multiply defined}}}%
426     \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.

```
427 \CheckCommand*\@testdef[3]{%
428   \def\reserved@a{#3}%
429   \expandafter\ifx\csname#1@#2\endcsname\reserved@a
430     \else
431       \@tempswatrue
432     \fi}
```

Now that we made sure that `\@testdef` still has the same definition we can rewrite it. First we make the shorthands ‘safe’. Then we use `\bbl@tempa` as an ‘alias’ for the macro that contains the label which is being checked. Then we define `\bbl@tempb` just as `\@newl@bel` does it. When the label is defined we replace the definition of `\bbl@tempa` by its meaning. If the label didn’t change, `\bbl@tempa` and `\bbl@tempb` should be identical macros.

```
433 \def\@testdef#1#2#3{% TODO. With @samestring?
434   \@safe@activestrue
435   \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname
436   \def\bbl@tempb{#3}%
437   \@safe@activesfalse
```

```

438 \ifx\bbl@tempa\relax
439 \else
440 \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
441 \fi
442 \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
443 \ifx\bbl@tempa\bbl@tempb
444 \else
445 \@tempswatrue
446 \fi}
447 \fi

```

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

```

448 \bbl@xin@{R}\bbl@opt@safe
449 \ifin@
450 \bbl@redefineroobust\ref#1{%
451 \@safe@activetrue\org@ref{#1}\@safe@activesfalse}
452 \bbl@redefineroobust\pageref#1{%
453 \@safe@activetrue\org@pageref{#1}\@safe@activesfalse}
454 \else
455 \let\org@ref\ref
456 \let\org@pageref\pageref
457 \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.

```

458 \bbl@xin@{B}\bbl@opt@safe
459 \ifin@
460 \bbl@redefine\@citex[#1]#2{%
461 \@safe@activetrue\edef\@tempa{#2}\@safe@activesfalse
462 \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.

```

463 \AtBeginDocument{%
464 \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.)

```

465 \def\@citex[#1][#2]#3{%
466 \@safe@activetrue\edef\@tempa{#3}\@safe@activesfalse
467 \org@@citex[#1][#2]{\@tempa}}%
468 }{}

```

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

```

469 \AtBeginDocument{%
470 \ifpackageloaded{cite}{%
471 \def\@citex[#1]#2{%

```

```

472     \@safe@activetrue\org@@citex[#1]{#2}\@safe@activesfalse}%
473   }{}}

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

474   \bbl@redefine\nocite#1{%
475     \@safe@activetrue\org@nocite{#1}\@safe@activesfalse}

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

476   \bbl@redefine\bibcite{%
477     \bbl@cite@choice
478     \bibcite}

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

479   \def\bbl@bibcite#1#2{%
480     \org@bibcite{#1}{\@safe@activesfalse#2}}

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

481   \def\bbl@cite@choice{%
482     \global\let\bibcite\bbl@bibcite
483     \@ifpackageloaded{natbib}{\global\let\bibcite\org@bibcite}{}%
484     \@ifpackageloaded{cite}{\global\let\bibcite\org@bibcite}{}%
485     \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.

486   \AtBeginDocument{\bbl@cite@choice}

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

487   \bbl@redefine\@bibitem#1{%
488     \@safe@activetrue\org@@bibitem{#1}\@safe@activesfalse}
489   \else
490     \let\org@nocite\nocite
491     \let\org@@citex\@citex
492     \let\org@bibcite\bibcite
493     \let\org@@bibitem\@bibitem
494   \fi

```

7.6 Marks

\markright Because the output routine is asynchronous, we must pass the current language attribute to the head lines. To achieve this we need to adapt the definition of \markright and \markboth somewhat. However, headlines and footlines can contain text outside marks; for that we must take some actions in the output routine if the 'headfoot' options is used.

We need to make some redefinitions to the output routine to avoid an endless loop and to correctly handle the page number in bidi documents.

```

495 \bbl@trace{Marks}
496 \IfBabelLayout{sectioning}
497   {\ifx\bbl@opt@headfoot\@nnil
498     \g@addto@macro\@resetactivechars{%
499       \set@typeset@protect
500       \expandafter\select@language@x\expandafter{\bbl@main@language}%
501       \let\protect\noexpand
502       \edef\thepage{% TODO. Only with bidi. See also above
503         \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}%
504     \fi}
505   {\ifbbl@single\else
506     \bbl@ifunset{markright } \bbl@redefine\bbl@redefineroobust
507     \markright#1{%
508       \bbl@ifblank{#1}%
509       {\org@markright{}}%
510       {\toks@{#1}}%
511       \bbl@exp{%
512         \org@markright{\protect\foreignlanguage{\language}%
513           {\protect\bbl@restore@actives\the\toks@}}}%

```

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

```

514   \ifx\@mkboth\markboth
515     \def\bbl@tempc{\let\@mkboth\markboth}
516   \else
517     \def\bbl@tempc{}
518   \fi
519   \bbl@ifunset{markboth } \bbl@redefine\bbl@redefineroobust
520   \markboth#1#2{%
521     \protected@edef\bbl@tempb##1{%
522       \protect\foreignlanguage
523       {\language}{\protect\bbl@restore@actives##1}}%
524     \bbl@ifblank{#1}%
525     {\toks@{}}%
526     {\toks@\expandafter{\bbl@tempb{#1}}}%
527     \bbl@ifblank{#2}%
528     {\@temptokena{}}%
529     {\@temptokena\expandafter{\bbl@tempb{#2}}}%
530     \bbl@exp{\org@markboth{\the\toks@}{\the\@temptokena}}
531     \bbl@tempc
532   \fi} % end ifbbl@single, end \IfBabelLayout

```

7.7 Preventing clashes with other packages

7.7.1 ifthen

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

```

\ifthenelse{\isodd{\pageref{some:label}}}{
  {code for odd pages}
  {code for even pages}
}

```

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

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

Then we can set the `\@safe@activeswitch` 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.

```

533 \bbl@trace{Preventing clashes with other packages}
534 \bbl@xin@{R}\bbl@opt@safe
535 \ifin@
536   \AtBeginDocument{%
537     \@ifpackageloaded{ifthen}{%
538       \bbl@redefine@long\ifthenelse#1#2#3{%
539         \let\bbl@temp@pref\pageref
540         \let\pageref\org@pageref
541         \let\bbl@temp@ref\ref
542         \let\ref\org@ref
543         \@safe@activestrue
544         \org@ifthenelse{#1}%
545         {\let\pageref\bbl@temp@pref
546          \let\ref\bbl@temp@ref
547          \@safe@activesfalse
548          #2}%
549         {\let\pageref\bbl@temp@pref
550          \let\ref\bbl@temp@ref
551          \@safe@activesfalse
552          #3}%
553       }%
554     }{}%
555   }

```

7.7.2 varioref

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

```

556 \AtBeginDocument{%
557   \@ifpackageloaded{varioref}{%
558     \bbl@redefine\@@vpageref#1[#2]#3{%
559       \@safe@activestrue
560       \org@@@vpageref{#1}[#2]{#3}%
561       \@safe@activesfalse}%
562     \bbl@redefine\vrefpagemum#1#2{%
563       \@safe@activestrue
564       \org@vrefpagemum{#1}{#2}%
565       \@safe@activesfalse}%

```

The package `varioref` defines `\Ref` to be a robust command which uppercases the first character of the reference text. In order to be able to do that it needs to access the expandable form of `\ref`. So we employ a little trick here. We redefine the (internal)

command `\Ref` to call `\org@ref` instead of `\ref`. The disadvantage of this solution is that whenever the definition of `\Ref` changes, this definition needs to be updated as well.

```
566 \expandafter\def\csname Ref \endcsname#1{%
567 \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
568 }{}%
569 }
570 \fi
```

7.7.3 hhline

`\hhline` Delaying the activation of the shorthand characters has introduced a problem with the `hhline` package. The reason is that it uses the ‘:’ character which is made active by the french support in `babel`. Therefore we need to *reload* the package when the ‘:’ is an active character. Note that this happens *after* the category code of the @-sign has been changed to other, so we need to temporarily change it to letter again.

```
571 \AtEndOfPackage{%
572 \AtBeginDocument{%
573 \@ifpackageloaded{hhline}%
574 {\expandafter\ifx\csname normal@char\string:\endcsname\relax
575 \else
576 \makeatletter
577 \def\@currname{hhline}\input{hhline.sty}\makeatother
578 \fi}%
579 {}}}
```

7.7.4 hyperref

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

```
580 \AtBeginDocument{%
581 \ifx\pdfstringdefDisableCommands\undefined\else
582 \pdfstringdefDisableCommands{\languageshorthands{system}}%
583 \fi}
```

7.7.5 fancyhdr

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

```
584 \DeclareRobustCommand{\FOREIGNLANGUAGE}[1]{%
585 \lowercase{\foreignlanguage{#1}}}
```

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

```
586 \def\substitutefontfamily#1#2#3{%
587 \lowercase{\immediate\openout15=#1#2.fd\relax}%
588 \immediate\write15{%
589 \string\ProvidesFile{#1#2.fd}%
590 [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
591 \space generated font description file]^^J
592 \string\DeclareFontFamily{#1}{#2}{}}^^J
```

```

593 \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{}}^^J
594 \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{}}^^J
595 \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{}}^^J
596 \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{}}^^J
597 \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{}}^^J
598 \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{}}^^J
599 \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{}}^^J
600 \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{}}^^J
601 }%
602 \closeout15
603 }
604 \@onlypreamble\substitutefontfamily

```

7.8 Encoding and fonts

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

`\ensureascii`

```

605 \bbl@trace{Encoding and fonts}
606 \newcommand\BabelNonASCII{LGR,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU,PU,PD1}
607 \newcommand\BabelNonText{TS1,T3,TS3}
608 \let\org@TeX\TeX
609 \let\org@LaTeX\LaTeX
610 \let\ensureascii\@firstofone
611 \AtBeginDocument{%
612   \in@false
613   \bbl@foreach\BabelNonASCII{% is there a text non-ascii enc?
614     \ifin@ \else
615       \lowercase{\bbl@xin@{,#1enc.def,}}{\@filelist,}}%
616     \fi}%
617   \ifin@ % if a text non-ascii has been loaded
618     \def\ensureascii#1{{\fontencoding{OT1}\selectfont#1}}%
619     \DeclareTextCommandDefault{\TeX}{\org@TeX}%
620     \DeclareTextCommandDefault{\LaTeX}{\org@LaTeX}%
621     \def\bbl@tempb#1\@@{\uppercase{\bbl@tempc#1}ENC.DEF\empty\@@}%
622     \def\bbl@tempc#1ENC.DEF#2\@@{%
623       \ifx\empty#2\else
624         \bbl@ifunset{T#1}%
625         {}%
626         {\bbl@xin@{,#1,}}{\BabelNonASCII,\BabelNonText,}%
627       \ifin@
628         \DeclareTextCommand{\TeX}{#1}{\ensureascii{\org@TeX}}%
629         \DeclareTextCommand{\LaTeX}{#1}{\ensureascii{\org@LaTeX}}%
630       \else
631         \def\ensureascii#1{{\fontencoding{#1}\selectfont#1}}%
632       \fi}%
633     \fi}%
634   \bbl@foreach\@filelist{\bbl@tempb#1\@@}% TODO - \@@ de mas??
635   \bbl@xin@{,\cf@encoding,}{,\BabelNonASCII,\BabelNonText,}%
636   \ifin@ \else
637     \edef\ensureascii#1{%
638       \noexpand\fontencoding{\cf@encoding}\noexpand\selectfont#1}}%

```

```

639   \fi
640   \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.

```

641 \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.

```

642 \AtBeginDocument{%
643   \@ifpackageloaded{fontspec}%
644     {\xdef\latinencoding{%
645       \ifx\UTFencname\@undefined
646         EU\ifcase\bbl@engine\or2\or1\fi
647       \else
648         \UTFencname
649       \fi}}%
650   {\gdef\latinencoding{OT1}%
651     \ifx\cf@encoding\bbl@t@one
652       \xdef\latinencoding{\bbl@t@one}%
653     \else
654       \ifx\@fontenc@load@list\@undefined
655         \@ifl@aded{def}{t1enc}{\xdef\latinencoding{\bbl@t@one}}}%
656       \else
657         \def\@elt#1{,#1,}%
658         \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
659         \let\@elt\relax
660         \bbl@xin@{,T1,}\bbl@tempa
661         \ifin@
662           \xdef\latinencoding{\bbl@t@one}%
663         \fi
664       \fi
665     \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.

```

666 \DeclareRobustCommand{\latintext}{%
667   \fontencoding{\latinencoding}\selectfont
668   \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.

```

669 \ifx\@undefined\DeclareTextFontCommand
670   \DeclareRobustCommand{\textlatin}[1]{\leavevmode\latintext #1}}
671 \else
672   \DeclareTextFontCommand{\textlatin}{\latintext}
673 \fi

```

7.9 Basic bidi support

Work in progress. This code is currently placed here for practical reasons. It will be moved to the correct place soon, I hope.

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

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

- `pdfTeX` provides a minimal support for bidi text, and it must be done by hand. Vertical typesetting is not possible.
- `xetex` is somewhat better, thanks to its font engine (even if not always reliable) and a few additional tools. However, very little is done at the paragraph level. Another challenging problem is text direction does not honour \TeX grouping.
- `luatex` can provide the most complete solution, as we can manipulate almost freely the node list, the generated lines, and so on, but bidi text does not work out of the box and some development is necessary. It also provides tools to properly set left-to-right and right-to-left page layouts. As `Lua \TeX -ja` shows, vertical typesetting is possible, too.

As a first step, add a handler for bidi and digits (and potentially other processes) just before `luaotfload` is applied, which is loaded by default by \LaTeX . Just in case, consider the possibility it has not been loaded.

```
674 \ifodd\bbl@engine
675   \def\bbl@activate@preotf{%
676     \let\bbl@activate@preotf\relax % only once
677     \directlua{
678       Babel = Babel or {}
679       %
680       function Babel.pre_otfload_v(head)
681         if Babel.numbers and Babel.digits_mapped then
682           head = Babel.numbers(head)
683         end
684         if Babel.bidi_enabled then
685           head = Babel.bidi(head, false, dir)
686         end
687         return head
688       end
689       %
690       function Babel.pre_otfload_h(head, gc, sz, pt, dir)
691         if Babel.numbers and Babel.digits_mapped then
692           head = Babel.numbers(head)
693         end
694         if Babel.bidi_enabled then
695           head = Babel.bidi(head, false, dir)
696         end
697         return head
698       end
699       %
700       luatexbase.add_to_callback('pre_linebreak_filter',
701         Babel.pre_otfload_v,
702         'Babel.pre_otfload_v',
```

```

703     luatexbase.priority_in_callback('pre_linebreak_filter',
704     'luaotfload.node_processor') or nil)
705 %
706     luatexbase.add_to_callback('hpack_filter',
707     Babel.pre_otfload_h,
708     'Babel.pre_otfload_h',
709     luatexbase.priority_in_callback('hpack_filter',
710     'luaotfload.node_processor') or nil)
711 }}
712 \fi

```

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

```

713 \bbl@trace{Loading basic (internal) bidi support}
714 \ifodd\bbl@engine
715   \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
716     \let\bbl@beforeforeign\leavevmode
717     \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
718     \RequirePackage{luatexbase}
719     \bbl@activate@preotf
720     \directlua{
721       require('babel-data-bidi.lua')
722       \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
723         require('babel-bidi-basic.lua')
724       \or
725         require('babel-bidi-basic-r.lua')
726       \fi}
727     % TODO - to locale_props, not as separate attribute
728     \newattribute\bbl@attr@dir
729     % TODO. I don't like it, hackish:
730     \bbl@exp{\output{\bodydir\pagedir\the\output}}
731     \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
732   \fi\fi
733 \else
734   \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
735     \bbl@error
736     {The bidi method 'basic' is available only in\\%
737     luatex. I'll continue with 'bidi=default', so\\%
738     expect wrong results}%
739     {See the manual for further details.}%
740     \let\bbl@beforeforeign\leavevmode
741     \AtEndOfPackage{%
742       \EnableBabelHook{babel-bidi}%
743       \bbl@xebidipar}
744   \fi\fi
745   \def\bbl@loadxebidi#1{%
746     \ifx\RTLfootnotetext\@undefined
747       \AtEndOfPackage{%
748         \EnableBabelHook{babel-bidi}%
749         \ifx\fontspec\@undefined
750           \usepackage{fontspec}% bidi needs fontspec
751         \fi
752         \usepackage#1{bidi}}%
753     \fi}
754   \ifnum\bbl@bidimode>200
755     \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
756       \bbl@tentative{bidi=bidi}
757       \bbl@loadxebidi{}
758     \or

```

```

759     \bbl@tentative{bidi=bidi-r}
760     \bbl@loadxebidi{[rl]document}}
761   \or
762     \bbl@tentative{bidi=bidi-l}
763     \bbl@loadxebidi{}
764   \fi
765 \fi
766 \fi
767 \ifnum\bbl@bidimode=\@ne
768   \let\bbl@beforeforeign\leavevmode
769   \ifodd\bbl@engine
770     \newattribute\bbl@attr@dir
771     \bbl@exp{\output{\bodydir\pagedir\the\output}}}%
772   \fi
773   \AtEndOfPackage{%
774     \EnableBabelHook{babel-bidi}%
775     \ifodd\bbl@engine\else
776       \bbl@xebidipar
777     \fi}
778 \fi

```

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

```

779 \bbl@trace{Macros to switch the text direction}
780 \def\bbl@alscripts{,Arabic,Syriac,Thaana,}
781 \def\bbl@rscripts{% TODO. Base on codes ??
782   ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
783   Old Hungarian,Old Hungarian,Lydian,Mandaean,Manichaeen,%
784   Manichaeen,Meroitic Cursive,Meroitic,Old North Arabian,%
785   Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
786   Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%
787   Old South Arabian,}%
788 \def\bbl@provide@dirs#1{%
789   \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts\bbl@rscripts}%
790   \ifin@
791     \global\bbl@csarg\chardef{wdir@#1}\@ne
792     \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts}%
793   \ifin@
794     \global\bbl@csarg\chardef{wdir@#1}\tw@ % useless in xetex
795   \fi
796   \else
797     \global\bbl@csarg\chardef{wdir@#1}\z@
798   \fi
799   \ifodd\bbl@engine
800     \bbl@csarg\ifcase{wdir@#1}%
801       \directlua{ Babel.locale_props[\the\localeid].textdir = 'l' }%
802     \or
803       \directlua{ Babel.locale_props[\the\localeid].textdir = 'r' }%
804     \or
805       \directlua{ Babel.locale_props[\the\localeid].textdir = 'al' }%
806     \fi
807   \fi}
808 \def\bbl@switchdir{%
809   \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}}%
810   \bbl@ifunset{bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}}%
811   \bbl@exp{\bbl@setdirs\bbl@cl{wdir}}}%
812 \def\bbl@setdirs#1{% TODO - math
813   \ifcase\bbl@select@type % TODO - strictly, not the right test
814     \bbl@bodydir{#1}%

```



```

815 \bbl@pardir{#1}%
816 \fi
817 \bbl@textdir{#1}}
818% TODO. Only if \bbl@bidimode > 0?:
819 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
820 \DisableBabelHook{babel-bidi}

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

821 \ifodd\bbl@engine % luatex=1
822 \chardef\bbl@thetextdir\z@
823 \chardef\bbl@thepardir\z@
824 \def\bbl@getluadir#1{%
825 \directlua{
826 if tex.#1dir == 'TLT' then
827 tex.sprint('0')
828 elseif tex.#1dir == 'TRT' then
829 tex.sprint('1')
830 end}}
831 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\textdir.. 3=0 lr/1 rl
832 \ifcase#3\relax
833 \ifcase\bbl@getluadir{#1}\relax\else
834 #2 TLT\relax
835 \fi
836 \else
837 \ifcase\bbl@getluadir{#1}\relax
838 #2 TRT\relax
839 \fi
840 \fi}
841 \def\bbl@textdir#1{%
842 \bbl@setluadir{text}\textdir{#1}%
843 \chardef\bbl@thetextdir#1\relax
844 \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*3+#1}}
845 \def\bbl@pardir#1{%
846 \bbl@setluadir{par}\pardir{#1}%
847 \chardef\bbl@thepardir#1\relax}
848 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}
849 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}
850 \def\bbl@dirparastext{\pardir\the\textdir\relax}% %%%
851 % Sadly, we have to deal with boxes in math with basic.
852 % Activated every math with the package option bidi=:
853 \def\bbl@mathboxdir{%
854 \ifcase\bbl@thetextdir\relax
855 \everyhbox{\textdir TLT\relax}%
856 \else
857 \everyhbox{\textdir TRT\relax}%
858 \fi}
859 \frozen@everymath\expandafter{%
860 \expandafter\bbl@mathboxdir\the\frozen@everymath}
861 \frozen@everydisplay\expandafter{%
862 \expandafter\bbl@mathboxdir\the\frozen@everydisplay}
863 \else % pdftex=0, xetex=2
864 \newcount\bbl@dirlevel
865 \chardef\bbl@thetextdir\z@
866 \chardef\bbl@thepardir\z@
867 \def\bbl@textdir#1{%
868 \ifcase#1\relax
869 \chardef\bbl@thetextdir\z@
870 \bbl@textdir@i\beginL\endL
871 \else

```

```

872     \chardef\bbl@thetextdir\@ne
873     \bbl@textdir@i\beginR\endR
874   \fi}
875 \def\bbl@textdir@i#1#2{%
876   \ifhmode
877     \ifnum\currentgrouplevel>\z@
878       \ifnum\currentgrouplevel=\bbl@dirlevel
879         \bbl@error{Multiple bidi settings inside a group}%
880         {I'll insert a new group, but expect wrong results.}%
881         \bgroup\aftergroup#2\aftergroup\egroup
882       \else
883         \ifcase\currentgrouptype\or % 0 bottom
884           \aftergroup#2% 1 simple {}
885         \or
886           \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
887         \or
888           \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
889         \or\or % vbox vtop align
890         \or
891           \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
892         \or\or\or\or\or\or % output math disc insert vcent mathchoice
893         \or
894           \aftergroup#2% 14 \begingroup
895         \else
896           \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
897         \fi
898       \fi
899       \bbl@dirlevel\currentgrouplevel
900     \fi
901     #1%
902   \fi}
903 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
904 \let\bbl@bodydir\@gobble
905 \let\bbl@pagedir\@gobble
906 \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).

```

907 \def\bbl@xebidipar{%
908   \let\bbl@xebidipar\relax
909   \TeXeTstate\@ne
910   \def\bbl@xeverypar{%
911     \ifcase\bbl@thepardir
912       \ifcase\bbl@thetextdir\else\beginR\fi
913     \else
914       {\setbox\z@\lastbox\beginR\box\z@}%
915     \fi}%
916   \let\bbl@severypar\everypar
917   \newtoks\everypar
918   \everypar=\bbl@severypar
919   \bbl@severypar{\bbl@xeverypar\the\everypar}}
920 \ifnum\bbl@bidimode>200
921   \let\bbl@textdir@i\@gobbletwo
922   \let\bbl@xebidipar\@empty
923   \AddBabelHook{bidi}{foreign}{%
924     \def\bbl@tempa{\def\BabelText####1}%
925     \ifcase\bbl@thetextdir
926       \expandafter\bbl@tempa\expandafter{\BabelText{\LR{####1}}}%

```

```

927 \else
928 \expandafter\babel@tempa\expandafter{\BabelText{\RL{##1}}}%
929 \fi}
930 \def\babel@pardir#1{\ifcase#1\relax\setLR\else\setRL\fi}
931 \fi
932 \fi

```

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

```

933 \DeclareRobustCommand\babelsublr[1]{\leavevmode{\babel@textdir\z@#1}}
934 \AtBeginDocument{%
935 \ifx\pdfstringdefDisableCommands\@undefined\else
936 \ifx\pdfstringdefDisableCommands\relax\else
937 \pdfstringdefDisableCommands{\let\babelsublr\@firstofone}%
938 \fi
939 \fi}

```

7.10 Local Language Configuration

`\loadlocalcfg` At some sites it may be necessary to add site-specific actions to a language definition file. This can be done by creating a file with the same name as the language definition file, but with the extension `.cfg`. For instance the file `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`.

```

940 \babel@trace{Local Language Configuration}
941 \ifx\loadlocalcfg\@undefined
942 \ifpackagewith{babel}{noconfigs}%
943 {\let\loadlocalcfg\@gobble}%
944 {\def\loadlocalcfg#1{%
945 \InputIfFileExists{#1.cfg}%
946 {\typeout{*****^J%
947 * Local config file #1.cfg used^^J%
948 *}}}%
949 \@empty}}
950 \fi

```

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

```

951 \ifx\@unexpandable@protect\@undefined
952 \def\@unexpandable@protect{\noexpand\protect\noexpand}
953 \long\def\protected@write#1#2#3{%
954 \begingroup
955 \let\thepage\relax
956 #2%
957 \let\protect\@unexpandable@protect
958 \edef\reserved@a{\write#1{#3}}%
959 \reserved@a
960 \endgroup
961 \if@nolbreak\ifvmode\nobreak\fi\fi}
962 \fi
963 %
964 % \subsection{Language options}
965 %
966 % Languages are loaded when processing the corresponding option
967 % \textit{except} if a |main| language has been set. In such a
968 % case, it is not loaded until all options has been processed.
969 % The following macro inputs the ldf file and does some additional

```

```

970% checks (|\input| works, too, but possible errors are not caught).
971%
972%   \begin{macrocode}
973 \bbl@trace{Language options}
974 \let\bbl@afterlang\relax
975 \let\babelModifiers\relax
976 \let\bbl@loaded\@empty
977 \def\bbl@load@language#1{%
978   \InputIfFileExists{#1.ldf}%
979   {\edef\bbl@loaded{\CurrentOption
980     \ifx\bbl@loaded\@empty\else,\bbl@loaded\fi}%
981     \expandafter\let\expandafter\bbl@afterlang
982       \csname\CurrentOption.ldf-h@@k\endcsname
983     \expandafter\let\expandafter\babelModifiers
984       \csname bbl@mod@\CurrentOption\endcsname}%
985   {\bbl@error{%
986     Unknown option '\CurrentOption'. Either you misspelled it\\%
987     or the language definition file \CurrentOption.ldf was not found}{%
988     Valid options are: shorthands=, KeepShorthandsActive,\\%
989     activeacute, activegrave, noconfigs, safe=, main=, math=\\%
990     headfoot=, strings=, config=, hyphenmap=, or a language name.}}}

```

Now, we set a few language options whose names are different from ldf files. These declarations are preserved for backwards compatibility, but they must be eventually removed. Use proxy files instead.

```

991 \def\bbl@try@load@lang#1#2#3{%
992   \IfFileExists{\CurrentOption.ldf}%
993   {\bbl@load@language{\CurrentOption}}%
994   {#1\bbl@load@language{#2}#3}}
995 \DeclareOption{afrikaans}{\bbl@try@load@lang{}{dutch}}{}
996 \DeclareOption{hebrew}{%
997   \input{rlbabel.def}%
998   \bbl@load@language{hebrew}}
999 \DeclareOption{hungarian}{\bbl@try@load@lang{}{magyar}}{}
1000 \DeclareOption{lowersorbian}{\bbl@try@load@lang{}{lsorbian}}{}
1001 \DeclareOption{nynorsk}{\bbl@try@load@lang{}{norsk}}{}
1002 \DeclareOption{polutonikogreek}{%
1003   \bbl@try@load@lang{}{greek}{\languageattribute{greek}{polutoniko}}}
1004 \DeclareOption{russian}{\bbl@try@load@lang{}{russianb}}{}
1005 \DeclareOption{ukrainian}{\bbl@try@load@lang{}{ukraineb}}{}
1006 \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.

```

1007 \ifx\bbl@opt@config\@nnil
1008   \@ifpackagewith{babel}{noconfigs}}{}%
1009   {\InputIfFileExists{bblopts.cfg}%
1010     {\typeout{*****^J%
1011       * Local config file bblopts.cfg used^^J%
1012       *}}}%
1013   {}}%
1014 \else
1015   \InputIfFileExists{\bbl@opt@config.cfg}%
1016   {\typeout{*****^J%
1017     * Local config file \bbl@opt@config.cfg used^^J%

```

```

1018         *}}%
1019     {\bbl@error{%
1020         Local config file '\bbl@opt@config.cfg' not found}{%
1021         Perhaps you misspelled it.}}%
1022 \fi

```

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

```

1023 \bbl@for\bbl@tempa\bbl@language@opts{%
1024     \bbl@ifunset{ds@\bbl@tempa}%
1025     {\edef\bbl@tempb{%
1026         \noexpand\DeclareOption
1027         {\bbl@tempa}%
1028         {\noexpand\bbl@load@language{\bbl@tempa}}}%
1029     \bbl@tempb}%
1030     \@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.

```

1031 \bbl@foreach\@classoptionslist{%
1032     \bbl@ifunset{ds@#1}%
1033     {\IfFileExists{#1.ldf}%
1034     {\DeclareOption{#1}{\bbl@load@language{#1}}}%
1035     {}}%
1036     {}}

```

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

```

1037 \ifx\bbl@opt@main\@nnil\else
1038     \expandafter
1039     \let\expandafter\bbl@loadmain\csname ds@\bbl@opt@main\endcsname
1040     \DeclareOption{\bbl@opt@main}{}
1041 \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):

```

1042 \def\AfterBabelLanguage#1{%
1043     \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang{}}
1044     \DeclareOption*{}
1045     \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`.

```

1046 \bbl@trace{Option 'main'}
1047 \ifx\bbl@opt@main\@nnil
1048     \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
1049     \let\bbl@tempc\@empty
1050     \bbl@for\bbl@tempb\bbl@tempa{%
1051         \bbl@xin@{\bbl@tempb,}{\bbl@loaded,}%
1052         \ifin@ \edef\bbl@tempc{\bbl@tempb}\fi}

```

```

1053 \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
1054 \expandafter\bbl@tempa\bbl@loaded,\@nnil
1055 \ifx\bbl@tempb\bbl@tempc\else
1056   \bbl@warning{%
1057     Last declared language option is '\bbl@tempc',\%
1058     but the last processed one was '\bbl@tempb'.\%
1059     The main language cannot be set as both a global\%
1060     and a package option. Use 'main=\bbl@tempc' as\%
1061     option. Reported}%
1062   \fi
1063 \else
1064   \DeclareOption{\bbl@opt@main}{\bbl@loadmain}
1065   \ExecuteOptions{\bbl@opt@main}
1066   \DeclareOption*{}
1067   \ProcessOptions*
1068 \fi
1069 \def\AfterBabelLanguage{%
1070   \bbl@error
1071     {Too late for \string\AfterBabelLanguage}%
1072     {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.

1073 \ifx\bbl@main@language\@undefined
1074   \bbl@info{%
1075     You haven't specified a language. I'll use 'nil'\%
1076     as the main language. Reported}
1077   \bbl@load@language{nil}
1078 \fi
1079 \</package>
1080 \<*core>

```

8 The kernel of Babel (babel.def, common)

The kernel of the babel system is currently stored in babel.def. The file babel.def contains most of the code. The file hyphen.cfg is a file that can be loaded into the format, which is necessary when you want to be able to switch hyphenation patterns. Because plain T_EX users might want to use some of the features of the babel system too, care has to be taken that plain T_EX can process the files. For this reason the current format will have to be checked in a number of places. Some of the code below is common to plain T_EX and L^AT_EX, some of it is for the L^AT_EX case only. Plain formats based on etex (etex, xetex, luatex) don't load hyphen.cfg but etex.src, which follows a different naming convention, so we need to define the babel names. It presumes language.def exists and it is the same file used when formats were created.

8.1 Tools

```

1081 \ifx\ldf@quit\@undefined\else
1082 \endinput\fi % Same line!
1083 \<<Make sure ProvidesFile is defined>>
1084 \ProvidesFile{babel.def}[\<<date>>] \<<version>> Babel common definitions]

```

The file babel.def expects some definitions made in the L^AT_EX 2_ε style file. So, In L^AT_EX 2.09 and Plain we must provide at least some predefined values as well some tools to set them (even if not all options are available). There are no package options, and therefore an alternative mechanism is provided. For the moment, only \babeloptionstrings and

`\babeloptionmath` are provided, which can be defined before loading babel.
`\BabelModifiers` can be set too (but not sure it works).

```

1085 \ifx\AtBeginDocument\@undefined % TODO. change test.
1086 <<Emulate LaTeX>>
1087 \def\language{english}%
1088 \let\bbl@opt@shorthands\@nnil
1089 \def\bbl@ifshorthand#1#2#3{#2}%
1090 \let\bbl@language@opts\@empty
1091 \ifx\babeloptionstrings\@undefined
1092   \let\bbl@opt@strings\@nnil
1093 \else
1094   \let\bbl@opt@strings\babeloptionstrings
1095 \fi
1096 \def\BabelStringsDefault{generic}
1097 \def\bbl@tempa{normal}
1098 \ifx\babeloptionmath\bbl@tempa
1099   \def\bbl@mathnormal{\noexpand\textormath}
1100 \fi
1101 \def\AfterBabelLanguage#1#2{}
1102 \ifx\BabelModifiers\@undefined\let\BabelModifiers\relax\fi
1103 \let\bbl@afterlang\relax
1104 \def\bbl@opt@safe{BR}
1105 \ifx\@uclclist\@undefined\let\@uclclist\@empty\fi
1106 \ifx\bbl@trace\@undefined\def\bbl@trace#1{}\fi
1107 \expandafter\newif\csname ifbbl@single\endcsname
1108 \chardef\bbl@bidimode\z@
1109 \fi

```

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

```

1110 \ifx\bbl@trace\@undefined
1111   \let\LdfInit\endinput
1112 \def\ProvidesLanguage#1{\endinput}
1113 \endinput\fi % Same line!

```

And continue.

9 Multiple languages

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

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

```

1114 <<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.

```

1115 \def\bbl@version{<<version>>}
1116 \def\bbl@date{<<date>>}
1117 \def\adddialect#1#2{%
1118   \global\chardef#1#2\relax
1119   \bbl@usehooks{adddialect}{#1}{#2}}%
1120 \begingroup
1121   \count@#1\relax
1122   \def\bbl@elt##1##2##3##4{%
1123     \ifnum\count@=##2\relax
1124       \bbl@info{\string#1 = using hyphenrules for ##1\\%
1125         (\string\language\the\count@)}%
1126       \def\bbl@elt####1####2####3####4{%

```

```

1127     \fi}%
1128     \bbl@cs{languages}%
1129 \endgroup}

```

\bbl@iflanguage executes code only if the language l@ exists. Otherwise raises and error. The argument of \bbl@fixname has to be a macro name, as it may get “fixed” if casing (lc/uc) is wrong. It’s 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.

```

1130 \def\bbl@fixname#1{%
1131   \begingroup
1132   \def\bbl@tempe{l@}%
1133   \edef\bbl@tempd{\noexpand\@ifundefined{\noexpand\bbl@tempe#1}}%
1134   \bbl@tempd
1135     {\lowercase\expandafter{\bbl@tempd}%
1136     {\uppercase\expandafter{\bbl@tempd}%
1137     \@empty
1138     {\edef\bbl@tempd{\def\noexpand#1{#1}}%
1139     \uppercase\expandafter{\bbl@tempd}}}%
1140     {\edef\bbl@tempd{\def\noexpand#1{#1}}%
1141     \lowercase\expandafter{\bbl@tempd}}}%
1142   \@empty
1143   \edef\bbl@tempd{\endgroup\def\noexpand#1{#1}}%
1144   \bbl@tempd
1145   \bbl@exp{\bbl@usehooks{language}{\language}{#1}}}%
1146 \def\bbl@iflanguage#1{%
1147   \@ifundefined{l@#1}{\@nolanerr{#1}\@gobble}\@firstofone}

```

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

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

```

1148 \def\bbl@bcpcase#1#2#3#4\@#5{%
1149   \ifx\@empty#3%
1150     \uppercase{\def#5{#1#2}}%
1151   \else
1152     \uppercase{\def#5{#1}}%
1153     \lowercase{\edef#5{#5#2#3#4}}%
1154   \fi}
1155 \def\bbl@bcpllookup#1-#2-#3-#4\@{%
1156   \let\bbl@bcp\relax
1157   \lowercase{\def\bbl@tempa{#1}}%
1158   \ifx\@empty#2%
1159     \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
1160   \else\ifx\@empty#3%
1161     \bbl@bcpcase#2\@empty\@empty\@{\bbl@tempb
1162     \IfFileExists{babel-\bbl@tempa-\bbl@tempb.ini}%
1163     {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb}}}%
1164     {}%
1165   \ifx\bbl@bcp\relax
1166     \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
1167   \fi
1168   \else

```



```

1169 \bbl@bcpcase#2\@empty\@empty\@@\bbl@tempb
1170 \bbl@bcpcase#3\@empty\@empty\@@\bbl@tempc
1171 \IfFileExists{babel-\bbl@tempa-\bbl@tempb-\bbl@tempc.ini}%
1172 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb-\bbl@tempc}}}%
1173 {}%
1174 \ifx\bbl@bcp\relax
1175 \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
1176 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}}%
1177 {}%
1178 \fi
1179 \ifx\bbl@bcp\relax
1180 \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
1181 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}}%
1182 {}%
1183 \fi
1184 \ifx\bbl@bcp\relax
1185 \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}}}%
1186 \fi
1187 \fi\fi}
1188 \let\bbl@autoload@options\@empty
1189 \let\bbl@initoload\relax
1190 \def\bbl@provide@locale{%
1191 \ifx\babelprovide\undefined
1192 \bbl@error{For a language to be defined on the fly 'base'\\%
1193 is not enough, and the whole package must be\\%
1194 loaded. Either delete the 'base' option or\\%
1195 request the languages explicitly}%
1196 {See the manual for further details.}%
1197 \fi
1198 % TODO. Option to search if loaded, with \LocaleForEach
1199 \let\bbl@auxname\language % Still necessary. TODO
1200 \bbl@ifunset{bbl@bcp@map@\language}{}% Move uplevel??
1201 {\edef\language{\@nameuse{bbl@bcp@map@\language}}}%
1202 \ifbbl@bcpallowed
1203 \expandafter\ifx\csname date\language\endcsname\relax
1204 \expandafter
1205 \bbl@bcplookup\language-\@empty-\@empty-\@empty\@@
1206 \ifx\bbl@bcp\relax\else % Returned by \bbl@bcplookup
1207 \edef\language{\bbl@bcp@prefix\bbl@bcp}%
1208 \edef\localename{\bbl@bcp@prefix\bbl@bcp}%
1209 \expandafter\ifx\csname date\language\endcsname\relax
1210 \let\bbl@initoload\bbl@bcp
1211 \bbl@exp{\bbl@babelprovide[\bbl@autoload@bcpoptions]{\language}}%
1212 \let\bbl@initoload\relax
1213 \fi
1214 \bbl@csarg\xdef{bcp@map@\bbl@bcp}{\localename}%
1215 \fi
1216 \fi
1217 \fi
1218 \expandafter\ifx\csname date\language\endcsname\relax
1219 \IfFileExists{babel-\language.tex}%
1220 {\bbl@exp{\bbl@babelprovide[\bbl@autoload@options]{\language}}}%
1221 {}%
1222 \fi}

```

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

either the second or the third argument.

```
1223 \def\iflanguage#1{%
1224   \bbl@iflanguage{#1}{%
1225     \ifnum\csname l@#1\endcsname=\language
1226       \expandafter\@firstoftwo
1227     \else
1228       \expandafter\@secondoftwo
1229     \fi}}
```

9.1 Selecting the language

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

```
1230 \let\bbl@select@type\z@
1231 \edef\selectlanguage{%
1232   \noexpand\protect
1233   \expandafter\noexpand\csname selectlanguage \endcsname}
```

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

```
1234 \ifx\@undefined\protect\let\protect\relax\fi
```

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

```
1235 \let\xstring\string
```

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

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

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

```
1236 \def\bbl@language@stack{}
```

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

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

`\bbl@pop@language`

```
1237 \def\bbl@push@language{%
1238   \ifx\language\@undefined\else
1239     \xdef\bbl@language@stack{\language+\bbl@language@stack}%
1240   \fi}
```

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

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

```
1241 \def\bbl@pop@lang#1+#2&#3{%
1242   \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.

```
1243 \let\bbl@ifrestoring\@secondoftwo
1244 \def\bbl@pop@language{%
1245   \expandafter\bbl@pop@lang\bbl@language@stack&\bbl@language@stack
1246   \let\bbl@ifrestoring\@firstoftwo
1247   \expandafter\bbl@set@language\expandafter{\language}%
1248   \let\bbl@ifrestoring\@secondoftwo}
```

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

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

```
1249 \chardef\localeid\z@
1250 \def\bbl@id@last{0} % No real need for a new counter
1251 \def\bbl@id@assign{%
1252   \bbl@ifunset{bbl@id@\language}%
1253   {\count@bbl@id@last\relax
1254    \advance\count@@ne
1255    \bbl@csarg\chardef{id@\language}\count@
1256    \edef\bbl@id@last{\the\count@}%
1257    \ifcase\bbl@engine\or
1258      \directlua{
1259        Babel = Babel or {}
1260        Babel.locale_props = Babel.locale_props or {}
1261        Babel.locale_props[\bbl@id@last] = {}
1262        Babel.locale_props[\bbl@id@last].name = '\language'
1263      }%
1264    \fi}%
1265   {}}%
1266   \chardef\localeid\bbl@c{id@}}
```

The unprotected part of `\selectlanguage`.

```
1267 \expandafter\def\csname selectlanguage \endcsname#1{%
1268   \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\tw\fi
1269   \bbl@push@language
1270   \aftergroup\bbl@pop@language
1271   \bbl@set@language{#1}}
```

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

\BabelContentsFiles, but make sure they are loaded inside a group (as aux, toc, lof, and lot do) or the last language of the document will remain active afterwards.
We also write a command to change the current language in the auxiliary files.

```

1272 \def\BabelContentsFiles{toc,lof,lot}
1273 \def\bbl@set@language#1{% from selectlanguage, pop@
1274 % The old buggy way. Preserved for compatibility.
1275 \edef\language{%
1276   \ifnum\escapechar=\expandafter`\string#1\@empty
1277   \else\string#1\@empty\fi}%
1278 \ifcat\relax\noexpand#1%
1279   \expandafter\ifx\csname date\language\endcsname\relax
1280   \edef\language{#1}%
1281   \let\locale\language
1282 \else
1283   \bbl@info{Using '\string\language' instead of 'language' is\\%
1284             deprecated. If what you want is to use a\\%
1285             macro containing the actual locale, make\\%
1286             sure it does not not match any language.\\%
1287             Reported}%
1288   I'll\\%
1289   try to fix '\string\locale', but I cannot promise\\%
1290   anything. Reported}%
1291   \ifx\scantokens\undefined
1292     \def\locale{??}%
1293   \else
1294     \scantokens\expandafter{\expandafter
1295       \def\expandafter\locale\expandafter{\language}}%
1296   \fi
1297 \fi
1298 \else
1299   \def\locale{#1}% This one has the correct catcodes
1300 \fi
1301 \select@language{\language}%
1302 % write to aux
1303 \expandafter\ifx\csname date\language\endcsname\relax\else
1304   \if@files
1305     \ifx\babel@aux\@gobbletwo\else % Set if single in the first, redundant
1306       \protected@write\@auxout{}\string\babel@aux{\bbl@auxname}{}}%
1307     \fi
1308     \bbl@usehooks{write}{}%
1309   \fi
1310 \fi}
1311 %
1312 \newif\ifbbl@bcpallowed
1313 \bbl@bcpallowedfalse
1314 \def\select@language#1{% from set@, babel@aux
1315 % set hymap
1316 \ifnum\bbl@hymapset=\@ccclv\chardef\bbl@hymapset4\relax\fi
1317 % set name
1318 \edef\language{#1}%
1319 \bbl@fixname\language
1320 % TODO. name@map must be here?
1321 \bbl@provide@locale
1322 \bbl@iflanguage\language{%
1323   \expandafter\ifx\csname date\language\endcsname\relax
1324   \bbl@error
1325     {Unknown language '\language'. Either you have\\%
1326     misspelled its name, it has not been installed,\\%

```

```

1327         or you requested it in a previous run. Fix its name,\%
1328         install it or just rerun the file, respectively. In\%
1329         some cases, you may need to remove the aux file}%
1330         {You may proceed, but expect wrong results}%
1331     \else
1332         % set type
1333         \let\bbl@select@type\z@
1334         \expandafter\bbl@switch\expandafter{\language}%
1335     \fi}}
1336 \def\babel@aux#1#2{%
1337     \select@language{#1}%
1338     \bbl@foreach\BabelContentsFiles{%
1339         \@writefile{##1}{\babel@toc{#1}{#2}}}% % TODO - ok in plain?
1340 \def\babel@toc#1#2{%
1341     \select@language{#1}}

```

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

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

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

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

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

```

1342 \newif\ifbbl@usedategroup
1343 \def\bbl@switch#1{% from select@, foreign@
1344     % make sure there is info for the language if so requested
1345     \bbl@ensureinfo{#1}%
1346     % restore
1347     \originalTeX
1348     \expandafter\def\expandafter\originalTeX\expandafter{%
1349         \csname noextras#1\endcsname
1350         \let\originalTeX\@empty
1351         \babel@beginsave}%
1352     \bbl@usehooks{afterreset}{}%
1353     \languageshorthands{none}%
1354     % set the locale id
1355     \bbl@id@assign
1356     % switch captions, date
1357     \ifcase\bbl@select@type
1358         \ifhmode
1359             \hspace\z@skip % trick to ignore spaces
1360             \csname captions#1\endcsname\relax
1361             \csname date#1\endcsname\relax
1362             \loop\ifdim\lastskip>\z@\unskip\repeat\unskip
1363         \else
1364             \csname captions#1\endcsname\relax
1365             \csname date#1\endcsname\relax
1366         \fi
1367     \else
1368         \ifbbl@usedategroup % if \foreign... within \<lang>date

```

```

1369     \bbl@usedategroupfalse
1370     \ifhmode
1371         \hskip\z@skip % trick to ignore spaces
1372         \csname date#1\endcsname\relax
1373         \loop\ifdim\lastskip>\z@\unskip\repeat\unskip
1374     \else
1375         \csname date#1\endcsname\relax
1376     \fi
1377 \fi
1378 \fi
1379 % switch extras
1380 \bbl@usehooks{beforeextras}{}%
1381 \csname extras#1\endcsname\relax
1382 \bbl@usehooks{afterextras}{}%
1383 % > babel-ensure
1384 % > babel-sh-<short>
1385 % > babel-bidi
1386 % > babel-fontspec
1387 % hyphenation - case mapping
1388 \ifcase\bbl@opt@hyphenmap\or
1389     \def\BabelLower##1##2{\lccode#1=##2\relax}%
1390     \ifnum\bbl@hymapsel>4\else
1391         \csname\languagename @bbl@hyphenmap\endcsname
1392     \fi
1393     \chardef\bbl@opt@hyphenmap\z@
1394 \else
1395     \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
1396         \csname\languagename @bbl@hyphenmap\endcsname
1397     \fi
1398 \fi
1399 \global\let\bbl@hymapsel\@cclv
1400 % hyphenation - patterns
1401 \bbl@patterns{#1}%
1402 % hyphenation - mins
1403 \babel@savevariable\lefthyphenmin
1404 \babel@savevariable\righthyphenmin
1405 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
1406     \set@hyphenmins\tw@\thr@@\relax
1407 \else
1408     \expandafter\expandafter\expandafter\set@hyphenmins
1409     \csname #1hyphenmins\endcsname\relax
1410 \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.

```

1411 \long\def\otherlanguage#1{%
1412     \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\thr@@\fi
1413     \csname selectlanguage \endcsname{#1}%
1414     \ignorespaces}

```

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

```

1415 \long\def\endotherlanguage{%
1416     \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`.

```
1417 \expandafter\def\csname otherlanguage*\endcsname#1{%
1418   \ifnum\bbl@hymapsel=\@cclv\chardef\bbl@hymapsel4\relax\fi
1419   \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”.

```
1420 \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`.

```
1421 \providecommand\bbl@beforeforeign{}
1422 \edef\foreignlanguage{%
1423   \noexpand\protect
1424   \expandafter\def\csname foreignlanguage \endcsname{
1425     \expandafter\def\csname foreignlanguage \endcsname{%
1426       \@ifstar\bbl@foreign@s\bbl@foreign@x}
1427   \def\bbl@foreign@x#1#2{%
1428     \begingroup
1429       \let\BabelText\@firstofone
1430       \bbl@beforeforeign
1431       \foreign@language{#1}%
1432       \bbl@usehooks{foreign}{}%
1433       \BabelText{#2}% Now in horizontal mode!
1434     \endgroup}
1435   \def\bbl@foreign@s#1#2{% TODO - \shapemode, \@setpar, ?\@par
1436     \begingroup
1437       {\par}%
1438       \let\BabelText\@firstofone
1439       \foreign@language{#1}%
1440       \bbl@usehooks{foreign*}{}%
1441       \bbl@dirparastext
1442       \BabelText{#2}% Still in vertical mode!
```

```

1443   {\par}%
1444   \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`.

```

1445 \def\foreign@language#1{%
1446   % set name
1447   \edef\language#1}%
1448   \bb1@fixname\language
1449   % TODO. name@map here?
1450   \bb1@provide@locale
1451   \bb1@iflanguage\language{%
1452     \expandafter\ifx\csname date\language\endcsname\relax
1453       \bb1@warning % TODO - why a warning, not an error?
1454       {Unknown language `#1'. Either you have\\%
1455        misspelled its name, it has not been installed,\\%
1456        or you requested it in a previous run. Fix its name,\\%
1457        install it or just rerun the file, respectively. In\\%
1458        some cases, you may need to remove the aux file.\\%
1459        I'll proceed, but expect wrong results.\\%
1460        Reported}%
1461     \fi
1462     % set type
1463     \let\bb1@select@type\@ne
1464     \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 `\lcode'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.

```

1465 \let\bb1@hyphlist\@empty
1466 \let\bb1@hyphenation\relax
1467 \let\bb1@pttnlist\@empty
1468 \let\bb1@patterns\relax
1469 \let\bb1@hymapsel=\@cclv
1470 \def\bb1@patterns#1{%
1471   \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
1472     \csname l@#1\endcsname
1473     \edef\bb1@tempa{#1}%
1474     \else
1475       \csname l@#1:\f@encoding\endcsname
1476       \edef\bb1@tempa{#1:\f@encoding}%
1477     \fi
1478     \@expandtwoargs\bb1@usehooks{patterns}{#1}{\bb1@tempa}%
1479     % > luatex
1480     \@ifundefined{bb1@hyphenation@}{#1}{% Can be \relax!
1481       \begingroup
1482         \bb1@xin@{, \number\language,}{, \bb1@hyphlist}%
1483         \ifin@else
1484           \@expandtwoargs\bb1@usehooks{hyphenation}{#1}{\bb1@tempa}%
1485           \hyphenation{

```



```

1486         \bbl@hyphenation@
1487         \@ifundefined{bbl@hyphenation@#1}%
1488         \@empty
1489         {\space\csname bbl@hyphenation@#1\endcsname}}%
1490         \xdef\bbl@hyphlist{\bbl@hyphlist\number\language,}%
1491         \fi
1492     \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*`.

```

1493 \def\hyphenrules#1{%
1494     \edef\bbl@tempf{#1}%
1495     \bbl@fixname\bbl@tempf
1496     \bbl@iflanguage\bbl@tempf{%
1497         \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
1498         \languageshortands{none}%
1499         \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
1500             \set@hyphenmins\tw@\thr@@\relax
1501         \else
1502             \expandafter\expandafter\expandafter\set@hyphenmins
1503             \csname\bbl@tempf hyphenmins\endcsname\relax
1504         \fi}}
1505 \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.

```

1506 \def\providehyphenmins#1#2{%
1507     \expandafter\ifx\csname #1hyphenmins\endcsname\relax
1508         \@namedef{#1hyphenmins}{#2}%
1509     \fi}

```

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

```

1510 \def\set@hyphenmins#1#2{%
1511     \lefthyphenmin#1\relax
1512     \righthyphenmin#2\relax}

```

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

```

1513 \ifx\ProvidesFile\@undefined
1514     \def\ProvidesLanguage#1[#2 #3 #4]{%
1515         \wlog{Language: #1 #4 #3 <#2>}%
1516     }
1517 \else
1518     \def\ProvidesLanguage#1{%
1519         \begingroup
1520         \catcode`\ 10 %
1521         \@makeother\/%
1522         \@ifnextchar[%]
1523             {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}
1524     \def\@provideslanguage#1[#2]{%
1525         \wlog{Language: #1 #2}%

```

```

1526 \expandafter\xdef\csname ver@#1.1df\endcsname{#2}%
1527 \endgroup}
1528 \fi

```

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

```

1529 \ifx\originalTeX\@undefined\let\originalTeX\@empty\fi

```

Because this part of the code can be included in a format, we make sure that the macro which initializes the save mechanism, `\babel@beginsave`, is not considered to be undefined.

```

1530 \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’:

```

1531 \providecommand\setlocale{%
1532   \bbl@error
1533   {Not yet available}%
1534   {Find an armchair, sit down and wait}}
1535 \let\uselocale\setlocale
1536 \let\locale\setlocale
1537 \let\selectlocale\setlocale
1538 \let\localename\setlocale
1539 \let\textlocale\setlocale
1540 \let\textlanguage\setlocale
1541 \let\languagegetext\setlocale

```

9.2 Errors

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

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

```

1542 \edef\bbl@nulllanguage{\string\language=0}
1543 \ifx\PackageError\@undefined % TODO. Move to Plain
1544   \def\bbl@error#1#2{%
1545     \begingroup
1546       \newlinechar=`^^J
1547       \def\^^J(babel) }%
1548       \errhelp{#2}\errmessage{\#1}%
1549     \endgroup}
1550   \def\bbl@warning#1{%
1551     \begingroup
1552       \newlinechar=`^^J
1553       \def\^^J(babel) }%
1554       \message{\#1}%
1555     \endgroup}
1556   \let\bbl@infowarn\bbl@warning

```

```

1557 \def\bbl@info#1{%
1558   \begingroup
1559     \newlinechar=`^^J
1560   \def\{^J}%
1561   \wlog{#1}%
1562   \endgroup}
1563 \fi
1564 \def\bbl@nocaption{\protect\bbl@nocaption@i}
1565 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
1566   \global\@namedef{#2}{\textbf{?#1?}}%
1567   \@nameuse{#2}%
1568   \bbl@warning{%
1569     \@backslashchar#2 not set. Please, define\\%
1570     it in the preamble with something like:\\%
1571     \string\renewcommand\@backslashchar#2{..}\\%
1572     Reported}}
1573 \def\bbl@tentative{\protect\bbl@tentative@i}
1574 \def\bbl@tentative@i#1{%
1575   \bbl@warning{%
1576     Some functions for '#1' are tentative.\\%
1577     They might not work as expected and their behavior\\%
1578     could change in the future.\\%
1579     Reported}}
1580 \def\@nolanerr#1{%
1581   \bbl@error
1582   {You haven't defined the language #1\space yet.\\%
1583     Perhaps you misspelled it or your installation\\%
1584     is not complete}%
1585   {Your command will be ignored, type <return> to proceed}}
1586 \def\@nopatterns#1{%
1587   \bbl@warning
1588   {No hyphenation patterns were preloaded for\\%
1589     the language '#1' into the format.\\%
1590     Please, configure your TeX system to add them and\\%
1591     rebuild the format. Now I will use the patterns\\%
1592     preloaded for \bbl@nulllanguage\space instead}}
1593 \let\bbl@usehooks\@gobbletwo
1594 \ifx\bbl@onlyswitch\@empty\endinput\fi
1595 % Here ended switch.def

Here ended switch.def.

1596 \ifx\directlua\@undefined\else
1597   \ifx\bbl@luapatterns\@undefined
1598     \input luababel.def
1599   \fi
1600 \fi
1601 <<Basic macros>>
1602 \bbl@trace{Compatibility with language.def}
1603 \ifx\bbl@languages\@undefined
1604   \ifx\directlua\@undefined
1605     \openin1 = language.def % TODO. Remove hardcoded number
1606     \ifeof1
1607       \closein1
1608       \message{I couldn't find the file language.def}
1609     \else
1610       \closein1
1611       \begingroup
1612         \def\addlanguage#1#2#3#4#5{%
1613           \expandafter\ifx\csname lang@#1\endcsname\relax\else

```

```

1614      \global\expandafter\let\csname l@#1\expandafter\endcsname
1615      \csname lang@#1\endcsname
1616      \fi}%
1617      \def\uselanguage#1{%
1618      \input language.def
1619      \endgroup
1620      \fi
1621      \fi
1622      \chardef\l@english\z@
1623 \fi

```

`\addto` It takes two arguments, a *control sequence* and \TeX -code to be added to the *control sequence*.
 If the *control sequence* has not been defined before it is defined now. The control sequence could also expand to `\relax`, in which case a circular definition results. The net result is a stack overflow. Note there is an inconsistency, because the assignment in the last branch is global.

```

1624 \def\addto#1#2{%
1625   \ifx#1\undefined
1626     \def#1{#2}%
1627   \else
1628     \ifx#1\relax
1629       \def#1{#2}%
1630     \else
1631       {\toks@\expandafter{#1#2}%
1632        \xdef#1{the\toks@}}%
1633     \fi
1634   \fi}

```

The macro `\initiate@active@char` below takes all the necessary actions to make its argument a shorthand character. The real work is performed once for each character. But first we define a little tool. `TODO`. Always used with additional expansions. Move them here? Move the macro to basic?

```

1635 \def\bbl@withactive#1#2{%
1636   \begingroup
1637   \lccode`~=`#2\relax
1638   \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). A macro named `\macro` will be saved new control sequences named `\org@macro`.

```

1639 \def\bbl@redefine#1{%
1640   \edef\bbl@tempa{\bbl@stripslash#1}%
1641   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
1642   \expandafter\def\csname\bbl@tempa\endcsname}
1643 \@onlypreamble\bbl@redefine

```

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

```

1644 \def\bbl@redefine@long#1{%
1645   \edef\bbl@tempa{\bbl@stripslash#1}%
1646   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
1647   \expandafter\long\expandafter\def\csname\bbl@tempa\endcsname}
1648 \@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_.

```

1649 \def\bbl@redefineroobust#1{%
1650   \edef\bbl@tempa{\bbl@stripslash#1}%
1651   \bbl@ifunset{\bbl@tempa\space}%
1652     {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
1653      \bbl@exp{\def\\#1{\\protect\<\bbl@tempa\space>}}}%
1654     {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}}%
1655     \@namedef{\bbl@tempa\space}}
1656 \@onlypreamble\bbl@redefineroobust

```

9.3 Hooks

Admittedly, the current implementation is a somewhat simplistic and does very little to catch errors, but it is meant for developers, after all. \bbl@usehooks is the commands used by babel to execute hooks defined for an event.

```

1657 \bbl@trace{Hooks}
1658 \newcommand\AddBabelHook[3][{}{%
1659   \bbl@ifunset{bbl@hk@#2}{\EnableBabelHook{#2}}{}%
1660   \def\bbl@tempa##1,#3=##2,##3\@empty{\def\bbl@tempb{##2}}%
1661   \expandafter\bbl@tempa\bbl@evargs,#3=,\@empty
1662   \bbl@ifunset{bbl@ev@#2@#3@#1}%
1663     {\bbl@csarg\bbl@add{ev@#3@#1}{\bbl@elt{#2}}}%
1664     {\bbl@csarg\let{ev@#2@#3@#1}\relax}%
1665   \bbl@csarg\newcommand{ev@#2@#3@#1}[\bbl@tempb]}
1666 \newcommand\EnableBabelHook[1]{\bbl@csarg\let{hk@#1}\@firstofone}
1667 \newcommand\DisableBabelHook[1]{\bbl@csarg\let{hk@#1}\@gobble}
1668 \def\bbl@usehooks#1#2{%
1669   \def\bbl@elt##1{%
1670     \bbl@cs{hk@##1}{\bbl@cs{ev@##1@#1@#2}}%
1671     \bbl@cs{ev@#1@}%
1672     \ifx\language\@undefined\else % Test required for Plain (?)
1673       \def\bbl@elt##1{%
1674         \bbl@cs{hk@##1}{\bbl@cl{ev@##1@#1@#2}}%
1675         \bbl@cl{ev@#1@}%
1676       \fi}

```

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

```

1677 \def\bbl@evargs{% <- don't delete this comma
1678   everylanguage=1,loadkernel=1,loadpatterns=1,loadexceptions=1,%
1679   adddialect=2,patterns=2,defaultcommands=0,encodedcommands=2,write=0,%
1680   beforeextras=0,afterextras=0,stopcommands=0,stringprocess=0,%
1681   hyphenation=2,initiateactive=3,afterreset=0,foreign=0,foreign*=0,%
1682   beforestart=0,language=2}

```

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

The macro \bbl@e@<language> contains \bbl@ensure{\include}{\exclude}{\fontenc}, which in turn loops over the macros names in \bbl@captionslist, excluding (with the help of \in@) those in the exclude list. If the fontenc is given (and not \relax), the

\fontencoding is also added. Then we loop over the include list, but if the macro already contains \foreignlanguage, nothing is done. Note this macro (1) is not restricted to the preamble, and (2) changes are local.

```

1683 \bbl@trace{Defining babelensure}
1684 \newcommand\babelensure[2][{}]{% TODO - revise test files
1685   \AddBabelHook{babel-ensure}{afterextras}{%
1686     \ifcase\bbl@select@type
1687       \bbl@cl{e}%
1688       \fi}%
1689   \beginngroup
1690     \let\bbl@ens@include\@empty
1691     \let\bbl@ens@exclude\@empty
1692     \def\bbl@ens@fontenc{\relax}%
1693     \def\bbl@tempb##1{%
1694       \ifx\@empty##1\else\noexpand##1\expandafter\bbl@tempb\fi}%
1695     \edef\bbl@tempa{\bbl@tempb#1\@empty}%
1696     \def\bbl@tempb##1=##2\@{\@namedef{bbl@ens@##1}{##2}}%
1697     \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
1698     \def\bbl@tempc{\bbl@ensure}%
1699     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1700       \expandafter{\bbl@ens@include}}%
1701     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1702       \expandafter{\bbl@ens@exclude}}%
1703     \toks@\expandafter{\bbl@tempc}%
1704     \bbl@exp{%
1705   \endgroup
1706   \def\<bbl@e@#2>{\the\toks@{\bbl@ens@fontenc}}}%
1707 \def\bbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
1708   \def\bbl@tempb##1{% elt for (excluding) \bbl@captionslist list
1709     \ifx##1\@undefined % 3.32 - Don't assume the macro exists
1710       \edef##1{\noexpand\bbl@nocaption
1711         {\bbl@stripslash##1}{\language\name\bbl@stripslash##1}}%
1712       \fi
1713       \ifx##1\@empty\else
1714         \in@{##1}{#2}%
1715         \ifin@ \else
1716           \bbl@ifunset{bbl@ensure@\language\name}%
1717             {\bbl@exp{%
1718               \\\DeclareRobustCommand\<bbl@ensure@\language\name>[1]{%
1719                 \\\foreignlanguage{\language\name}%
1720                 {\ifx\relax#3\else
1721                   \\\fontencoding{#3}\selectfont
1722                   \fi
1723                 #####1}}}%
1724             }%
1725           \toks@\expandafter{##1}%
1726           \edef##1{%
1727             \bbl@csarg\noexpand{ensure@\language\name}%
1728             {\the\toks@}}%
1729           \fi
1730           \expandafter\bbl@tempb
1731           \fi}%
1732   \expandafter\bbl@tempb\bbl@captionslist\today\@empty
1733   \def\bbl@tempa##1{% elt for include list
1734     \ifx##1\@empty\else
1735       \bbl@csarg\in@{ensure@\language\name\expandafter}\expandafter{##1}%
1736       \ifin@ \else
1737         \bbl@tempb##1\@empty

```

```

1738     \fi
1739     \expandafter\bb1@tempa
1740     \fi}%
1741     \bb1@tempa#1\@empty}
1742 \def\bb1@captionslist{%
1743   \prefacename\refname\abstractname\bibname\chaptername\appendixname
1744   \contentsname\listfigurename\listtablename\indexname\figurename
1745   \tablename\partname\enclname\ccname\headtoname\pagename\seename
1746   \alsoname\proofname\glossaryname}

```

9.4 Setting up language files

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

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

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

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

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

Finally we check `\originalTeX`.

```

1747 \bb1@trace{Macros for setting language files up}
1748 \def\bb1@ldfinit{% TODO. Merge into the next macro? Unused elsewhere
1749   \let\bb1@screset\@empty
1750   \let\BabelStrings\bb1@opt@string
1751   \let\BabelOptions\@empty
1752   \let\BabelLanguages\relax
1753   \ifx\originalTeX\@undefined
1754     \let\originalTeX\@empty
1755   \else
1756     \originalTeX
1757   \fi}
1758 \def\LdfInit#1#2{%
1759   \chardef\atcatcode=\catcode`\@
1760   \catcode`\@=11\relax
1761   \chardef\eqcatcode=\catcode`\=
1762   \catcode`\==12\relax
1763   \expandafter\if\expandafter\@backslashchar
1764     \expandafter\@car\string#2\@nil
1765     \ifx#2\@undefined\else
1766       \ldf@quit{#1}%
1767     \fi
1768   \else
1769     \expandafter\ifx\cscname#2\endcscname\relax\else
1770       \ldf@quit{#1}%
1771     \fi

```

```

1772 \fi
1773 \bbl@ldfinit}

```

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

```

1774 \def\ldf@quit#1{%
1775 \expandafter\main@language\expandafter{#1}%
1776 \catcode`\@=\atcatcode \let\atcatcode\relax
1777 \catcode`\==\eqcatcode \let\eqcatcode\relax
1778 \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.

```

1779 \def\bbl@afterldf#1{% TODO. Merge into the next macro? Unused elsewhere
1780 \bbl@afterlang
1781 \let\bbl@afterlang\relax
1782 \let\BabelModifiers\relax
1783 \let\bbl@screset\relax}%
1784 \def\ldf@finish#1{%
1785 \ifx\loadlocalcfg\undefined\else % For LaTeX 209
1786 \loadlocalcfg{#1}%
1787 \fi
1788 \bbl@afterldf{#1}%
1789 \expandafter\main@language\expandafter{#1}%
1790 \catcode`\@=\atcatcode \let\atcatcode\relax
1791 \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 .

```

1792 \@onlypreamble\LdfInit
1793 \@onlypreamble\ldf@quit
1794 \@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.

```

1795 \def\main@language#1{%
1796 \def\bbl@main@language{#1}%
1797 \let\language\name\bbl@main@language % TODO. Set localname
1798 \bbl@id@assign
1799 \bbl@patterns{\language}

```

We also have to make sure that some code gets executed at the beginning of the document, either when the aux file is read or, if it does not exist, when the `\AtBeginDocument` is executed. Languages do not set `\pagedir`, so we set here for the whole document to the main `\bodydir`.

```

1800 \def\bbl@beforestart{%
1801 \bbl@usehooks{beforestart}}}%
1802 \global\let\bbl@beforestart\relax}
1803 \AtBeginDocument{%
1804 \@nameuse{bbl@beforestart}%
1805 \if@filesw
1806 \immediate\write\@mainaux{\string\@nameuse{bbl@beforestart}}}%
1807 \fi
1808 \expandafter\selectlanguage\expandafter{\bbl@main@language}%

```



```

1809 \ifbbl@single % must go after the line above.
1810 \renewcommand\selectlanguage[1]{}%
1811 \renewcommand\foreignlanguage[2]{#2}%
1812 \global\let\babel@aux\@gobbletwo % Also as flag
1813 \fi
1814 \ifcase\bbl@engine\or\pagedir\bodydir\fi} % TODO - a better place

```

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

```

1815 \def\select@language@x#1{%
1816 \ifcase\bbl@select@type
1817 \bbl@ifsamestring\languagename{#1}{}{\select@language{#1}}%
1818 \else
1819 \select@language{#1}%
1820 \fi}

```

9.5 Shorthands

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

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

```

1821 \bbl@trace{Shorhands}
1822 \def\bbl@add@special#1{% 1:a macro like \", \?, etc.
1823 \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
1824 \bbl@ifunset{@sanitize}{}{\bbl@add@sanitize{\@makeother#1}}%
1825 \ifx\nfss@catcodes\undefined\else % TODO - same for above
1826 \begingroup
1827 \catcode`#1\active
1828 \nfss@catcodes
1829 \ifnum\catcode`#1=\active
1830 \endgroup
1831 \bbl@add\nfss@catcodes{\@makeother#1}%
1832 \else
1833 \endgroup
1834 \fi
1835 \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.

```

1836 \def\bbl@remove@special#1{%
1837 \begingroup
1838 \def\x##1##2{\ifnum`#1=`##2\noexpand\@empty
1839 \else\noexpand##1\noexpand##2\fi}%
1840 \def\do{\x\do}%
1841 \def\@makeother{\x\@makeother}%
1842 \edef\x{\endgroup
1843 \def\noexpand\dospecials{\dospecials}%
1844 \expandafter\ifx\cname @sanitize\endcname\relax\else
1845 \def\noexpand\@sanitize{\@sanitize}%
1846 \fi}%
1847 \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).

```
1848 \def\bbl@active@def#1#2#3#4{%
1849   \@namedef{#3#1}{%
1850     \expandafter\ifx\csname#2@sh@#1@\endcsname\relax
1851       \bbl@afterelse\bbl@sh@select#2#1{#3@arg#1}{#4#1}%
1852     \else
1853       \bbl@afterfi\csname#2@sh@#1@\endcsname
1854     \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.

```
1855 \long\@namedef{#3@arg#1}##1{%
1856   \expandafter\ifx\csname#2@sh@#1@\string##1@\endcsname\relax
1857     \bbl@afterelse\csname#4#1\endcsname##1%
1858   \else
1859     \bbl@afterfi\csname#2@sh@#1@\string##1@\endcsname
1860   \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.

```
1861 \def\@initiate@active@char#1{%
1862   \bbl@ifunset{active@char\string#1}%
1863   {\bbl@withactive
1864     {\expandafter\@initiate@active@char\expandafter}#1\string#1}%
1865   {}}
```

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`).

```
1866 \def\@initiate@active@char#1#2#3{%
1867   \bbl@csarg\edef{oricat@#2}{\catcode`#2=\the\catcode`#2\relax}%
1868   \ifx#1\@undefined
1869     \bbl@csarg\edef{oridef@#2}{\let\noexpand#1\noexpand\@undefined}%
1870   \else
1871     \bbl@csarg\let{oridef@#2}#1%
1872     \bbl@csarg\edef{oridef@#2}{%
1873       \let\noexpand#1%
1874       \expandafter\noexpand\csname\bbl@oridef@@#2\endcsname}%
1875   \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*").

```

1876 \ifx#1#3\relax
1877   \expandafter\let\csname normal@char#2\endcsname#3%
1878 \else
1879   \bbl@info{Making #2 an active character}%
1880   \ifnum\mathcode`#2=\ifodd\bbl@engine"1000000 \else"8000 \fi
1881   \@namedef{normal@char#2}{%
1882     \textormath{#3}{\csname bbl@oridef@#2\endcsname}}%
1883   \else
1884     \@namedef{normal@char#2}{#3}%
1885   \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).

```

1886   \bbl@restoreactive{#2}%
1887   \AtBeginDocument{%
1888     \catcode`#2\active
1889     \if@filesw
1890       \immediate\write\@mainaux{\catcode`\string#2\active}%
1891     \fi}%
1892   \expandafter\bbl@add@special\csname#2\endcsname
1893   \catcode`#2\active
1894 \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⟩`).

```

1895 \let\bbl@tempa\@firstoftwo
1896 \if\string^#2%
1897   \def\bbl@tempa{\noexpand\textormath}%
1898 \else
1899   \ifx\bbl@mathnormal\@undefined\else
1900     \let\bbl@tempa\bbl@mathnormal
1901   \fi
1902 \fi
1903 \expandafter\edef\csname active@char#2\endcsname{%
1904   \bbl@tempa
1905     {\noexpand\if@safe@actives
1906       \noexpand\expandafter
1907       \expandafter\noexpand\csname normal@char#2\endcsname
1908     \noexpand\else
1909       \noexpand\expandafter
1910       \expandafter\noexpand\csname bbl@doactive#2\endcsname
1911     \noexpand\fi}%
1912   {\expandafter\noexpand\csname normal@char#2\endcsname}}%

```

```

1913 \bbl@csarg\edef{doactive#2}{%
1914   \expandafter\noexpand\csname user@active#2\endcsname}%

```

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

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

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

```

1915 \bbl@csarg\edef{active@#2}{%
1916   \noexpand\active@prefix\noexpand#1%
1917   \expandafter\noexpand\csname active@char#2\endcsname}%
1918 \bbl@csarg\edef{normal@#2}{%
1919   \noexpand\active@prefix\noexpand#1%
1920   \expandafter\noexpand\csname normal@char#2\endcsname}%
1921 \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.

```

1922 \bbl@active@def#2\user@group{user@active}{language@active}%
1923 \bbl@active@def#2\language@group{language@active}{system@active}%
1924 \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 $\mathrm{T}_{\mathrm{E}}\mathrm{X}$ would see $\backslash\mathrm{protect}'\backslash\mathrm{protect}'$. To prevent this from happening a couple of shorthand needs to be defined at user level.

```

1925 \expandafter\edef\csname\user@group @sh@#2@@\endcsname
1926   {\expandafter\noexpand\csname normal@char#2\endcsname}%
1927 \expandafter\edef\csname\user@group @sh@#2@\string\protect@\endcsname
1928   {\expandafter\noexpand\csname user@active#2\endcsname}%

```

Finally, a couple of special cases are taken care of. (1) If we are making the right quote (') active we need to change $\backslash\mathrm{pr@m@s}$ 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.

```

1929 \if\string'#2%
1930   \let\prim@s\bbl@prim@s
1931   \let\active@math@prime#1%
1932 \fi
1933 \bbl@usehooks{initiateactive}{\#1}{\#2}{\#3}}

```

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

```

1934 <<(*More package options)>> \equiv
1935 \DeclareOption{math=active}{}
1936 \DeclareOption{math=normal}{{\def\bbl@mathnormal{\noexpand\textormath}}}
1937 <</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*.

```

1938 \@ifpackagewith{babel}{KeepShorthandsActive}%
1939   {\let\bbl@restoreactive@gobble}%
1940   {\def\bbl@restoreactive#1{%
1941     \bbl@exp{%

```

```

1942      \\AfterBabelLanguage\\CurrentOption
1943      {\catcode`#1=\the\catcode`#1\relax}%
1944      \\AtEndOfPackage
1945      {\catcode`#1=\the\catcode`#1\relax}}}%
1946      \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.

```

1947 \def\bbl@sh@select#1#2{%
1948   \expandafter\ifx\csname#1@sh#2@sel\endcsname\relax
1949     \bbl@afterelse\bbl@scndcs
1950   \else
1951     \bbl@afterfi\csname#1@sh#2@sel\endcsname
1952   \fi}

```

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

```

1953 \begingroup
1954 \bbl@ifunset{ifincsname}% TODO. Ugly. Correct?
1955 {\gdef\active@prefix#1{%
1956   \ifx\protect\@typeset@protect
1957   \else
1958     \ifx\protect\@unexpandable@protect
1959       \noexpand#1%
1960     \else
1961       \protect#1%
1962     \fi
1963     \expandafter\@gobble
1964   \fi}}
1965 {\gdef\active@prefix#1{%
1966   \ifincsname
1967     \string#1%
1968     \expandafter\@gobble
1969   \else
1970     \ifx\protect\@typeset@protect
1971     \else
1972       \ifx\protect\@unexpandable@protect
1973         \noexpand#1%
1974       \else
1975         \protect#1%
1976       \fi
1977       \expandafter\expandafter\expandafter\@gobble
1978     \fi
1979   \fi}}
1980 \endgroup

```

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

```

1981 \newif\if@safe@actives
1982 \@safe@activesfalse

\bb1@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.

1983 \def\bb1@restore@actives{\if@safe@actives\@safe@activesfalse\fi}

\bb1@activate Both macros take one argument, like \initiate@active@char. The macro is used to
\bb1@deactivate change the definition of an active character to expand to \active@char<char> in the case
of \bb1@activate, or \normal@char<char> in the case of \bb1@deactivate.

1984 \def\bb1@activate#1{%
1985 \bb1@withactive{\expandafter\let\expandafter}#1%
1986 \csname bbl@active@\string#1\endcsname}
1987 \def\bb1@deactivate#1{%
1988 \bb1@withactive{\expandafter\let\expandafter}#1%
1989 \csname bbl@normal@\string#1\endcsname}

\bb1@firstcs These macros are used only as a trick when declaring shorthands.
\bb1@scndcs
1990 \def\bb1@firstcs#1#2{\csname#1\endcsname}
1991 \def\bb1@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.

1992 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
1993 \def\@decl@short#1#2#3\@nil#4{%
1994 \def\bb1@tempa{#3}%
1995 \ifx\bb1@tempa\@empty
1996 \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bb1@scndcs
1997 \bb1@ifunset{#1@sh@\string#2@}{}%
1998 {\def\bb1@tempa{#4}%
1999 \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bb1@tempa
2000 \else
2001 \bb1@info
2002 {Redefining #1 shorthand \string#2\%
2003 in language \CurrentOption}%
2004 \fi}%
2005 \@namedef{#1@sh@\string#2@}{#4}%
2006 \else
2007 \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bb1@firstcs
2008 \bb1@ifunset{#1@sh@\string#2@\string#3@}{}%
2009 {\def\bb1@tempa{#4}%
2010 \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bb1@tempa
2011 \else
2012 \bb1@info
2013 {Redefining #1 shorthand \string#2\string#3\%
2014 in language \CurrentOption}%
2015 \fi}%
2016 \@namedef{#1@sh@\string#2@\string#3@}{#4}%
2017 \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.

```

2018 \def\textormath{%
2019   \ifmmode
2020     \expandafter\@secondoftwo
2021   \else
2022     \expandafter\@firstoftwo
2023   \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’.

```

2024 \def\user@group{user}
2025 \def\language@group{english} % TODO. I don't like defaults
2026 \def\system@group{system}

```

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

```

2027 \def\useshorthands{%
2028   \@ifstar\bb1@usesh@s{\bb1@usesh@x{}}
2029 \def\bb1@usesh@s#1{%
2030   \bb1@usesh@x
2031   {\AddBabelHook{babel-sh-\string#1}{afterextras}{\bb1@activate{#1}}}%
2032   {#1}}
2033 \def\bb1@usesh@x#1#2{%
2034   \bb1@ifshorthand{#2}%
2035   {\def\user@group{user}%
2036     \initiate@active@char{#2}%
2037     #1%
2038     \bb1@activate{#2}}%
2039   {\bb1@error
2040     {Cannot declare a shorthand turned off (\string#2)}
2041     {Sorry, but you cannot use shorthands which have been\\%
2042       turned off in the package options}}}

```

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

```

2043 \def\user@language@group{user@\language@group}
2044 \def\bb1@set@user@generic#1#2{%
2045   \bb1@ifunset{user@generic@active#1}%
2046   {\bb1@active@def#1\user@language@group{user@active}{user@generic@active}%
2047     \bb1@active@def#1\user@group{user@generic@active}{language@active}%
2048     \expandafter\edef\csname#2sh@#1@@\endcsname{%
2049       \expandafter\noexpand\csname normal@char#1\endcsname}%
2050     \expandafter\edef\csname#2sh@#1@\string\protect@\endcsname{%
2051       \expandafter\noexpand\csname user@active#1\endcsname}}%
2052   \@empty}
2053 \newcommand\defineshorthand[3][user]{%
2054   \edef\bb1@tempa{\zap@space#1 \@empty}%
2055   \bb1@for\bb1@tempb\bb1@tempa{%
2056     \if*\expandafter\@car\bb1@tempb\@nil

```

```

2057 \edef\bbl@tempb{user@\expandafter\@gobble\bbl@tempb}%
2058 \expandtwoargs
2059 \bbl@set@user@generic{\expandafter\string\car#2\@nil}\bbl@tempb
2060 \fi
2061 \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 [TODO. Unclear].

```

2062 \def\languageshorthands#1{\def\language@group{#1}}

```

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

```

2063 \def\aliasshorthand#1#2{%
2064   \bbl@ifshorthand{#2}%
2065   {\expandafter\ifx\csname active@char\string#2\endcsname\relax
2066     \ifx\document\@notprerr
2067       \@notshorthand{#2}%
2068     \else
2069       \initiate@active@char{#2}%
2070       \expandafter\let\csname active@char\string#2\expandafter\endcsname
2071       \csname active@char\string#1\endcsname
2072       \expandafter\let\csname normal@char\string#2\expandafter\endcsname
2073       \csname normal@char\string#1\endcsname
2074       \bbl@activate{#2}%
2075     \fi
2076   \fi}%
2077 {\bbl@error
2078   {Cannot declare a shorthand turned off (\string#2)}
2079   {Sorry, but you cannot use shorthands which have been\\%
2080     turned off in the package options}}}

```

`\@notshorthand`

```

2081 \def\@notshorthand#1{%
2082   \bbl@error{%
2083     The character '\string #1' should be made a shorthand character;\\%
2084     add the command \string\usesshorthands\string{#1\string} to
2085     the preamble.\\%
2086     I will ignore your instruction}%
2087   {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.

```

2088 \newcommand*\shorthandon[1]{\bbl@switch@sh\@ne#1\@nnil}
2089 \DeclareRobustCommand*\shorthandoff{%
2090   \@ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
2091 \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.

```

2092 \def\bb@switch@sh#1#2{%
2093   \ifx#2\@nnil\else
2094     \bb@ifunset{bb@active@\string#2}%
2095     {\bb@error
2096       {I cannot switch '\string#2' on or off--not a shorthand}%
2097       {This character is not a shorthand. Maybe you made\\%
2098        a typing mistake? I will ignore your instruction}}%
2099     {\ifcase#1%
2100       \catcode`#2\relax
2101       \or
2102       \catcode`#2\active
2103       \or
2104       \csname bb@oricat@\string#2\endcsname
2105       \csname bb@oridef@\string#2\endcsname
2106       \fi}%
2107     \bb@afterfi\bb@switch@sh#1%
2108   \fi}

```

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

```

2109 \def\babelshorthand{\active@prefix\babelshorthand\bb@putsh}
2110 \def\bb@putsh#1{%
2111   \bb@ifunset{bb@active@\string#1}%
2112   {\bb@putsh@i#1\@empty\@nnil}%
2113   {\csname bb@active@\string#1\endcsname}}
2114 \def\bb@putsh@i#1#2\@nnil{%
2115   \csname\language\@sh@\string#1@%
2116     \ifx\@empty#2\else\string#2@\fi\endcsname}
2117 \ifx\bb@opt@shorthands\@nnil\else
2118   \let\bb@s@initiate@active@char\initiate@active@char
2119   \def\initiate@active@char#1{%
2120     \bb@ifshorthand{#1}{\bb@s@initiate@active@char{#1}}{}}
2121   \let\bb@s@switch@sh\bb@switch@sh
2122   \def\bb@switch@sh#1#2{%
2123     \ifx#2\@nnil\else
2124       \bb@afterfi
2125       \bb@ifshorthand{#2}{\bb@s@switch@sh#1{#2}}{\bb@switch@sh#1}%
2126     \fi}
2127   \let\bb@s@activate\bb@activate
2128   \def\bb@activate#1{%
2129     \bb@ifshorthand{#1}{\bb@s@activate{#1}}{}}
2130   \let\bb@s@deactivate\bb@deactivate
2131   \def\bb@deactivate#1{%
2132     \bb@ifshorthand{#1}{\bb@s@deactivate{#1}}{}}
2133 \fi

```

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

```

2134 \newcommand\ifbabelshorthand[3]{\bb@ifunset{bb@active@\string#1}{#3}{#2}}

```

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

```

2135 \def\bbl@prim@s{%
2136   \prime\futurelet\@let@token\bbl@pr@m@s}
2137 \def\bbl@if@primes#1#2{%
2138   \ifx#1\@let@token
2139     \expandafter\@firstoftwo
2140   \else\ifx#2\@let@token
2141     \bbl@afterelse\expandafter\@firstoftwo
2142   \else
2143     \bbl@afterfi\expandafter\@secondoftwo
2144   \fi\fi}
2145 \begingroup
2146   \catcode`\^=7 \catcode`\*=\active \lccode`\*=\^
2147   \catcode`\'=12 \catcode`\"=\active \lccode`\"=\'
2148   \lowercase{%
2149     \gdef\bbl@pr@m@s{%
2150       \bbl@if@primes"%
2151         \pr@@s
2152         {\bbl@if@primes*\^{\pr@@t\egroup}}}}
2153 \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).

```

2154 \initiate@active@char{~}
2155 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }
2156 \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.

```

2157 \expandafter\def\csname OT1dqpos\endcsname{127}
2158 \expandafter\def\csname T1dqpos\endcsname{4}

```

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

```

2159 \ifx\f@encoding\@undefined
2160   \def\f@encoding{OT1}
2161 \fi

```

9.6 Language attributes

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

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

```

2162 \bbl@trace{Language attributes}
2163 \newcommand\languageattribute[2]{%
2164   \def\bbl@tempc{#1}%
2165   \bbl@fixname\bbl@tempc
2166   \bbl@iflanguage\bbl@tempc{%
2167     \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.

```

2168 \if\bbl@known@attrs\@undefined
2169 \in@false
2170 \else
2171 \bbl@xin@{,\bbl@tempc-##1,}{,\bbl@known@attrs,}%
2172 \fi
2173 \ifin@
2174 \bbl@warning{%
2175 You have more than once selected the attribute '##1'\%
2176 for language #1. Reported}%
2177 \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.

```

2178 \bbl@exp{%
2179 \\\bbl@add@list\\bbl@known@attrs{\bbl@tempc-##1}}%
2180 \edef\bbl@tempa{\bbl@tempc-##1}%
2181 \expandafter\bbl@ifknown@trib\expandafter{\bbl@tempa}\bbl@attributes%
2182 {\csname\bbl@tempc @attr##1\endcsname}%
2183 {\@attrerr{\bbl@tempc}{##1}}%
2184 \fi}}
2185 \@onlypreamble\languageattribute

```

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

```

2186 \newcommand*{\@attrerr}[2]{%
2187 \bbl@error
2188 {The attribute #2 is unknown for language #1.}%
2189 {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}`.

```

2190 \def\bbl@declare@ttribute#1#2#3{%
2191 \bbl@xin@{,#2,}{,\BabelModifiers,}%
2192 \ifin@
2193 \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
2194 \fi
2195 \bbl@add@list\bbl@attributes{#1-#2}%
2196 \expandafter\def\csname#1@attr#2\endcsname{#3}}

```

`\bbl@ifattributeset` This internal macro has 4 arguments. It can be used to interpret \TeX code based on whether a certain attribute was set. This command should appear inside the argument to `\AtBeginDocument` because the attributes are set in the document preamble, *after* babel is loaded.

The first argument is the language, the second argument the attribute being checked, and the third and fourth arguments are the true and false clauses.

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

```

2197 \def\bbl@ifattributeset#1#2#3#4{%

```

```

2198 \ifx\bb1@known@attribs\@undefined
2199 \in@false
2200 \else
2201 \bb1@xin@{,#1-#2,}{,\bb1@known@attribs,}%
2202 \fi
2203 \ifin@
2204 \bb1@afterelse#3%
2205 \else
2206 \bb1@afterfi#4%
2207 \fi
2208 }

```

`\bb1@ifknown@ttrib` An internal macro to check whether a given language/attribute is known. The macro takes 4 arguments, the language/attribute, the attribute list, the \TeX -code to be executed when the attribute is known and the \TeX -code to be executed otherwise. We first assume the attribute is unknown. Then we loop over the list of known attributes, trying to find a match. When a match is found the definition of `\bb1@tempa` is changed. Finally we execute `\bb1@tempa`.

```

2209 \def\bb1@ifknown@ttrib#1#2{%
2210 \let\bb1@tempa\@secondoftwo
2211 \bb1@loopx\bb1@tempb{#2}{%
2212 \expandafter\in@expandafter{\expandafter,\bb1@tempb,}{,#1,}%
2213 \ifin@
2214 \let\bb1@tempa\@firstoftwo
2215 \else
2216 \fi}%
2217 \bb1@tempa
2218 }

```

`\bb1@clear@ttribs` This macro removes all the attribute code from \LaTeX 's memory at `\begin{document}` time (if any is present).

```

2219 \def\bb1@clear@ttribs{%
2220 \ifx\bb1@attributes\@undefined\else
2221 \bb1@loopx\bb1@tempa{\bb1@attributes}{%
2222 \expandafter\bb1@clear@ttrib\bb1@tempa.
2223 }%
2224 \let\bb1@attributes\@undefined
2225 \fi}
2226 \def\bb1@clear@ttrib#1-#2.{%
2227 \expandafter\let\csname#1@attr#2\endcsname\@undefined}
2228 \AtBeginDocument{\bb1@clear@ttribs}

```

9.7 Support for saving macro definitions

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

`\babel@savecnt` The initialization of a new save cycle: reset the counter to zero.

`\babel@beginsave`

```

2229 \bb1@trace{Macros for saving definitions}
2230 \def\babel@beginsave{\babel@savecnt\z@}

```

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

```
2231 \newcount\babel@savecnt
2232 \babel@beginsave
```

`\babel@save` The macro `\babel@save⟨csize⟩` saves the current meaning of the control sequence `⟨csize⟩` to `\originalTeX`³¹. To do this, we let the current meaning to a temporary control sequence, the restore commands are appended to `\originalTeX` and the counter is incremented. The macro `\babel@savevariable⟨variable⟩` saves the value of the variable. `⟨variable⟩` can be anything allowed after the `\the` primitive.

```
2233 \def\babel@save#1{%
2234   \expandafter\let\csname babel@number\babel@savecnt\endcsname#1\relax
2235   \toks@\expandafter{\originalTeX\let#1=}
2236   \bbl@exp{%
2237     \def\originalTeX{\the\toks@<\babel@number\babel@savecnt>\relax}}
2238   \advance\babel@savecnt@ne
2239 \def\babel@savevariable#1{%
2240   \toks@\expandafter{\originalTeX #1=}
2241   \bbl@exp{\def\originalTeX{\the\toks@the#1\relax}}}
```

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

```
2242 \def\bbl@frenchspacing{%
2243   \ifnum\the\sfcode\.\!=\@m
2244     \let\bbl@nonfrenchspacing\relax
2245   \else
2246     \frenchspacing
2247     \let\bbl@nonfrenchspacing\nonfrenchspacing
2248   \fi
2249 \let\bbl@nonfrenchspacing\nonfrenchspacing
```

9.8 Short tags

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

```
2250 \bbl@trace{Short tags}
2251 \def\babeltags#1{%
2252   \edef\bbl@tempa{\zap@space#1 \@empty}%
2253   \def\bbl@tempb##1=##2\@{
2254     \edef\bbl@tempc{%
2255       \noexpand\newcommand
2256       \expandafter\noexpand\csname ##1\endcsname{%
2257         \noexpand\protect
2258         \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
2259       \noexpand\newcommand
2260       \expandafter\noexpand\csname text##1\endcsname{%
2261         \noexpand\foreignlanguage{##2}}
2262       \bbl@tempc}%
2263   \bbl@for\bbl@tempa\bbl@tempa{%
2264     \expandafter\bbl@tempb\bbl@tempa\@{}}
```

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

9.9 Hyphens

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

```

2265 \bbl@trace{Hyphens}
2266 \@onlypreamble\babelhyphenation
2267 \AtEndOfPackage{%
2268   \newcommand\babelhyphenation[2][\@empty]{%
2269     \ifx\bbl@hyphenation@\relax
2270       \let\bbl@hyphenation@\@empty
2271     \fi
2272     \ifx\bbl@hyphlist\@empty\else
2273       \bbl@warning{%
2274         You must not intermingle \string\selectlanguage\space and\%
2275         \string\babelhyphenation\space or some exceptions will not\%
2276         be taken into account. Reported}%
2277     \fi
2278     \ifx\@empty#1%
2279       \protected@edef\bbl@hyphenation@{\bbl@hyphenation@\space#2}%
2280     \else
2281       \bbl@vforeach{#1}{%
2282         \def\bbl@tempa{##1}%
2283         \bbl@fixname\bbl@tempa
2284         \bbl@iflanguage\bbl@tempa{%
2285           \bbl@csarg\protected@edef{hyphenation@\bbl@tempa}{%
2286             \bbl@ifunset{bbl@hyphenation@\bbl@tempa}%
2287             \@empty
2288             {\csname bbl@hyphenation@\bbl@tempa\endcsname\space}%
2289             #2}}}%
2290       \fi}}

```

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

```

2291 \def\bbl@allowhyphens{\ifvmode\else\nobreak\hskip\zskip\fi}
2292 \def\bbl@t@one{T1}
2293 \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`.

```

2294 \newcommand\babellnullhyphen{\char\hyphenchar\font}
2295 \def\babelhyphen{\active@prefix\babelhyphen\bbl@hyphen}
2296 \def\bbl@hyphen{%
2297   \@ifstar{\bbl@hyphen@i @}{\bbl@hyphen@i \@empty}}
2298 \def\bbl@hyphen@i#1#2{%
2299   \bbl@ifunset{bbl@hy@#1#2\@empty}%
2300   {\csname bbl@#1usehyphen\endcsname{\discretionary{#2}{\#2}}}%
2301   {\csname bbl@hy@#1#2\@empty\endcsname}}

```

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

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

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.

```
2302 \def\bbl@usehyphen#1{%
2303   \leavevmode
2304   \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
2305   \nobreak\hskip\z@skip}
2306 \def\bbl@usehyphen#1{%
2307   \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}
```

The following macro inserts the hyphen char.

```
2308 \def\bbl@hyphenchar{%
2309   \ifnum\hyphenchar\font=\m@ne
2310     \babeinullhyphen
2311   \else
2312     \char\hyphenchar\font
2313   \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.

```
2314 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
2315 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
2316 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
2317 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
2318 \def\bbl@hy@nobreak{\bbl@usehyphen{\mbox{\bbl@hyphenchar}}}
2319 \def\bbl@hy@nobreak{\mbox{\bbl@hyphenchar}}
2320 \def\bbl@hy@repeat{%
2321   \bbl@usehyphen{%
2322     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
2323 \def\bbl@hy@repeat{%
2324   \bbl@usehyphen{%
2325     \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
2326 \def\bbl@hy@empty{\hskip\z@skip}
2327 \def\bbl@hy@empty{\discretionary{}{}{}}
```

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

```
2328 \def\bbl@disc#1#2{\nobreak\discretionary{#2-}{#1}\bbl@allowhyphens}
```

9.10 Multiencoding strings

The aim following commands is to provide a common interface for strings in several encodings. They also contains several hooks which can be used by `luatex` and `xetex`. The code is organized here with pseudo-guards, so we start with the basic commands.

Tools But first, a couple of tools. The first one makes global a local variable. This is not the best solution, but it works.

```
2329 \bbl@trace{Multiencoding strings}
2330 \def\bbl@tglobal#1{\global\let#1#1}
2331 \def\bbl@recatcode#1{% TODO. Used only once}
2332   \@tempcnta="7F
2333   \def\bbl@tempa{%
2334     \ifnum\@tempcnta>"FF\else
2335       \catcode\@tempcnta=#1\relax
2336       \advance\@tempcnta@ne
2337       \expandafter\bbl@tempa}
```

```

2338   \fi}%
2339   \bbl@tempa}

```

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

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

and starts over (and similarly when lowercasing).

```

2340 \@ifpackagewith{babel}{nocase}%
2341   {\let\bbl@patchuclc\relax}%
2342   {\def\bbl@patchuclc{%
2343     \global\let\bbl@patchuclc\relax
2344     \g@addto@macro\@uclclist{\reserved@b{\reserved@b\bbl@uclc}}%
2345     \gdef\bbl@uclc##1{%
2346       \let\bbl@encoded\bbl@encoded@uclc
2347       \bbl@ifunset{\language @bbl@uclc}% and resumes it
2348       {##1}%
2349       {\let\bbl@tempa##1\relax % Used by LANG@bbl@uclc
2350        \csname\language @bbl@uclc\endcsname}%
2351       {\bbl@tolower\@empty}{\bbl@toupper\@empty}}%
2352     \gdef\bbl@tolower{\csname\language @bbl@lc\endcsname}%
2353     \gdef\bbl@toupper{\csname\language @bbl@uc\endcsname}}%
2354 \langle *More package options \rangle \equiv
2355 \DeclareOption{nocase}{}
2356 \langle /More package options \rangle

```

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

```

2357 \langle *More package options \rangle \equiv
2358 \let\bbl@opt@strings\@nnil % accept strings=value
2359 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
2360 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
2361 \def\BabelStringsDefault{generic}
2362 \langle /More package options \rangle

```

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

```

2363 \@onlypreamble\StartBabelCommands
2364 \def\StartBabelCommands{%
2365   \begingroup
2366   \bbl@recatcode{11}%
2367   \langle Macros local to BabelCommands \rangle
2368   \def\bbl@provstring##1##2{%
2369     \providecommand##1{##2}%
2370     \bbl@tglobal##1}%
2371   \global\let\bbl@scafter\@empty
2372   \let\StartBabelCommands\bbl@startcmds
2373   \ifx\BabelLanguages\relax
2374     \let\BabelLanguages\CurrentOption
2375   \fi

```



```

2376 \begingroup
2377 \let\bbl@screset\@nnil % local flag - disable 1st stopcommands
2378 \StartBabelCommands}
2379 \def\bbl@startcmds{%
2380   \ifx\bbl@screset\@nnil\else
2381     \bbl@usehooks{stopcommands}{}%
2382   \fi
2383 \endgroup
2384 \begingroup
2385 \@ifstar
2386   {\ifx\bbl@opt@strings\@nnil
2387     \let\bbl@opt@strings\BabelStringsDefault
2388     \fi
2389     \bbl@startcmds@i}%
2390   \bbl@startcmds@i}
2391 \def\bbl@startcmds@i#1#2{%
2392   \edef\bbl@L{\zap@space#1 \@empty}%
2393   \edef\bbl@G{\zap@space#2 \@empty}%
2394   \bbl@startcmds@ii}
2395 \let\bbl@startcommands\StartBabelCommands

```

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

Select the behavior of \SetString. There are two main cases, depending 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.

```

2396 \newcommand\bbl@startcmds@ii[1][\@empty]{%
2397   \let\SetString@gobbletwo
2398   \let\bbl@stringdef@gobbletwo
2399   \let\AfterBabelCommands@gobble
2400   \ifx\@empty#1%
2401     \def\bbl@sc@label{generic}%
2402     \def\bbl@encstring##1##2{%
2403       \ProvideTextCommandDefault##1{##2}%
2404       \bbl@toglobal##1%
2405       \expandafter\bbl@toglobal\csname\string?\string##1\endcsname}%
2406     \let\bbl@sctest\in@true
2407   \else
2408     \let\bbl@sc@charset\space % <- zapped below
2409     \let\bbl@sc@fontenc\space % <- " "
2410     \def\bbl@tempa##1=##2\@nil{%
2411       \bbl@csarg\edef{sc@\zap@space##1 \@empty}{##2 }}%
2412     \bbl@vforeach{label=#1}{\bbl@tempa##1\@nil}%
2413     \def\bbl@tempa##1 ##2{% space -> comma
2414       ##1%
2415       \ifx\@empty##2\else\ifx,##1,\else,\fi\bbl@afterfi\bbl@tempa##2\fi}%
2416     \edef\bbl@sc@fontenc{\expandafter\bbl@tempa\bbl@sc@fontenc\@empty}%
2417     \edef\bbl@sc@label{\expandafter\zap@space\bbl@sc@label\@empty}%
2418     \edef\bbl@sc@charset{\expandafter\zap@space\bbl@sc@charset\@empty}%
2419     \def\bbl@encstring##1##2{%
2420       \bbl@foreach\bbl@sc@fontenc{%
2421         \bbl@ifunset{T@####1}%
2422         {}}%

```

```

2423         {\ProvideTextCommand###1{####1}{##2}%
2424         \bbl@toglobal##1%
2425         \expandafter
2426         \bbl@toglobal\csname####1\string##1\endcsname}}}%
2427     \def\bbl@sctest{%
2428         \bbl@xin@{\,\bbl@opt@strings,}{\,\bbl@sc@label,\bbl@sc@fontenc,}}%
2429     \fi
2430     \ifx\bbl@opt@strings\@nnil          % ie, no strings key -> defaults
2431     \else\ifx\bbl@opt@strings\relax      % ie, strings=encoded
2432         \let\AfterBabelCommands\bbl@aftercmds
2433         \let\SetString\bbl@setstring
2434         \let\bbl@stringdef\bbl@encstring
2435     \else                                % ie, strings=value
2436         \bbl@sctest
2437     \fin@
2438         \let\AfterBabelCommands\bbl@aftercmds
2439         \let\SetString\bbl@setstring
2440         \let\bbl@stringdef\bbl@provstring
2441     \fi\fi\fi
2442     \bbl@scswitch
2443     \ifx\bbl@G\@empty
2444         \def\SetString##1##2{%
2445             \bbl@error{Missing group for string \string##1}%
2446             {You must assign strings to some category, typically\\%
2447             captions or extras, but you set none}}%
2448     \fi
2449     \ifx\@empty#1%
2450         \bbl@usehooks{defaultcommands}}}%
2451     \else
2452         \@expandtwoargs
2453         \bbl@usehooks{encodedcommands}{\bbl@sc@charset}{\bbl@sc@fontenc}}}%
2454     \fi}

```

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

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

```

2455 \def\bbl@forlang#1#2{%
2456     \bbl@for#1\bbl@L{%
2457         \bbl@xin@{,#1,}{\,\BabelLanguages,}%
2458         \ifin@#2\relax\fi}}
2459 \def\bbl@scswitch{%
2460     \bbl@forlang\bbl@tempa{%
2461         \ifx\bbl@G\@empty\else
2462             \ifx\SetString\@gobbletwo\else
2463                 \edef\bbl@GL{\bbl@G\bbl@tempa}%
2464                 \bbl@xin@{\,\bbl@GL,}{\,\bbl@screset,}%
2465             \ifin@\else
2466                 \global\expandafter\let\csname\bbl@GL\endcsname\@undefined
2467                 \xdef\bbl@screset{\bbl@screset,\bbl@GL}%
2468             \fi
2469         \fi
2470     \fi}}

```

```

2471 \AtEndOfPackage{%
2472   \def\bbl@forlang#1#2{\bbl@for#1\bbl@L{\bbl@ifunset{date#1}{}{#2}}}%
2473   \let\bbl@scswitch\relax}
2474 \@onlypreamble\EndBabelCommands
2475 \def\EndBabelCommands{%
2476   \bbl@usehooks{stopcommands}{}%
2477   \endgroup
2478   \endgroup
2479   \bbl@scafter}
2480 \let\bbl@endcommands\EndBabelCommands

```

Now we define commands to be used inside \StartBabelCommands.

Strings The following macro is the actual definition of \SetString when it is “active” First save the “switcher”. Create it if undefined. Strings are defined only if undefined (ie, like \providescommand). With the event stringprocess you can preprocess the string by manipulating the value of \BabelString. If there are several hooks assigned to this event, preprocessing is done in the same order as defined. Finally, the string is set.

```

2481 \def\bbl@setstring#1#2{%
2482   \bbl@forlang\bbl@tempa{%
2483     \edef\bbl@LC{\bbl@tempa\bbl@stripslash#1}%
2484     \bbl@ifunset{\bbl@LC}% eg, \germanchaptername
2485     {\global\expandafter % TODO - con \bbl@exp ?
2486       \bbl@add\csname\bbl@G\bbl@tempa\expandafter\endcsname\expandafter
2487       {\expandafter\bbl@scset\expandafter#1\csname\bbl@LC\endcsname}}}%
2488     {}}%
2489   \def\BabelString{#2}%
2490   \bbl@usehooks{stringprocess}{}%
2491   \expandafter\bbl@stringdef
2492   \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.

```

2493 \ifx\bbl@opt@strings\relax
2494   \def\bbl@scset#1#2{\def#1{\bbl@encoded#2}}
2495   \bbl@patchuclc
2496   \let\bbl@encoded\relax
2497   \def\bbl@encoded@uclc#1{%
2498     \@inmathwarn#1%
2499     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
2500       \expandafter\ifx\csname ?\string#1\endcsname\relax
2501         \TextSymbolUnavailable#1%
2502       \else
2503         \csname ?\string#1\endcsname
2504       \fi
2505     \else
2506       \csname\cf@encoding\string#1\endcsname
2507     \fi}
2508 \else
2509   \def\bbl@scset#1#2{\def#1{#2}}
2510 \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.

```

2511 <<*Macros local to BabelCommands>> ≡
2512 \def\SetStringLoop##1##2{%
2513   \def\bbl@templ####1{\expandafter\noexpand\csname##1\endcsname}%
2514   \count@ \z@
2515   \bbl@loop\bbl@tempa{##2}{% empty items and spaces are ok
2516     \advance\count@ \@ne
2517     \toks@\expandafter{\bbl@tempa}%
2518     \bbl@exp{%
2519       \\SetString\bbl@templ{\romannumeral\count@}{\the\toks@}%
2520       \count@=\the\count@\relax}}}%
2521 <</Macros local to BabelCommands>>

```

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

```

2522 \def\bbl@aftercmds#1{%
2523   \toks@\expandafter{\bbl@scafter#1}%
2524   \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.

```

2525 <<*Macros local to BabelCommands>> ≡
2526 \newcommand\SetCase[3][1]{%
2527   \bbl@patchuclc
2528   \bbl@forlang\bbl@tempa{%
2529     \expandafter\bbl@encstring
2530     \csname\bbl@tempa @bbl@uclc\endcsname{\bbl@tempa##1}%
2531     \expandafter\bbl@encstring
2532     \csname\bbl@tempa @bbl@uc\endcsname{##2}%
2533     \expandafter\bbl@encstring
2534     \csname\bbl@tempa @bbl@lc\endcsname{##3}}}%
2535 <</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.

```

2536 <<*Macros local to BabelCommands>> ≡
2537 \newcommand\SetHyphenMap[1]{%
2538   \bbl@forlang\bbl@tempa{%
2539     \expandafter\bbl@stringdef
2540     \csname\bbl@tempa @bbl@hyphenmap\endcsname{##1}}}%
2541 <</Macros local to BabelCommands>>

```

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

```

2542 \newcommand\BabelLower[2]{% one to one.
2543   \ifnum\lccode#1=#2\else
2544     \babel@savevariable{\lccode#1}%
2545     \lccode#1=#2\relax
2546   \fi}
2547 \newcommand\BabelLowerMM[4]{% many-to-many
2548   \@tempcnta=#1\relax
2549   \@tempcntb=#4\relax
2550   \def\bbl@tempa{%
2551     \ifnum\@tempcnta>#2\else
2552       \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
2553       \advance\@tempcnta#3\relax
2554       \advance\@tempcntb#3\relax
2555       \expandafter\bbl@tempa

```

```

2556 \fi}%
2557 \bbl@tempa}
2558 \newcommand\BabelLowerM0[4]{% many-to-one
2559 \@tempcnta=#1\relax
2560 \def\bbl@tempa{%
2561 \ifnum\@tempcnta>#2\else
2562 \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
2563 \advance\@tempcnta#3
2564 \expandafter\bbl@tempa
2565 \fi}%
2566 \bbl@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

2567 <<(*More package options)>> ≡
2568 \DeclareOption{hyphenmap=off}{\chardef\bbl@opt@hyphenmap\z@}
2569 \DeclareOption{hyphenmap=first}{\chardef\bbl@opt@hyphenmap\@ne}
2570 \DeclareOption{hyphenmap=select}{\chardef\bbl@opt@hyphenmap\tw@}
2571 \DeclareOption{hyphenmap=other}{\chardef\bbl@opt@hyphenmap\thr@@}
2572 \DeclareOption{hyphenmap=other*}{\chardef\bbl@opt@hyphenmap4\relax}
2573 <</More package options>>

```

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

```

2574 \AtEndOfPackage{%
2575 \ifx\bbl@opt@hyphenmap\undefined
2576 \bbl@xin@{,}{\bbl@language@opts}%
2577 \chardef\bbl@opt@hyphenmap\ifin4\else\@ne\fi
2578 \fi}

```

9.11 Macros common to a number of languages

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

```

2579 \bbl@trace{Macros related to glyphs}
2580 \def\set@low@box#1{\setbox\tw@\hbox{,}\setbox\z@\hbox{#1}%
2581 \dimen\z@\ht\z@ \advance\dimen\z@ -\ht\tw@%
2582 \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.

```

2583 \def\save@sf@q#1{\leavevmode
2584 \begingroup
2585 \edef\@SF{\spacefactor\the\spacefactor}#1\@SF
2586 \endgroup}

```

9.12 Making glyphs available

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

9.12.1 Quotation marks

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

```

2587 \ProvideTextCommand{\quotedblbase}{OT1}{%
2588 \save@sf@q{\set@low@box{\textquotedblright\}%
2589 \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.

```
2592 \ProvideTextCommandDefault{\quotedblbase}{%
2591 \UseTextSymbol{OT1}{\quotedblbase}}
```

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

```
2592 \ProvideTextCommand{\quotesinglbase}{OT1}{%
2593 \save@sf@q{\set@low@box{\textquoteright\}%
2594 \box\z@\kern-.04em\bb1@allowhyphens}}
```

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

```
2595 \ProvideTextCommandDefault{\quotesinglbase}{%
2596 \UseTextSymbol{OT1}{\quotesinglbase}}
```

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

```
2597 \ProvideTextCommand{\guillemetleft}{OT1}{%
2598 \ifmmode
2599 \ll
2600 \else
2601 \save@sf@q{\nobreak
2602 \raise.2ex\hbox{\scriptscriptstyle\ll}\bb1@allowhyphens}%
2603 \fi}
2604 \ProvideTextCommand{\guillemetright}{OT1}{%
2605 \ifmmode
2606 \gg
2607 \else
2608 \save@sf@q{\nobreak
2609 \raise.2ex\hbox{\scriptscriptstyle\gg}\bb1@allowhyphens}%
2610 \fi}
2611 \ProvideTextCommand{\guillemotleft}{OT1}{%
2612 \ifmmode
2613 \ll
2614 \else
2615 \save@sf@q{\nobreak
2616 \raise.2ex\hbox{\scriptscriptstyle\ll}\bb1@allowhyphens}%
2617 \fi}
2618 \ProvideTextCommand{\guillemotright}{OT1}{%
2619 \ifmmode
2620 \gg
2621 \else
2622 \save@sf@q{\nobreak
2623 \raise.2ex\hbox{\scriptscriptstyle\gg}\bb1@allowhyphens}%
2624 \fi}
```

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

```
2625 \ProvideTextCommandDefault{\guillemetleft}{%
2626 \UseTextSymbol{OT1}{\guillemetleft}}
2627 \ProvideTextCommandDefault{\guillemetright}{%
2628 \UseTextSymbol{OT1}{\guillemetright}}
2629 \ProvideTextCommandDefault{\guillemotleft}{%
2630 \UseTextSymbol{OT1}{\guillemotleft}}
2631 \ProvideTextCommandDefault{\guillemotright}{%
2632 \UseTextSymbol{OT1}{\guillemotright}}
```

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

```
2633 \ProvideTextCommand{\guilsinglleft}{OT1}{%
2634   \ifmmode
2635     <%
2636   \else
2637     \save@sf@q{\nobreak
2638       \raise.2ex\hbox{$\scriptscriptstyle<$}\bbl@allowhyphens}%
2639   \fi}
2640 \ProvideTextCommand{\guilsinglright}{OT1}{%
2641   \ifmmode
2642     >%
2643   \else
2644     \save@sf@q{\nobreak
2645       \raise.2ex\hbox{$\scriptscriptstyle>$}\bbl@allowhyphens}%
2646   \fi}
```

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

```
2647 \ProvideTextCommandDefault{\guilsinglleft}{%
2648   \UseTextSymbol{OT1}{\guilsinglleft}}
2649 \ProvideTextCommandDefault{\guilsinglright}{%
2650   \UseTextSymbol{OT1}{\guilsinglright}}
```

9.12.2 Letters

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

```
2651 \DeclareTextCommand{\ij}{OT1}{%
2652   i\kern-0.02em\bbl@allowhyphens j}
2653 \DeclareTextCommand{\IJ}{OT1}{%
2654   I\kern-0.02em\bbl@allowhyphens J}
2655 \DeclareTextCommand{\ij}{T1}{\char188}
2656 \DeclareTextCommand{\IJ}{T1}{\char156}
```

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

```
2657 \ProvideTextCommandDefault{\ij}{%
2658   \UseTextSymbol{OT1}{\ij}}
2659 \ProvideTextCommandDefault{\IJ}{%
2660   \UseTextSymbol{OT1}{\IJ}}
```

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

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

```
2661 \def\crrtic@{\hrule height0.1ex width0.3em}
2662 \def\crrtic@{\hrule height0.1ex width0.33em}
2663 \def\ddj@{%
2664   \setbox0\hbox{d}\dimen@=\ht0
2665   \advance\dimen@1ex
2666   \dimen@.45\dimen@
2667   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2668   \advance\dimen@ii.5ex
2669   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
2670 \def\DDJ@{%
2671   \setbox0\hbox{D}\dimen@=.55\ht0
2672   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
```

```

2673 \advance\dimen@ii.15ex % correction for the dash position
2674 \advance\dimen@ii-.15\fontdimen7\font % correction for cmtt font
2675 \dimen\thr@@\expandafter\rem\pt\the\fontdimen7\font\dimen@
2676 \leavevmode\rlap{\raise\dimen@hbox{\kern\dimen@ii\vbox{\crttic@}}}}
2677 %
2678 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
2679 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}

```

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

```

2680 \ProvideTextCommandDefault{\dj}{%
2681 \UseTextSymbol{OT1}{\dj}}
2682 \ProvideTextCommandDefault{\DJ}{%
2683 \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.

```

2684 \DeclareTextCommand{\SS}{OT1}{SS}
2685 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}

```

9.12.3 Shorthands for quotation marks

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

\glq The ‘german’ single quotes.

```

\grq 2686 \ProvideTextCommandDefault{\glq}{%
2687 \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}

```

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

```

2688 \ProvideTextCommand{\grq}{T1}{%
2689 \textormath{\kern\z@\textquoteleft}{\mbox{\textquoteleft}}}
2690 \ProvideTextCommand{\grq}{TU}{%
2691 \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
2692 \ProvideTextCommand{\grq}{OT1}{%
2693 \save@sf@q{\kern-.0125em
2694 \textormath{\textquoteleft}{\mbox{\textquoteleft}}}%
2695 \kern.07em\relax}}
2696 \ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}

```

\glqq The ‘german’ double quotes.

```

\grqq 2697 \ProvideTextCommandDefault{\glqq}{%
2698 \textormath{\quotedblbase}{\mbox{\quotedblbase}}}

```

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

```

2699 \ProvideTextCommand{\grqq}{T1}{%
2700 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
2701 \ProvideTextCommand{\grqq}{TU}{%
2702 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
2703 \ProvideTextCommand{\grqq}{OT1}{%
2704 \save@sf@q{\kern-.07em
2705 \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}%
2706 \kern.07em\relax}}
2707 \ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}

```


`\flq` The ‘french’ single guillemets.
`\frq` 2708 \ProvideTextCommandDefault{\flq}{%
 2709 \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}
 2710 \ProvideTextCommandDefault{\frq}{%
 2711 \textormath{\guilsinglright}{\mbox{\guilsinglright}}}

`\flqq` The ‘french’ double guillemets.
`\frqq` 2712 \ProvideTextCommandDefault{\flqq}{%
 2713 \textormath{\guillemetleft}{\mbox{\guillemetleft}}}
 2714 \ProvideTextCommandDefault{\frqq}{%
 2715 \textormath{\guillemetright}{\mbox{\guillemetright}}}

9.12.4 Umlauts and tremas

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

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

```
2716 \def\umlauthigh{%
2717   \def\bbl@umlauta##1{\leavevmode\bgroup%
2718     \expandafter\accent\csname\f@encoding dqpos\endcsname
2719     ##1\bbl@allowhyphens\egroup}%
2720   \let\bbl@umlaute\bbl@umlauta}
2721 \def\umlautlow{%
2722   \def\bbl@umlauta{\protect\lower@umlaut}}
2723 \def\umlautelow{%
2724   \def\bbl@umlaute{\protect\lower@umlaut}}
2725 \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.

```
2726 \expandafter\ifx\csname U@D\endcsname\relax
2727   \csname newdimen\endcsname\U@D
2728 \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.

```
2729 \def\lower@umlaut#1{%
2730   \leavevmode\bgroup
2731   \U@D 1ex%
2732   {\setbox\z@\hbox{%
2733     \expandafter\char\csname\f@encoding dqpos\endcsname}%
2734     \dimen@ -.45ex\advance\dimen@\ht\z@
2735     \ifdim 1ex<\dimen@ \fontdimen5\font\dimen@ \fi}%
2736   \expandafter\accent\csname\f@encoding dqpos\endcsname
```

```

2737 \fontdimen5\font\U@D #1%
2738 \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).

```

2739 \AtBeginDocument{%
2740 \DeclareTextCompositeCommand{\}{OT1}{a}{\bbl@umlauta{a}}%
2741 \DeclareTextCompositeCommand{\}{OT1}{e}{\bbl@umlaute{e}}%
2742 \DeclareTextCompositeCommand{\}{OT1}{i}{\bbl@umlaute{i}}%
2743 \DeclareTextCompositeCommand{\}{OT1}{\i}{\bbl@umlaute{i}}%
2744 \DeclareTextCompositeCommand{\}{OT1}{o}{\bbl@umlauta{o}}%
2745 \DeclareTextCompositeCommand{\}{OT1}{u}{\bbl@umlauta{u}}%
2746 \DeclareTextCompositeCommand{\}{OT1}{A}{\bbl@umlauta{A}}%
2747 \DeclareTextCompositeCommand{\}{OT1}{E}{\bbl@umlaute{E}}%
2748 \DeclareTextCompositeCommand{\}{OT1}{I}{\bbl@umlaute{I}}%
2749 \DeclareTextCompositeCommand{\}{OT1}{O}{\bbl@umlauta{O}}%
2750 \DeclareTextCompositeCommand{\}{OT1}{U}{\bbl@umlauta{U}}%

```

Finally, make sure the default hyphenrules are defined (even if empty). For internal use, another empty `\language` is defined. Currently used in Amharic.

```

2751 \ifx\l@english\@undefined
2752 \chardef\l@english\z@
2753 \fi
2754 \ifx\l@babelnohyphens\@undefined
2755 \newlanguage\l@babelnohyphens
2756 \fi

```

9.13 Layout

Work in progress.

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

```

2757 \bbl@trace{Bidi layout}
2758 \providecommand\IfBabelLayout[3]{#3}%
2759 \newcommand\BabelPatchSection[1]{%
2760 \@ifundefined{#1}{%
2761 \bbl@exp{\let\bbl@ss@#1>\<#1>}%
2762 \@namedef{#1}{%
2763 \ifstar{\bbl@presec@s{#1}}%
2764 {\@dblarg{\bbl@presec@x{#1}}}}}%
2765 \def\bbl@presec@x#1[#2]#3{%
2766 \bbl@exp{%
2767 \\\select@language@x{\bbl@main@language}%
2768 \\\bbl@cs{sspre@#1}%
2769 \\\bbl@cs{ss@#1}%
2770 [\\foreignlanguage{\language}{\unexpanded{#2}}]%
2771 {\\foreignlanguage{\language}{\unexpanded{#3}}}%
2772 \\\select@language@x{\language}}}%
2773 \def\bbl@presec@s#1#2{%
2774 \bbl@exp{%
2775 \\\select@language@x{\bbl@main@language}%
2776 \\\bbl@cs{sspre@#1}%

```

```

2777   \\\bbl@cs{ss@#1}*%
2778   {\\\foreignlanguage{\language}{\unexpanded{#2}}}%
2779   \\\select@language@x{\language}}}%
2780 \IfBabelLayout{sectioning}%
2781   {\BabelPatchSection{part}%
2782    \BabelPatchSection{chapter}%
2783    \BabelPatchSection{section}%
2784    \BabelPatchSection{subsection}%
2785    \BabelPatchSection{subsubsection}%
2786    \BabelPatchSection{paragraph}%
2787    \BabelPatchSection{subparagraph}%
2788    \def\babel@toc#1{%
2789      \select@language@x{\bbl@main@language}}}%
2790 \IfBabelLayout{captions}%
2791   {\BabelPatchSection{caption}}}%

```

9.14 Load engine specific macros

```

2792 \bbl@trace{Input engine specific macros}
2793 \ifcase\bbl@engine
2794   \input txtbabel.def
2795 \or
2796   \input luababel.def
2797 \or
2798   \input xebabel.def
2799 \fi

```

9.15 Creating and modifying languages

`\babelprovide` is a general purpose tool for creating and modifying languages. It creates the language infrastructure, and loads, if requested, an ini file. It may be used in conjunction to previously loaded ldf files.

```

2800 \bbl@trace{Creating languages and reading ini files}
2801 \newcommand\babelprovide[2][{}]{%
2802   \let\bbl@savelangname\language
2803   \edef\bbl@savelocaleid{\the\localeid}%
2804   % Set name and locale id
2805   \edef\language{#2}%
2806   % \global\@namedef{\bbl@lcnname@#2}{#2}%
2807   \bbl@id@assign
2808   \let\bbl@KVP@captions\@nil
2809   \let\bbl@KVP@import\@nil
2810   \let\bbl@KVP@main\@nil
2811   \let\bbl@KVP@script\@nil
2812   \let\bbl@KVP@language\@nil
2813   \let\bbl@KVP@hyphenrules\@nil % only for provide@new
2814   \let\bbl@KVP@mapfont\@nil
2815   \let\bbl@KVP@maparabic\@nil
2816   \let\bbl@KVP@mapdigits\@nil
2817   \let\bbl@KVP@intraspace\@nil
2818   \let\bbl@KVP@intrapenalty\@nil
2819   \let\bbl@KVP@onchar\@nil
2820   \let\bbl@KVP@alph\@nil
2821   \let\bbl@KVP@Alph\@nil
2822   \let\bbl@KVP@info\@nil % Ignored with import? Or error/warning?
2823   \bbl@forkv{#1}{% TODO - error handling
2824     \in@{/}{##1}%
2825     \ifin@

```

```

2826 \bbl@renewinikey##1\@{##2}%
2827 \else
2828 \bbl@csarg\def{KVP@##1}{##2}%
2829 \fi}%
2830 % == import, captions ==
2831 \ifx\bbl@KVP@import\@nil\else
2832 \bbl@exp{\bbl@ifblank{\bbl@KVP@import}}%
2833 {\ifx\bbl@initoload\relax
2834 \begingroup
2835 \def\BabelBeforeIni##1##2{\gdef\bbl@KVP@import{##1}\endinput}%
2836 \InputIfFileExists{babel-#2.tex}{}}%
2837 \endgroup
2838 \else
2839 \xdef\bbl@KVP@import{\bbl@initoload}%
2840 \fi}%
2841 {}%
2842 \fi
2843 \ifx\bbl@KVP@captions\@nil
2844 \let\bbl@KVP@captions\bbl@KVP@import
2845 \fi
2846 % Load ini
2847 \bbl@ifunset{date#2}%
2848 {\bbl@provide@new{#2}}%
2849 {\bbl@ifblank{#1}%
2850 {\bbl@error
2851 {If you want to modify `#2' you must tell how in\\
2852 the optional argument. See the manual for the\\
2853 available options.}%
2854 {Use this macro as documented}}%
2855 {\bbl@provide@renew{#2}}}%
2856 % Post tasks
2857 \bbl@exp{\bbl@babelensure[exclude=\\today]{#2}}%
2858 \bbl@ifunset{bbl@ensure@\\languagename}%
2859 {\bbl@exp{%
2860 \\DeclareRobustCommand\<bbl@ensure@\\languagename>[1]{%
2861 \\foreignlanguage{\\languagename}%
2862 {###1}}}%
2863 {}%
2864 \bbl@exp{%
2865 \\bbl@toglobal\<bbl@ensure@\\languagename>%
2866 \\bbl@toglobal\<bbl@ensure@\\languagename\space>%
2867 % At this point all parameters are defined if 'import'. Now we
2868 % execute some code depending on them. But what about if nothing was
2869 % imported? We just load the very basic parameters: ids and a few
2870 % more.
2871 \bbl@ifunset{bbl@lname@#2}% TODO. Duplicated
2872 {\def\BabelBeforeIni##1##2{%
2873 \begingroup
2874 \catcode`\[=12 \catcode`\]=12 \catcode`\==12
2875 \catcode`\;=12 \catcode`\|=12 %
2876 \let\bbl@ini@captions@aux\@gobbles
2877 \def\bbl@inidate #####1.####2.####3.####4\relax #####5####6}%
2878 \bbl@read@ini{##1}{basic data}%
2879 \bbl@exportkey{chrng}{characters.ranges}{}%
2880 \bbl@exportkey{dgnat}{numbers.digits.native}{}%
2881 \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
2882 \bbl@exportkey{lnbrk}{typography.linebreaking}{h}%
2883 \bbl@exportkey{lfthm}{typography.lefthyphenmin}{2}%
2884 \bbl@exportkey{rgthm}{typography.righthyphenmin}{3}%

```

```

2885     \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
2886     \bbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
2887     \bbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
2888     \bbl@exportkey{intsp}{typography.intraspace}{}%
2889     \ifx\bbl@initoload\relax\endinput\fi
2890   \endgroup}%
2891   \begingroup      % boxed, to avoid extra spaces:
2892     \ifx\bbl@initoload\relax
2893       \setbox\z@\hbox{\InputIfFileExists{babel-#2.tex}{}{}}%
2894     \else
2895       \setbox\z@\hbox{\BabelBeforeIni{\bbl@initoload}{}{}}%
2896     \fi
2897   \endgroup}%
2898   {}%
2899   % == script, language ==
2900   % Override the values from ini or defines them
2901   \ifx\bbl@KVP@script\@nil\else
2902     \bbl@csarg\edef\sname@#2{\bbl@KVP@script}%
2903   \fi
2904   \ifx\bbl@KVP@language\@nil\else
2905     \bbl@csarg\edef\lname@#2{\bbl@KVP@language}%
2906   \fi
2907   % == onchar ==
2908   \ifx\bbl@KVP@onchar\@nil\else
2909     \bbl@luahyphenate
2910     \directlua{
2911       if Babel.locale_mapped == nil then
2912         Babel.locale_mapped = true
2913         Babel.linebreaking.add_before(Babel.locale_map)
2914         Babel.loc_to_scr = {}
2915         Babel.chr_to_loc = Babel.chr_to_loc or {}
2916       end}%
2917     \bbl@xin@{ ids }{ \bbl@KVP@onchar\space}%
2918   \ifin@
2919     \ifx\bbl@starthyphens\@undefined % Needed if no explicit selection
2920       \AddBabelHook{babel-onchar}{beforestart}{{\bbl@starthyphens}}%
2921     \fi
2922     \bbl@exp{\bbl@add\bbl@starthyphens
2923       {\bbl@patterns@lua{\languagename}}}%
2924     % TODO - error/warning if no script
2925     \directlua{
2926       if Babel.script_blocks['\bbl@cl{sbc}'] then
2927         Babel.loc_to_scr[\the\localeid] =
2928           Babel.script_blocks['\bbl@cl{sbc}']
2929         Babel.locale_props[\the\localeid].lc = \the\localeid\space
2930         Babel.locale_props[\the\localeid].lg = \the\@nameuse{1@\languagename}\space
2931       end
2932     }%
2933   \fi
2934   \bbl@xin@{ fonts }{ \bbl@KVP@onchar\space}%
2935   \ifin@
2936     \bbl@ifunset{bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
2937     \bbl@ifunset{bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{}%
2938     \directlua{
2939       if Babel.script_blocks['\bbl@cl{sbc}'] then
2940         Babel.loc_to_scr[\the\localeid] =
2941           Babel.script_blocks['\bbl@cl{sbc}']
2942       end}%
2943     \ifx\bbl@mapselect\@undefined

```

```

2944 \AtBeginDocument{%
2945 \expandafter\bb1@add\csname selectfont \endcsname{{\bb1@mapselect}}}%
2946 {\selectfont}}%
2947 \def\bb1@mapselect{%
2948 \let\bb1@mapselect\relax
2949 \edef\bb1@prefontid{\fontid\font}}%
2950 \def\bb1@mapdir##1{%
2951 {\def\languagename{##1}%
2952 \let\bb1@ifrestoring\@firstoftwo % To avoid font warning
2953 \bb1@switchfont
2954 \directlua{
2955 Babel.locale_props[\the\csname bb1@id@##1\endcsname]%
2956 ['/\bb1@prefontid'] = \fontid\font\space}}}%
2957 \fi
2958 \bb1@exp{\bb1@add\bb1@mapselect{\bb1@mapdir{\languagename}}}%
2959 \fi
2960 % TODO - catch non-valid values
2961 \fi
2962 % == mapfont ==
2963 % For bidi texts, to switch the font based on direction
2964 \ifx\bb1@KVP@mapfont\@nil\else
2965 \bb1@ifsamestring{\bb1@KVP@mapfont}{direction}}}%
2966 {\bb1@error{Option '\bb1@KVP@mapfont' unknown for\%
2967 mapfont. Use 'direction'.%
2968 {See the manual for details.}}}%
2969 \bb1@ifunset{\bb1@lsys@\languagename}{\bb1@provide@lsys{\languagename}}}%
2970 \bb1@ifunset{\bb1@wdir@\languagename}{\bb1@provide@dirs{\languagename}}}%
2971 \ifx\bb1@mapselect\undefined
2972 \AtBeginDocument{%
2973 \expandafter\bb1@add\csname selectfont \endcsname{{\bb1@mapselect}}}%
2974 {\selectfont}}%
2975 \def\bb1@mapselect{%
2976 \let\bb1@mapselect\relax
2977 \edef\bb1@prefontid{\fontid\font}}%
2978 \def\bb1@mapdir##1{%
2979 {\def\languagename{##1}%
2980 \let\bb1@ifrestoring\@firstoftwo % avoid font warning
2981 \bb1@switchfont
2982 \directlua{Babel.fontmap
2983 [\the\csname bb1@wdir@##1\endcsname]%
2984 [\bb1@prefontid]=\fontid\font}}}%
2985 \fi
2986 \bb1@exp{\bb1@add\bb1@mapselect{\bb1@mapdir{\languagename}}}%
2987 \fi
2988 % == intraspace, intrapenalty ==
2989 % For CJK, East Asian, Southeast Asian, if interspace in ini
2990 \ifx\bb1@KVP@intraspace\@nil\else % We can override the ini or set
2991 \bb1@csarg\edef{intsp@#2}{\bb1@KVP@intraspace}%
2992 \fi
2993 \bb1@provide@intraspace
2994 % == hyphenate.other.locale ==
2995 \bb1@ifunset{\bb1@hyotl@\languagename}}}%
2996 {\bb1@csarg\bb1@replace{hyotl@\languagename}{ }{,}}%
2997 \bb1@startcommands*{\languagename}}}%
2998 \bb1@csarg\bb1@foreach{hyotl@\languagename}{%
2999 \ifcase\bb1@engine
3000 \ifnum##1<257
3001 \SetHyphenMap{\BabelLower{##1}{##1}}}%
3002 \fi

```

```

3003         \else
3004             \SetHyphenMap{\BabelLower{##1}{##1}}%
3005             \fi}%
3006         \bbl@endcommands}%
3007 % == hyphenate.other.script ==
3008 \bbl@ifunset{\bbl@hyots@language}{}%
3009 {\bbl@csarg\bbl@replace{hyots@language}{ }{,}%
3010  \bbl@csarg\bbl@foreach{hyots@language}{%
3011     \ifcase\bbl@engine
3012     \ifnum##1<257
3013         \global\lccode##1=##1\relax
3014     \fi
3015     \else
3016         \global\lccode##1=##1\relax
3017     \fi}}%
3018 % == maparabic ==
3019 % Native digits, if provided in ini (TeX level, xe and lua)
3020 \ifcase\bbl@engine\else
3021     \bbl@ifunset{\bbl@dgnat@language}{}%
3022     {\expandafter\ifx\csname bbl@dgnat@language\endcsname\empty\else
3023         \expandafter\expandafter\expandafter
3024         \bbl@setdigits\csname bbl@dgnat@language\endcsname
3025         \ifx\bbl@KVP@maparabic@nil\else
3026             \ifx\bbl@latinarabic@undefined
3027                 \expandafter\let\expandafter\@arabic
3028                 \csname bbl@counter@language\endcsname
3029             \else % ie, if layout=counters, which redefines \@arabic
3030                 \expandafter\let\expandafter\bbl@latinarabic
3031                 \csname bbl@counter@language\endcsname
3032             \fi
3033         \fi
3034     \fi}%
3035 \fi
3036 % == mapdigits ==
3037 % Native digits (lua level).
3038 \ifodd\bbl@engine
3039     \ifx\bbl@KVP@mapdigits@nil\else
3040         \bbl@ifunset{\bbl@dgnat@language}{}%
3041         {\RequirePackage{luatexbase}%
3042          \bbl@activate@preotf
3043          \directlua{
3044              Babel = Babel or {} %% -> presets in luababel
3045              Babel.digits_mapped = true
3046              Babel.digits = Babel.digits or {}
3047              Babel.digits[\the\localeid] =
3048                  table.pack(string.utfvalue('\bbl@cl{dgnat}'))
3049              if not Babel.numbers then
3050                  function Babel.numbers(head)
3051                      local LOCALE = luatexbase.registernumber'bbl@attr@locale'
3052                      local GLYPH = node.id'glyph'
3053                      local inmath = false
3054                      for item in node.traverse(head) do
3055                          if not inmath and item.id == GLYPH then
3056                              local temp = node.get_attribute(item, LOCALE)
3057                              if Babel.digits[temp] then
3058                                  local chr = item.char
3059                                  if chr > 47 and chr < 58 then
3060                                      item.char = Babel.digits[temp][chr-47]
3061                                  end

```

```

3062             end
3063             elseif item.id == node.id'math' then
3064                 inmath = (item.subtype == 0)
3065             end
3066         end
3067         return head
3068     end
3069 end
3070 }}%
3071 \fi
3072 \fi
3073 % == alph, Alph ==
3074 % What if extras<lang> contains a \babel@save@alph? It won't be
3075 % restored correctly when exiting the language, so we ignore
3076 % this change with the \bbl@alph@saved trick.
3077 \ifx\bbl@KVP@alph@nil\else
3078     \toks@{\expandafter\expandafter\expandafter{%
3079         \csname extras\language\endcsname}%
3080         \bbl@exp{%
3081             \def<extras\language>{%
3082                 \let\\bbl@alph@saved\\@alph
3083                 \the\toks@
3084                 \let\\@alph\\bbl@alph@saved
3085                 \\babel@save\\@alph
3086                 \let\\@alph<bbl@cntr@bbl@KVP@alph @\language>}}}%
3087 \fi
3088 \ifx\bbl@KVP@Alph@nil\else
3089     \toks@{\expandafter\expandafter\expandafter{%
3090         \csname extras\language\endcsname}%
3091         \bbl@exp{%
3092             \def<extras\language>{%
3093                 \let\\bbl@Alph@saved\\@Alph
3094                 \the\toks@
3095                 \let\\@Alph\\bbl@Alph@saved
3096                 \\babel@save\\@Alph
3097                 \let\\@Alph<bbl@cntr@bbl@KVP@Alph @\language>}}}%
3098 \fi
3099 % == require.babel in ini ==
3100 % To load or reload the babel-*.tex, if require.babel in ini
3101 \bbl@ifunset{bbl@rqtex@\language}{}%
3102     {\expandafter\ifx\csname bbl@rqtex@\language\endcsname\@empty\else
3103         \let\BabelBeforeIni@gobbletwo
3104         \chardef\atcatcode=\catcode`\@
3105         \catcode`\@=11\relax
3106         \InputIfFileExists{babel-\bbl@cs{rqtex@\language}.tex}{}{}%
3107         \catcode`\@=\atcatcode
3108         \let\atcatcode\relax
3109     \fi}%
3110 % == main ==
3111 \ifx\bbl@KVP@main@nil % Restore only if not 'main'
3112     \let\language\bbl@savelangname
3113     \chardef\localeid\bbl@savelocaleid\relax
3114 \fi}

```

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

```

3115 \newcommand\localedigits{@nameuse{\language digits}}
3116 \def\bbl@setdigits#1#2#3#4#5{%

```


[illegible]

```

3146 \def\bbl@provide@new#1{%
3147   \@namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
3148   \@namedef{extras#1}{}%
3149   \@namedef{noextras#1}{}%
3150   \bbl@startcommands*{#1}{captions}%
3151     \ifx\bbl@KVP@captions\@nil %      and also if import, implicit
3152       \def\bbl@tempb##1{%            elt for \bbl@captionslist
3153         \ifx##1\@empty\else
3154           \bbl@exp{%
3155             \\SetString\\##1{%
3156               \\bbl@nocaption{\bbl@stripslash##1}{#1\bbl@stripslash##1}}}%
3157             \expandafter\bbl@tempb
3158           \fi}%
3159       \expandafter\bbl@tempb\bbl@captionslist\@empty
3160     \else
3161       \ifx\bbl@initoload\relax
3162         \bbl@read@ini{\bbl@KVP@captions}{data}% Here letters cat = 11
3163       \else
3164         \bbl@read@ini{\bbl@initoload}{data}% Here all letters cat = 11
3165       \fi
3166       \bbl@after@ini
3167       \bbl@savestrings
3168     \fi
3169   \StartBabelCommands*{#1}{date}%
3170   \ifx\bbl@KVP@import\@nil
3171     \bbl@exp{%
3172       \\SetString\\today{\bbl@nocaption{today}{#1today}}}%
3173   \else

```

```

3174 \bbl@savetoday
3175 \bbl@savedate
3176 \fi
3177 \bbl@endcommands
3178 \bbl@ifunset{\bbl@lname@#1}%      TODO. Duplicated
3179 {\def\BabelBeforeIni##1##2{%
3180     \begingroup
3181     \catcode`\[=12 \catcode`\]=12 \catcode`\==12
3182     \catcode`\;=12 \catcode`\|=12 %
3183     \let\bbl@ini@captions@aux\@gobbletwo
3184     \def\bbl@inidate ####1.####2.####3.####4\relax ####5####6{%
3185     \bbl@read@ini{##1}{basic data}%
3186     \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
3187     \bbl@exportkey{lnbrk}{typography.linebreaking}{h}%
3188     \bbl@exportkey{lfthm}{typography.lefthyphenmin}{2}%
3189     \bbl@exportkey{rgthm}{typography.righthyphenmin}{3}%
3190     \bbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
3191     \bbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
3192     \bbl@exportkey{intsp}{typography.intraspace}{}%
3193     \bbl@exportkey{chrng}{characters.ranges}{}%
3194     \bbl@exportkey{dgnat}{numbers.digits.native}{}%
3195     \ifx\bbl@initoload\relax\endinput\fi
3196     \endgroup}%
3197 \begingroup      % boxed, to avoid extra spaces:
3198 \ifx\bbl@initoload\relax
3199     \setbox\z@\hbox{\InputIfFileExists{babel-#1.tex}{}}%
3200 \else
3201     \setbox\z@\hbox{\BabelBeforeIni{\bbl@initoload}}%
3202 \fi
3203 \endgroup}%
3204 {}%
3205 \bbl@exp{%
3206     \gdef\<#1hyphenmins>{%
3207         {\bbl@ifunset{\bbl@lfthm@#1}{2}{\bbl@cs{lfthm@#1}}}%
3208         {\bbl@ifunset{\bbl@rgthm@#1}{3}{\bbl@cs{rgthm@#1}}}%
3209     \bbl@provide@hyphens{#1}%
3210     \ifx\bbl@KVP@main\@nil\else
3211         \expandafter\main@language\expandafter{#1}%
3212     \fi}
3213 \def\bbl@provide@renew#1{%
3214     \ifx\bbl@KVP@captions\@nil\else
3215         \StartBabelCommands*{#1}{captions}%
3216         \bbl@read@ini{\bbl@KVP@captions}{data}%      Here all letters cat = 11
3217         \bbl@after@ini
3218         \bbl@savestrings
3219         \EndBabelCommands
3220     \fi
3221     \ifx\bbl@KVP@import\@nil\else
3222         \StartBabelCommands*{#1}{date}%
3223         \bbl@savetoday
3224         \bbl@savedate
3225         \EndBabelCommands
3226     \fi
3227     % == hyphenrules ==
3228     \bbl@provide@hyphens{#1}}

```

The hyphenrules option is handled with an auxiliary macro.

```

3229 \def\bbl@provide@hyphens#1{%
3230     \let\bbl@tempa\relax

```

```

3231 \ifx\bbbl@KVP@hyphenrules\@nil\else
3232 \bbbl@replace\bbbl@KVP@hyphenrules{ }{,}%
3233 \bbbl@foreach\bbbl@KVP@hyphenrules{%
3234 \ifx\bbbl@tempa\relax % if not yet found
3235 \bbbl@ifsamestring{##1}{+}%
3236 {\bbbl@exp{\addlanguage\<l@##1>}}}%
3237 }%
3238 \bbbl@ifunset{l@##1}%
3239 }%
3240 {\bbbl@exp{\let\bbbl@tempa\<l@##1>}}}%
3241 \fi}%
3242 \fi
3243 \ifx\bbbl@tempa\relax % if no opt or no language in opt found
3244 \ifx\bbbl@KVP@import\@nil
3245 \ifx\bbbl@initoload\relax\else
3246 \bbbl@exp{% and hyphenrules is not empty
3247 \bbbl@ifblank{\bbbl@cs{hyphr@#1}}}%
3248 }%
3249 {\let\bbbl@tempa\<l@\bbbl@cl{hyphr}>}}}%
3250 \fi
3251 \else % if importing
3252 \bbbl@exp{% and hyphenrules is not empty
3253 \bbbl@ifblank{\bbbl@cs{hyphr@#1}}}%
3254 }%
3255 {\let\bbbl@tempa\<l@\bbbl@cl{hyphr}>}}}%
3256 \fi
3257 \fi
3258 \bbbl@ifunset{\bbbl@tempa}% ie, relax or undefined
3259 {\bbbl@ifunset{l@##1}% no hyphenrules found - fallback
3260 {\bbbl@exp{\adddialect\<l@#1>\language}}}%
3261 }% so, l@<lang> is ok - nothing to do
3262 {\bbbl@exp{\adddialect\<l@#1>\bbbl@tempa}}}% found in opt list or ini
3263

```

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.

```

3264 \ifx\bbbl@readstream\@undefined
3265 \csname newread\endcsname\bbbl@readstream
3266 \fi
3267 \def\bbbl@inipreread#1=#2\@{%
3268 \bbbl@trim@def\bbbl@tempa{#1}% Redundant below !!
3269 \bbbl@trim\toks@{#2}%
3270 % Move trims here ??
3271 \bbbl@ifunset{\bbbl@KVP@\bbbl@section/\bbbl@tempa}%
3272 {\bbbl@exp{%
3273 \g@addto@macro\bbbl@inidata{%
3274 \bbbl@elt{\bbbl@section}{\bbbl@tempa}{\the\toks@}}}%
3275 \expandafter\bbbl@inireader\bbbl@tempa=#2\@}%
3276 }%
3277 \def\bbbl@read@ini#1#2{%
3278 \bbbl@csarg\edef{lini@language}{#1}%
3279 \openin\bbbl@readstream=babel-#1.ini
3280 \ifeof\bbbl@readstream
3281 \bbbl@error
3282 {There is no ini file for the requested language\%
3283 (#1). Perhaps you misspelled it or your installation\%
3284 is not complete.}%
3285 {Fix the name or reinstall babel.}%
3286 \else

```

```

3287 \bbl@exp{\def\\bbl@inidata{\\bbl@elt{identificacion}{tag.ini}{#1}}}%
3288 \let\bbl@section\@empty
3289 \let\bbl@savestrings\@empty
3290 \let\bbl@savetoday\@empty
3291 \let\bbl@savodate\@empty
3292 \let\bbl@inireader\bbl@iniskip
3293 \bbl@info{Importing #2 for \language\%
3294         from babel-#1.ini. Reported}%
3295 \loop
3296 \if T\ifeof\bbl@readstream F\fi T\relax % Trick, because inside \loop
3297 \endlinechar\m@ne
3298 \read\bbl@readstream to \bbl@line
3299 \endlinechar`\^^M
3300 \ifx\bbl@line\@empty\else
3301 \expandafter\bbl@iniline\bbl@line\bbl@iniline
3302 \fi
3303 \repeat
3304 \bbl@foreach\bbl@renewlist{%
3305     \bbl@ifunset{bbl@renew@##1}{\bbl@inisec[##1]\@}%
3306 \global\let\bbl@renewlist\@empty
3307 % Ends last section. See \bbl@inisec
3308 \def\bbl@elt##1##2{\bbl@inireader##1=##2\@}%
3309 \bbl@cs{renew@\bbl@section}%
3310 \global\bbl@csarg\let{renew@\bbl@section}\relax
3311 \bbl@cs{secpost@\bbl@section}%
3312 \bbl@csarg{\global\expandafter\let}{inidata@\language}\bbl@inidata
3313 \bbl@exp{\\bbl@add@list\\bbl@ini@loaded{\language}}%
3314 \bbl@toglobal\bbl@ini@loaded
3315 \fi}
3316 \def\bbl@iniline#1\bbl@iniline{%
3317 \@ifnextchar[\bbl@inisec{\@ifnextchar\bbl@iniskip\bbl@inipreread}#1\@}% ]

```

The special cases for comment lines and sections are handled by the two following commands. In sections, we provide the possibility to take extra actions at the end or at the start (TODO - but note the last section is not ended). By default, key=val pairs are ignored. The secpost “hook” is used only by ‘identification’, while secpre only by date.gregorian.licr.

```

3318 \def\bbl@iniskip#1\@{%          if starts with ;
3319 \def\bbl@inisec[##1]##2\@{%    if starts with opening bracket
3320 \def\bbl@elt##1##2{%
3321     \expandafter\toks@\expandafter{%
3322         \expandafter{\bbl@section}{##1}{##2}}%
3323     \bbl@exp{%
3324         \\g@addto@macro\\bbl@inidata{\\bbl@elt\the\toks@}}%
3325     \bbl@inireader##1=##2\@}%
3326 \bbl@cs{renew@\bbl@section}%
3327 \global\bbl@csarg\let{renew@\bbl@section}\relax
3328 \bbl@cs{secpost@\bbl@section}%
3329 % The previous code belongs to the previous section.
3330 % Now start the current one.
3331 \def\bbl@section{#1}%
3332 \def\bbl@elt##1##2{%
3333     \@namedef{bbl@KVP@#1/##1}{}}%
3334 \bbl@cs{renew@#1}%
3335 \bbl@cs{secpre@#1}% pre-section `hook'
3336 \bbl@ifunset{bbl@inikv@#1}%
3337 {\let\bbl@inireader\bbl@iniskip}%
3338 {\bbl@exp{\let\\bbl@inireader<bbl@inikv@#1>}}
3339 \let\bbl@renewlist\@empty

```

```

3340 \def\bbl@renewinikey#1/#2\@#3{%
3341   \bbl@ifunset{\bbl@renew@#1}%
3342   {\bbl@add@list\bbl@renewlist{#1}}%
3343   }%
3344   \bbl@csarg\bbl@add{\renew@#1}{\bbl@elt{#2}{#3}}

```

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

```

3345 \def\bbl@inikv#1=#2\@#3{%      key=value
3346   \bbl@trim@def\bbl@tempa{#1}%
3347   \bbl@trim\toks@{#2}%
3348   \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.

```

3349 \def\bbl@exportkey#1#2#3{%
3350   \bbl@ifunset{\bbl@kv@#2}%
3351   {\bbl@csarg\gdef{#1@\language\name}{#3}}%
3352   {\expandafter\ifx\csname\bbl@kv@#2\endcsname\@empty
3353     \bbl@csarg\gdef{#1@\language\name}{#3}}%
3354   \else
3355     \bbl@exp{\global\let\<bbl@#1@\language\name>\<bbl@kv@#2>}%
3356     \fi}}

```

Key-value pairs are treated differently depending on the section in the ini file. The following macros are the readers for identification and typography. Note \bbl@secpost@identification is called always (via \bbl@inisec), while \bbl@after@ini must be called explicitly after \bbl@read@ini if necessary.

```

3357 \def\bbl@iniwarning#1{%
3358   \bbl@ifunset{\bbl@kv@identification.warning#1}{}%
3359   {\bbl@warning{%
3360     From babel-\bbl@cs{lini@\language\name}.ini:\%
3361     \bbl@cs{@kv@identification.warning#1}\%
3362     Reported }}
3363 \let\bbl@inikv@identification\bbl@inikv
3364 \def\bbl@secpost@identification{%
3365   \bbl@iniwarning}%
3366   \ifcase\bbl@engine
3367     \bbl@iniwarning{.pdf\latex}%
3368   \or
3369     \bbl@iniwarning{.lua\latex}%
3370   \or
3371     \bbl@iniwarning{.xela\latex}%
3372   \fi%
3373   \bbl@exportkey{elname}{identification.name.english}{}%
3374   \bbl@exp{\bbl@exportkey{lname}{identification.name.opentype}%
3375     {\csname\bbl@elname@\language\name\endcsname}}%
3376   \bbl@exportkey{lbcpr}{identification.tag.bcp47}{}%
3377   \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
3378   \bbl@exportkey{esname}{identification.script.name}{}%
3379   \bbl@exp{\bbl@exportkey{sname}{identification.script.name.opentype}%
3380     {\csname\bbl@esname@\language\name\endcsname}}%
3381   \bbl@exportkey{sbcpr}{identification.script.tag.bcp47}{}%
3382   \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}}
3383 \let\bbl@inikv@typography\bbl@inikv
3384 \let\bbl@inikv@characters\bbl@inikv
3385 \let\bbl@inikv@numbers\bbl@inikv
3386 \def\bbl@inikv@counters#1=#2\@#3{%
3387   \def\bbl@tempc{#1}%
3388   \bbl@trim@def{\bbl@tempb*}{#2}%

```

```

3389 \in@{.1$}{#1$}%
3390 \ifin@
3391 \bbl@replace\bbl@tempc{.1}{}%
3392 \bbl@csarg\protected@xdef{cntr@\bbl@tempc @\language}\bbl@tempc @\language}%
3393 \noexpand\bbl@alphanumeric{\bbl@tempc}}%
3394 \fi
3395 \in@{.F.}{#1}%
3396 \ifin@else\bbl@tempc{.S.}{#1}\fi
3397 \ifin@
3398 \bbl@csarg\protected@xdef{cntr@#1@\language}\bbl@tempb*}%
3399 \else
3400 \toks@{}% Required by \bbl@buildifcase, which returns \bbl@tempa
3401 \expandafter\bbl@buildifcase\bbl@tempb* \ \ % Space after \
3402 \bbl@csarg\global\expandafter\let}{cntr@#1@\language}\bbl@tempa
3403 \fi}
3404 \def\bbl@after@ini{%
3405 \bbl@exportkey{lfthm}{typography.lefthyphenmin}{2}%
3406 \bbl@exportkey{rgthm}{typography.righthyphenmin}{3}%
3407 \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
3408 \bbl@exportkey{lnbrk}{typography.linebreaking}{h}%
3409 \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
3410 \bbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
3411 \bbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
3412 \bbl@exportkey{intsp}{typography.intraspaces}{}%
3413 \bbl@exportkey{jstfy}{typography.justify}{w}%
3414 \bbl@exportkey{chrng}{characters.ranges}{}%
3415 \bbl@exportkey{dgnat}{numbers.digits.native}{}%
3416 \bbl@exportkey{rqtex}{identification.require.babel}{}%
3417 \bbl@toglobal\bbl@savetoday
3418 \bbl@toglobal\bbl@savestate}

```

Now captions and captions.licr, depending on the engine. And below also for dates. They rely on a few auxiliary macros. It is expected the ini file provides the complete set in Unicode and LICR, in that order.

```

3419 \ifcase\bbl@engine
3420 \bbl@csarg\def{inikv@captions.licr}#1=#2\@@{%
3421 \bbl@ini@captions@aux{#1}{#2}}
3422 \else
3423 \def\bbl@inikv@captions#1=#2\@@{%
3424 \bbl@ini@captions@aux{#1}{#2}}
3425 \fi

```

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

```

3426 \def\bbl@ini@captions@aux#1#2{%
3427 \bbl@trim\def\bbl@tempa{#1}%
3428 \bbl@ifblank{#2}%
3429 {\bbl@exp{%
3430 \toks@{\bbl@nocaption{\bbl@tempa}{\language}\bbl@tempa name}}}%
3431 {\bbl@trim\toks@{#2}}%
3432 \bbl@exp{%
3433 \bbl@add\bbl@savestrings{%
3434 \SetString\<\bbl@tempa name>{\the\toks@}}}

```

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

TODO. Remove copypaste pattern.

```

3435 \bbl@csarg\def{inikv@date.gregorian}#1=#2\@@{% for defaults
3436 \bbl@inidate#1...\relax{#2}}

```

```

3437 \bbl@csarg\def{inikv@date.islamic}#1=#2\@@{%
3438   \bbl@inidate#1...\relax{#2}{islamic}}
3439 \bbl@csarg\def{inikv@date.hebrew}#1=#2\@@{%
3440   \bbl@inidate#1...\relax{#2}{hebrew}}
3441 \bbl@csarg\def{inikv@date.persian}#1=#2\@@{%
3442   \bbl@inidate#1...\relax{#2}{persian}}
3443 \bbl@csarg\def{inikv@date.indian}#1=#2\@@{%
3444   \bbl@inidate#1...\relax{#2}{indian}}
3445 \ifcase\bbl@engine
3446   \bbl@csarg\def{inikv@date.gregorian.licr}#1=#2\@@{% override
3447     \bbl@inidate#1...\relax{#2}{}}
3448   \bbl@csarg\def{secpre@date.gregorian.licr}{% discard uni
3449     \ifcase\bbl@engine\let\bbl@savestate\empty\fi}
3450 \fi
3451 % TODO. With the following there is no need to ensure if \select...
3452 \newcommand\localedate{\@nameuse{\language name date}}
3453 % eg: 1=months, 2=wide, 3=1, 4=dummy
3454 \def\bbl@inidate#1.#2.#3.#4\relax#5#6{% TODO - ignore with 'captions'
3455   \bbl@trim@def\bbl@tempa{#1.#2}%
3456   \bbl@ifsamestring{\bbl@tempa}{months.wide}% to savedate
3457   {\bbl@trim@def\bbl@tempa{#3}%
3458     \bbl@trim\toks@{#5}%
3459     \bbl@exp{%
3460       \\bbl@add\\bbl@savestate{%
3461         \\SetString\<month\romannumeral\bbl@tempa#6name>{\the\toks@}}}%
3462     {\bbl@ifsamestring{\bbl@tempa}{date.long}% defined now
3463       {\bbl@trim@def\bbl@toreplace{#5}%
3464         \bbl@TG@date
3465         \global\bbl@csarg\let{date@\language name}\bbl@toreplace
3466         \bbl@exp{%
3467           \gdef\<\language name date>{\protect\<\language name date >}%
3468           \gdef\<\language name date >####1####2####3{%
3469             \\bbl@usedategrouptrue
3470             \<bbl@ensure@\language name>{%
3471               \<bbl@date@\language name>{####1}{####2}{####3}}}%
3472             \\bbl@add\\bbl@savetoday{%
3473               \\SetString\\today{%
3474                 \<\language name date>{\the\year}{\the\month}{\the\day}}}}}%
3475             {}}}

```

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.

```

3476 \let\bbl@calendar\@empty
3477 \newcommand\BabelDateSpace{\nobreakspace}
3478 \newcommand\BabelDateDot{.\@}
3479 \newcommand\BabelDated[1]{\number#1}
3480 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}
3481 \newcommand\BabelDateM[1]{\number#1}
3482 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
3483 \newcommand\BabelDateMMMM[1]{%
3484   \csname month\romannumeral#1\bbl@calendar name\endcsname}%
3485 \newcommand\BabelDatey[1]{\number#1}%
3486 \newcommand\BabelDateyy[1]{%
3487   \ifnum#1<10 0\number#1 %
3488   \else\ifnum#1<100 \number#1 %
3489   \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
3490   \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
3491   \else

```

```

3492 \bbl@error
3493 {Currently two-digit years are restricted to the\
3494 range 0-9999.}%
3495 {There is little you can do. Sorry.}%
3496 \fi\fi\fi\fi}}
3497 \newcommand\BabelDateyyyy[1]{\number#1}} % FIXME - add leading 0
3498 \def\bbl@replace@finish@iii#1{%
3499 \bbl@exp{\def\#1###1###2###3{\the\toks@}}
3500 \def\bbl@TG@date{%
3501 \bbl@replace\bbl@toreplace{[ ]}{\BabelDateSpace{}}}%
3502 \bbl@replace\bbl@toreplace{[.]}{\BabelDateDot{}}}%
3503 \bbl@replace\bbl@toreplace{[d]}{\BabelDated{###3}}}%
3504 \bbl@replace\bbl@toreplace{[dd]}{\BabelDatedd{###3}}}%
3505 \bbl@replace\bbl@toreplace{[M]}{\BabelDateM{###2}}}%
3506 \bbl@replace\bbl@toreplace{[MM]}{\BabelDateMM{###2}}}%
3507 \bbl@replace\bbl@toreplace{[MMM]}{\BabelDateMMM{###2}}}%
3508 \bbl@replace\bbl@toreplace{[y]}{\BabelDatey{###1}}}%
3509 \bbl@replace\bbl@toreplace{[yy]}{\BabelDateyy{###1}}}%
3510 \bbl@replace\bbl@toreplace{[yyy]}{\BabelDateyyy{###1}}}%
3511 \bbl@replace\bbl@toreplace{[y|]}{\bbl@datecctr[###1|]}%
3512 \bbl@replace\bbl@toreplace{[m|]}{\bbl@datecctr[###2|]}%
3513 \bbl@replace\bbl@toreplace{[d|]}{\bbl@datecctr[###3|]}%
3514 % Note after \bbl@replace \toks@ contains the resulting string.
3515 % TODO - Using this implicit behavior doesn't seem a good idea.
3516 \bbl@replace@finish@iii\bbl@toreplace}
3517 \def\bbl@datecctr[#1|#2]{\localenumeral{#2}{#1}}

```

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

```

3518 \def\bbl@provide@lsys#1{%
3519 \bbl@ifunset{bbl@lname@#1}%
3520 {\bbl@ini@basic{#1}}}%
3521 {}%
3522 \bbl@csarg\let{lsys@#1}\@empty
3523 \bbl@ifunset{bbl@sname@#1}{\bbl@csarg\gdef{sname@#1}{Default}}}%
3524 \bbl@ifunset{bbl@sotf@#1}{\bbl@csarg\gdef{sotf@#1}{DFLT}}}%
3525 \bbl@csarg\bbl@add@list{lsys@#1}{Script=\bbl@cs{sname@#1}}}%
3526 \bbl@ifunset{bbl@lname@#1}{%
3527 {\bbl@csarg\bbl@add@list{lsys@#1}{Language=\bbl@cs{lname@#1}}}%
3528 \ifcase\bbl@engine\or\or
3529 \bbl@ifunset{bbl@prehc@#1}{%
3530 {\bbl@exp{\bbl@ifblank{\bbl@cs{prehc@#1}}}%
3531 {}}%
3532 {\bbl@csarg\bbl@add@list{lsys@#1}{HyphenChar="200B}}}%
3533 \fi
3534 \bbl@csarg\bbl@to@global{lsys@#1}}

```

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

```

3535 \def\bbl@ini@basic#1{%
3536 \def\BabelBeforeIni##1##2{%
3537 \begingroup
3538 \bbl@add\bbl@secpost@identification{\closein\bbl@readstream}%
3539 \catcode`\[=12 \catcode`\]=12 \catcode`\==12
3540 \catcode`\;=12 \catcode`\|=12 %
3541 \bbl@read@ini{##1}{font and identification data}%

```



```

3542 \endinput % babel- .tex may contain onlypreamble's
3543 \endgroup}% boxed, to avoid extra spaces:
3544 {\setbox\z@\hbox{\InputIfFileExists{babel-#1.tex}{}}{}}

```

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

```

3545 \def\bbl@buildifcase#1 {% Returns \bbl@tempa, requires \toks@={}
3546 \ifx\\#1% % \\ before, in case #1 is multiletter
3547 \bbl@exp{%
3548 \def\\bbl@tempa####1{%
3549 \<ifcase>####1\space\the\toks@\<else>\\@ctrerr\<fi>}}%
3550 \else
3551 \toks@\expandafter{\the\toks@\or #1}%
3552 \expandafter\bbl@buildifcase
3553 \fi}

```

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

```

3554 \newcommand\localenumeral[2]{\bbl@cs{cntr@#1@\language}\{#2}}
3555 \def\bbl@localecntr#1#2{\localenumeral{#2}{#1}}
3556 \newcommand\localecounter[2]{%
3557 \expandafter\bbl@localecntr\csname c@#2\endcsname{#1}}
3558 \def\bbl@alphnumeral#1#2{%
3559 \expandafter\bbl@alphnumeral@i\number#2 76543210\@@{#1}}
3560 \def\bbl@alphnumeral@i#1#2#3#4#5#6#7#8\@@#9{%
3561 \ifcase\car#8\@nil\or % Currenty <10000, but prepared for bigger
3562 \bbl@alphnumeral@ii{#9}000000#1\or
3563 \bbl@alphnumeral@ii{#9}00000#1#2\or
3564 \bbl@alphnumeral@ii{#9}0000#1#2#3\or
3565 \bbl@alphnumeral@ii{#9}000#1#2#3#4\else
3566 \bbl@alphnum@invalid{>9999}%
3567 \fi}
3568 \def\bbl@alphnumeral@ii#1#2#3#4#5#6#7#8{%
3569 \bbl@ifunset{bbl@cntr@#1.F.\number#5#6#7#8@\language}%
3570 {\bbl@cs{cntr@#1.4@\language}\{#5}}
3571 \bbl@cs{cntr@#1.3@\language}\{#6}}
3572 \bbl@cs{cntr@#1.2@\language}\{#7}}
3573 \bbl@cs{cntr@#1.1@\language}\{#8}}
3574 \ifnum#6#7#8>\z@ % TODO. An ad hoc rule for Greek. Ugly.
3575 \bbl@ifunset{bbl@cntr@#1.S.321@\language}\{#1}}
3576 {\bbl@cs{cntr@#1.S.321@\language}\{#1}}
3577 \fi}%
3578 {\bbl@cs{cntr@#1.F.\number#5#6#7#8@\language}}
3579 \def\bbl@alphnum@invalid#1{%
3580 \bbl@error{Alphabetic numeral too large (#1)}%
3581 {Currently this is the limit.}}

```

The information in the identification section can be useful, so the following macro just exposes it with a user command.

```

3582 \newcommand\localeinfo[1]{%
3583 \bbl@ifunset{bbl@csname bbl@info@#1\endcsname @\language}%
3584 {\bbl@error{I've found no info for the current locale.\%
3585 The corresponding ini file has not been loaded\%
3586 Perhaps it doesn't exist}%
3587 {See the manual for details.}}%

```

```

3588     {\bbl@cs{\csname bbl@info@#1\endcsname @\language\name}}
3589 % \@namedef{bbl@info@name.locale}{lcname}
3590 \@namedef{bbl@info@tag.ini}{lini}
3591 \@namedef{bbl@info@name.english}{elname}
3592 \@namedef{bbl@info@name.opentype}{lname}
3593 \@namedef{bbl@info@tag.bcp47}{lbcpl}
3594 \@namedef{bbl@info@tag.opentype}{lotf}
3595 \@namedef{bbl@info@script.name}{esname}
3596 \@namedef{bbl@info@script.name.opentype}{sname}
3597 \@namedef{bbl@info@script.tag.bcp47}{sbcp}
3598 \@namedef{bbl@info@script.tag.opentype}{sotf}
3599 \let\bbl@ensureinfo\@gobble
3600 \newcommand\BabelEnsureInfo{%
3601   \def\bbl@ensureinfo##1{%
3602     \ifx\InputIfFileExists\undefined\else % not in plain
3603       \bbl@ifunset{bbl@lname@##1}{\bbl@ini@basic{##1}}{}%
3604     \fi}}

```

More general, but non-expandable, is `\getlocaleproperty`. To inspect every possible loaded ini, we define `\LocaleForEach`, where `\bbl@ini@loaded` is a comma-separated list of locales, built by `\bbl@read@ini`.

```

3605 \newcommand\getlocaleproperty[3]{%
3606   \let#1\relax
3607   \def\bbl@elt##1##2##3{%
3608     \bbl@ifsamestring{##1/##2}{##3}%
3609     {\providecommand#1{##3}%
3610     \def\bbl@elt####1####2####3{}}}%
3611   {}}%
3612   \bbl@cs{inidata@#2}%
3613   \ifx#1\relax
3614     \bbl@error
3615     {Unknown key for locale '#2':\%
3616     #3\%
3617     \string#1 will be set to \relax}%
3618     {Perhaps you misspelled it.}%
3619   \fi}
3620 \newcommand\LocaleForEach{\bbl@foreach\bbl@ini@loaded}

```

10 Adjusting the Babel bahavior

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

```

3621 \newcommand\babeladjust[1]{% TODO. Error handling.
3622   \bbl@forkv{#1}{%
3623     \bbl@ifunset{bbl@ADJ@##1@##2}%
3624     {\bbl@cs{ADJ@##1}{##2}}%
3625     {\bbl@cs{ADJ@##1@##2}}}
3626 %
3627 \def\bbl@adjust@lua#1#2{%
3628   \ifvmode
3629     \ifnum\currentgrouplevel=\z@
3630       \directlua{ Babel.#2 }%
3631       \expandafter\expandafter\expandafter\@gobble
3632     \fi
3633   \fi
3634   {\bbl@error % The error is gobbled if everything went ok.
3635     {Currently, #1 related features can be adjusted only\%
3636     in the main vertical list.}%

```

```

3637      {Maybe things change in the future, but this is what it is.}}
3638 \@namedef{bbl@ADJ@bidi.mirroring@on}{%
3639   \bbl@adjust@lua{bidi}{mirroring_enabled=true}}
3640 \@namedef{bbl@ADJ@bidi.mirroring@off}{%
3641   \bbl@adjust@lua{bidi}{mirroring_enabled=false}}
3642 \@namedef{bbl@ADJ@bidi.text@on}{%
3643   \bbl@adjust@lua{bidi}{bidi_enabled=true}}
3644 \@namedef{bbl@ADJ@bidi.text@off}{%
3645   \bbl@adjust@lua{bidi}{bidi_enabled=false}}
3646 \@namedef{bbl@ADJ@bidi.mapdigits@on}{%
3647   \bbl@adjust@lua{bidi}{digits_mapped=true}}
3648 \@namedef{bbl@ADJ@bidi.mapdigits@off}{%
3649   \bbl@adjust@lua{bidi}{digits_mapped=false}}
3650 %
3651 \@namedef{bbl@ADJ@linebreak.sea@on}{%
3652   \bbl@adjust@lua{linebreak}{sea_enabled=true}}
3653 \@namedef{bbl@ADJ@linebreak.sea@off}{%
3654   \bbl@adjust@lua{linebreak}{sea_enabled=false}}
3655 \@namedef{bbl@ADJ@linebreak.cjk@on}{%
3656   \bbl@adjust@lua{linebreak}{cjk_enabled=true}}
3657 \@namedef{bbl@ADJ@linebreak.cjk@off}{%
3658   \bbl@adjust@lua{linebreak}{cjk_enabled=false}}
3659 %
3660 \def\bbl@adjust@layout#1{%
3661   \ifvmode
3662     #1%
3663     \expandafter\@gobble
3664     \fi
3665   {\bbl@error   % The error is gobbled if everything went ok.
3666    {Currently, layout related features can be adjusted only\\%
3667     in vertical mode.}%
3668    {Maybe things change in the future, but this is what it is.}}}
3669 \@namedef{bbl@ADJ@layout.tabular@on}{%
3670   \bbl@adjust@layout{\let\@tabular\bbl@NL@tabular}}
3671 \@namedef{bbl@ADJ@layout.tabular@off}{%
3672   \bbl@adjust@layout{\let\@tabular\bbl@OL@tabular}}
3673 \@namedef{bbl@ADJ@layout.lists@on}{%
3674   \bbl@adjust@layout{\let\list\bbl@NL@list}}
3675 \@namedef{bbl@ADJ@layout.lists@off}{%
3676   \bbl@adjust@layout{\let\list\bbl@OL@list}}
3677 \@namedef{bbl@ADJ@hyphenation.extra@on}{%
3678   \bbl@activateposthyphen}
3679 %
3680 \@namedef{bbl@ADJ@autoload.bcp47@on}{%
3681   \bbl@bcpallowedtrue}
3682 \@namedef{bbl@ADJ@autoload.bcp47@off}{%
3683   \bbl@bcpallowedfalse}
3684 \@namedef{bbl@ADJ@autoload.bcp47.prefix}#1{%
3685   \def\bbl@bcp@prefix{#1}}
3686 \def\bbl@bcp@prefix{bcp47-}
3687 \@namedef{bbl@ADJ@autoload.options}#1{%
3688   \def\bbl@autoload@options{#1}}
3689 \let\bbl@autoload@bcptoptions\empty
3690 \@namedef{bbl@ADJ@autoload.bcp47.options}#1{%
3691   \def\bbl@autoload@bcptoptions{#1}}
3692 % TODO: use babel name, override
3693 %
3694 % As the final task, load the code for lua.
3695 %

```

```

3696 \ifx\directlua\@undefined\else
3697   \ifx\bbl@luapatterns\@undefined
3698     \input luababel.def
3699   \fi
3700 \fi
3701 </core>

```

A proxy file for switch.def

```

3702 <*kernel>
3703 \let\bbl@onlyswitch\@empty
3704 \input babel.def
3705 \let\bbl@onlyswitch\@undefined
3706 </kernel>
3707 <*patterns>

```

11 Loading hyphenation patterns

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

To make sure that $\text{\texttt{L\TeX}}$ 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.

```

3708 <<Make sure ProvidesFile is defined>>
3709 \ProvidesFile{hyphen.cfg}[<<date>> <<version>> Babel hyphens]
3710 \xdef\bbl@format{\jobname}
3711 \def\bbl@version{<<version>>}
3712 \def\bbl@date{<<date>>}
3713 \ifx\AtBeginDocument\@undefined
3714   \def\@empty{}
3715   \let\orig@dump\dump
3716   \def\dump{%
3717     \ifx\@ztryfc\@undefined
3718     \else
3719       \toks0=\expandafter{\@preamblecmds}%
3720       \edef\@preamblecmds{\noexpand\@begindocumenthook\the\toks0}%
3721       \def\@begindocumenthook{}%
3722     \fi
3723     \let\dump\orig@dump\let\orig@dump\@undefined\dump}
3724 \fi
3725 <<Define core switching macros>>

```

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

```

3726 \def\process@line#1#2 #3 #4 {%
3727   \ifx=#1%
3728     \process@synonym{#2}%
3729   \else
3730     \process@language{#1#2}{#3}{#4}%
3731   \fi

```

```
3732 \ignorespaces}
```

`\process@synonym` This macro takes care of the lines which start with an `=`. It needs an empty token register to begin with. `\bbl@languages` is also set to empty.

```
3733 \toks@{}
```

```
3734 \def\bbl@languages{}
```

When no languages have been loaded yet, the name following the `=` will be a synonym for hyphenation register 0. So, it is stored in a token register and executed when the first pattern file has been processed. (The `\relax` just helps to the `\if` below catching synonyms without a language.)

Otherwise the name will be a synonym for the language loaded last.

We also need to copy the `hyphenmin` parameters for the synonym.

```
3735 \def\process@synonym#1{%
```

```
3736   \ifnum\last@language=\m@ne
```

```
3737     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
```

```
3738   \else
```

```
3739     \expandafter\chardef\csname l@#1\endcsname\last@language
```

```
3740     \wlog{\string\l@#1=\string\language\the\last@language}%
```

```
3741     \expandafter\let\csname #1hyphenmins\expandafter\endcsname
```

```
3742       \csname\language\hyphenmins\endcsname
```

```
3743     \let\bbl@elt\relax
```

```
3744     \edef\bbl@languages{\bbl@languages\bbl@elt{#1}{\the\last@language}}{}}%
```

```
3745   \fi}
```

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

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

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

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

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

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

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

`\bbl@elt{\langle language-name \rangle}{\langle number \rangle}{\langle patterns-file \rangle}{\langle exceptions-file \rangle}`. 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.

```

3746 \def\process@language#1#2#3{%
3747   \expandafter\addlanguage\csname l@#1\endcsname
3748   \expandafter\language\csname l@#1\endcsname
3749   \edef\language{#1}%
3750   \bbl@hook@everylanguage{#1}%
3751   % > luatex
3752   \bbl@get@enc#1::\@@@
3753   \begingroup
3754     \lefthyphenmin\m@ne
3755     \bbl@hook@loadpatterns{#2}%
3756     % > luatex
3757     \ifnum\lefthyphenmin=\m@ne
3758       \else
3759         \expandafter\xdef\csname #1hyphenmins\endcsname{%
3760           \the\lefthyphenmin\the\righthyphenmin}%
3761         \fi
3762     \endgroup
3763   \def\bbl@tempa{#3}%
3764   \ifx\bbl@tempa\empty\else
3765     \bbl@hook@loadexceptions{#3}%
3766     % > luatex
3767   \fi
3768   \let\bbl@elt\relax
3769   \edef\bbl@languages{%
3770     \bbl@languages\bbl@elt{#1}\the\language}{#2}{\bbl@tempa}}%
3771   \ifnum\the\language=\z@
3772     \expandafter\ifx\csname #1hyphenmins\endcsname\relax
3773       \set@hyphenmins\tw@\thr@@\relax
3774     \else
3775       \expandafter\expandafter\expandafter\set@hyphenmins
3776       \csname #1hyphenmins\endcsname
3777     \fi
3778     \the\toks@
3779     \toks@{}}%
3780   \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.

```

3781 \def\bbl@get@enc#1:#2:#3\@@@{\def\bbl@hyph@enc{#2}}

```

Now, hooks are defined. For efficiency reasons, they are dealt here in a special way. Besides luatex, format-specific configuration files are taken into account. loadkernel currently loads nothing, but define some basic macros instead.

```

3782 \def\bbl@hook@everylanguage#1{}
3783 \def\bbl@hook@loadpatterns#1{\input #1\relax}
3784 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
3785 \def\bbl@hook@loadkernel#1{%
3786   \def\addlanguage{\alloc@9\language\chardef\ccclvi}%
3787   \def\adddialect##1##2{%
3788     \global\chardef##1##2\relax
3789     \wlog{\string##1 = a dialect from \string\language##2}}%
3790   \def\iflanguage##1{%
3791     \expandafter\ifx\csname l@##1\endcsname\relax
3792       \@nolanerr{##1}%
3793     \else
3794       \ifnum\csname l@##1\endcsname=\language
3795         \expandafter\expandafter\expandafter\@firstoftwo
3796       \else

```

```

3797     \expandafter\expandafter\expandafter\@secondoftwo
3798     \fi
3799     \fi}%
3800 \def\providehyphenmins##1##2{%
3801     \expandafter\ifx\csname ##1hyphenmins\endcsname\relax
3802     \@namedef{##1hyphenmins}{##2}%
3803     \fi}%
3804 \def\set@hyphenmins##1##2{%
3805     \lefthyphenmin##1\relax
3806     \righthyphenmin##2\relax}%
3807 \def\selectlanguage{%
3808     \errhelp{Selecting a language requires a package supporting it}%
3809     \errmessage{Not loaded}}%
3810 \let\foreignlanguage\selectlanguage
3811 \let\otherlanguage\selectlanguage
3812 \expandafter\let\csname otherlanguage*\endcsname\selectlanguage
3813 \def\bbl@usehooks##1##2{% TODO. Temporary!!
3814 \def\setlocale{%
3815     \errhelp{Find an armchair, sit down and wait}%
3816     \errmessage{Not yet available}}%
3817 \let\uselocale\setlocale
3818 \let\locale\setlocale
3819 \let\selectlocale\setlocale
3820 \let\localename\setlocale
3821 \let\textlocale\setlocale
3822 \let\textlanguage\setlocale
3823 \let\languagetext\setlocale}
3824 \begingroup
3825 \def\AddBabelHook#1#2{%
3826     \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
3827     \def\next{\toks1}%
3828     \else
3829     \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname###1}%
3830     \fi
3831     \next}
3832 \ifx\directlua\@undefined
3833     \ifx\XeTeXinputencoding\@undefined\else
3834     \input xebabel.def
3835     \fi
3836 \else
3837     \input luababel.def
3838 \fi
3839 \openin1 = babel-\bbl@format.cfg
3840 \ifeof1
3841 \else
3842     \input babel-\bbl@format.cfg\relax
3843 \fi
3844 \closein1
3845 \endgroup
3846 \bbl@hook@loadkernel{switch.def}

```

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

```

3847 \openin1 = language.dat

```

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

```

3848 \def\languagename{english}%
3849 \ifeof1
3850 \message{I couldn't find the file language.dat,\space

```

```

3851         I will try the file hyphen.tex}
3852 \input hyphen.tex\relax
3853 \chardef\l@english\z@
3854 \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`.

```

3855 \last@language\m@ne

```

We now read lines from the file until the end is found. While reading from the input, it is useful to switch off recognition of the end-of-line character. This saves us stripping off spaces from the contents of the control sequence.

```

3856 \loop
3857   \endlinechar\m@ne
3858   \read1 to \bbl@line
3859   \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.

```

3860   \if T\ifeof1F\fi T\relax
3861   \ifx\bbl@line\empty\else
3862     \edef\bbl@line{\bbl@line\space\space\space}%
3863     \expandafter\process@line\bbl@line\relax
3864   \fi
3865 \repeat

```

Check for the end of the file. We must reverse the test for `\ifeof` without `\else`. Then reactivate the default patterns, and close the configuration file.

```

3866 \begingroup
3867   \def\bbl@elt#1#2#3#4{%
3868     \global\language=#2\relax
3869     \gdef\language#1}%
3870   \def\bbl@elt##1##2##3##4{}}%
3871   \bbl@languages
3872 \endgroup
3873 \fi
3874 \closein1

```

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

```

3875 \if/\the\toks@\else
3876   \errhelp{language.dat loads no language, only synonyms}
3877   \errmessage{0rphan language synonym}
3878 \fi

```

Also remove some macros from memory and raise an error if `\toks@` is not empty. Finally load `switch.def`, but the latter is not required and the line inputting it may be commented out.

```

3879 \let\bbl@line\@undefined
3880 \let\process@line\@undefined
3881 \let\process@synonym\@undefined
3882 \let\process@language\@undefined
3883 \let\bbl@get@enc\@undefined
3884 \let\bbl@hyph@enc\@undefined
3885 \let\bbl@tempa\@undefined

```



```

3886 \let\bbl@hook@loadkernel\@undefined
3887 \let\bbl@hook@everylanguage\@undefined
3888 \let\bbl@hook@loadpatterns\@undefined
3889 \let\bbl@hook@loadexceptions\@undefined
3890 \end{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].

```

3891 <<More package options>> ≡
3892 \chardef\bbl@bidimode\z@
3893 \DeclareOption{bidi=default}{\chardef\bbl@bidimode=\@ne}
3894 \DeclareOption{bidi=basic}{\chardef\bbl@bidimode=101 }
3895 \DeclareOption{bidi=basic-r}{\chardef\bbl@bidimode=102 }
3896 \DeclareOption{bidi=bidi}{\chardef\bbl@bidimode=201 }
3897 \DeclareOption{bidi=bidi-r}{\chardef\bbl@bidimode=202 }
3898 \DeclareOption{bidi=bidi-l}{\chardef\bbl@bidimode=203 }
3899 <</More package options>>

```

With explicit languages, we could define the font at once, but we don't. Just wait and see if the language is actually activated. `bbl@font` replaces hardcoded font names inside `\.family` by the corresponding macro `\.default`.

```

3900 <<Font selection>> ≡
3901 \bbl@trace{Font handling with fontspec}
3902 \@onlypreamble\babelfont
3903 \newcommand\babelfont[2][\% 1=langs/scripts 2=fam
3904   \bbl@foreach{#1}{\%
3905     \expandafter\ifx\csname date##1\endcsname\relax
3906       \IfFileExists{babel-##1.tex}{\%
3907         {\babelprovide{##1}}{\%
3908           {}{\%
3909             \fi}%
3910           \edef\bbl@tempa{#1}%
3911           \def\bbl@tempb{#2}% Used by \bbl@babelfont
3912           \ifx\fontspec\@undefined
3913             \usepackage{fontspec}%
3914           \fi
3915           \EnableBabelHook{babel-fontspec}% Just calls \bbl@switchfont
3916           \bbl@babelfont}
3917 \newcommand\bbl@babelfont[2][\% 1=features 2=fontname, @font=rm|sf|tt
3918   \bbl@ifunset{\bbl@tempb family}{\%
3919     {\bbl@providedefam{\bbl@tempb}}{\%
3920       {\bbl@exp{\%
3921         \\\bbl@sreplace\<\bbl@tempb family >\%
3922         {\@nameuse{\bbl@tempb default}}{\<\bbl@tempb default>}}}{\%
3923       % For the default font, just in case:
3924       \bbl@ifunset{\bbl@lsys\@languagename}{\bbl@provide@lsys{\@languagename}}{\%
3925       \expandafter\bbl@ifblank\expandafter{\bbl@tempa}%
3926       {\bbl@csarg\edef{\bbl@tempb dflt@}{\<#1>{\bbl@tempb dflt@}}{\% save \bbl@rmdflt@
3927         \bbl@exp{\%
3928           \let\<\bbl@tempb dflt@\@languagename>\<\bbl@tempb dflt@>%
3929           \\\bbl@font@set\<\bbl@tempb dflt@\@languagename>%
3930           \<\bbl@tempb default>\<\bbl@tempb family>}}{\%

```

```

3931 {\bbl@foreach\bbl@tempa{% ie bbl@rmdflt@lang / *scrt
3932 \bbl@csarg\def{\bbl@tempb dflt@##1}{<{#1}{#2}}}}}%

```

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

```

3933 \def\bbl@providfam#1{%
3934 \bbl@exp{%
3935 \\\newcommand\<#1default>{}% Just define it
3936 \\\bbl@add@list\\bbl@font@fams{#1}%
3937 \\\DeclareRobustCommand\<#1family>{%
3938 \\\not@math@alphabet\<#1family>\relax
3939 \\\fontfamily\<#1default>\\selectfont}%
3940 \\\DeclareTextFontCommand{\<text#1>}{\<#1family>}}%

```

The following macro is activated when the hook babel-fontspec is enabled. But before we define a macro for a warning, which sets a flag to avoid duplicate them.

```

3941 \def\bbl@nostdfont#1{%
3942 \bbl@ifunset{\bbl@WFF@\f@family}%
3943 {\bbl@csarg\gdef{\bbl@WFF@\f@family}}}% Flag, to avoid dupl warns
3944 \bbl@infowarn{The current font is not a babel standard family:\%
3945 #1%
3946 \fontname\font\\%
3947 There is nothing intrinsically wrong with this warning, and\\%
3948 you can ignore it altogether if you do not need these\\%
3949 families. But if they are used in the document, you should be\\%
3950 aware 'babel' will no set Script and Language for them, so\\%
3951 you may consider defining a new family with \string\babelfont.\\%
3952 See the manual for further details about \string\babelfont.\\%
3953 Reported}}
3954 {}}%
3955 \gdef\bbl@switchfont{%
3956 \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}}%
3957 \bbl@exp{% eg Arabic -> arabic
3958 \lowercase{\edef\\bbl@tempa{\bbl@cl{sname}}}}}%
3959 \bbl@foreach\bbl@font@fams{%
3960 \bbl@ifunset{\bbl@##1dflt@\languagename}% (1) language?
3961 {\bbl@ifunset{\bbl@##1dflt@*\bbl@tempa}% (2) from script?
3962 {\bbl@ifunset{\bbl@##1dflt@}% 2=F - (3) from generic?
3963 {}% 123=F - nothing!
3964 {\bbl@exp{% 3=T - from generic
3965 \global\let\<bbl@##1dflt@\languagename>%
3966 \<bbl@##1dflt@>}}}%
3967 {\bbl@exp{% 2=T - from script
3968 \global\let\<bbl@##1dflt@\languagename>%
3969 \<bbl@##1dflt@*\bbl@tempa>}}}%
3970 {}}% 1=T - language, already defined
3971 \def\bbl@tempa{\bbl@nostdfont{}}}%
3972 \bbl@foreach\bbl@font@fams{% don't gather with prev for
3973 \bbl@ifunset{\bbl@##1dflt@\languagename}%
3974 {\bbl@cs{famrst@##1}%
3975 \global\bbl@csarg\let{famrst@##1}\relax}%
3976 {\bbl@exp{% order is relevant
3977 \\\bbl@add\\originalTeX{%
3978 \\\bbl@font@rst{\bbl@cl{##1dflt}}}%
3979 \<##1default>\<##1family>{##1}}}%
3980 \\\bbl@font@set\<bbl@##1dflt@\languagename>% the main part!
3981 \<##1default>\<##1family>}}}%
3982 \bbl@ifrestoring{}{\bbl@tempa}}}%

```

The following is executed at the beginning of the aux file or the document to warn about fonts not defined with \babelfont.

```

3983 \ifx\fbfamily\undefined\else % if latex
3984 \ifcase\bbbl@engine % if pdftex
3985 \let\bbbl@ckeckstdfonts\relax
3986 \else
3987 \def\bbbl@ckeckstdfonts{%
3988 \begingroup
3989 \global\let\bbbl@ckeckstdfonts\relax
3990 \let\bbbl@tempa\@empty
3991 \bbbl@foreach\bbbl@font@fams{%
3992 \bbbl@ifunset{\bbbl@##1dflt@}%
3993 {\nameuse{##1family}%
3994 \bbbl@csarg\gdef{WFF@fbfamily}}}% Flag
3995 \bbbl@exp{\bbbl@add\bbbl@tempa{* \<##1family>= \fbfamily\\}%
3996 \space\space\fontname\font\\}%
3997 \bbbl@csarg\xdef{##1dflt@}{fbfamily}%
3998 \expandafter\xdef\csname ##1default\endcsname{fbfamily}%
3999 {}}%
4000 \ifx\bbbl@tempa\@empty\else
4001 \bbbl@infowarn{The following font families will use the default\\%
4002 settings for all or some languages:\\%
4003 \bbbl@tempa
4004 There is nothing intrinsically wrong with it, but\\%
4005 'babel' will no set Script and Language, which could\\%
4006 be relevant in some languages. If your document uses\\%
4007 these families, consider redefining them with \string\babelfont.\\%
4008 Reported}%
4009 \fi
4010 \endgroup}
4011 \fi
4012 \fi

```

Now the macros defining the font with fontspec.

When there are repeated keys in fontspec, the last value wins. So, we just place the ini settings at the beginning, and user settings will take precedence. We must deactivate temporarily \bbbl@mapselect because \selectfont is called internally when a font is defined.

```

4013 \def\bbbl@font@set#1#2#3{% eg \bbbl@rmdflt@lang \rmdefault \rmfamily
4014 \bbbl@xin@{<>}{#1}%
4015 \ifin@
4016 \bbbl@exp{\bbbl@fontspec@set\#1\expandafter@gobbletwo#1\#3}%
4017 \fi
4018 \bbbl@exp{%
4019 \def\#2#1% eg, \rmdefault{\bbbl@rmdflt@lang}
4020 \bbbl@ifsamestring{#2}{fbfamily}{\#3\let\bbbl@tempa\relax}}}%
4021 % TODO - next should be global?, but even local does its job. I'm
4022 % still not sure -- must investigate:
4023 \def\bbbl@fontspec@set#1#2#3#4{% eg \bbbl@rmdflt@lang fnt-opt fnt-nme \xxfamily
4024 \let\bbbl@tempa\bbbl@mapselect
4025 \let\bbbl@mapselect\relax
4026 \let\bbbl@temp@fam#4% eg, '\rmfamily', to be restored below
4027 \let#4\@empty % Make sure \renewfontfamily is valid
4028 \bbbl@exp{%
4029 \let\bbbl@temp@pfam\<\bbbl@stripslash#4\space>% eg, '\rmfamily '
4030 \<keys_if_exist:nnF>{fontspec-opentype}{Script/\bbbl@cl{sname}}}%
4031 {\newfontscript{\bbbl@cl{sname}}{\bbbl@cl{sotf}}}%
4032 \<keys_if_exist:nnF>{fontspec-opentype}{Language/\bbbl@cl{lname}}}%
4033 {\newfontlanguage{\bbbl@cl{lname}}{\bbbl@cl{lotf}}}%
4034 \renewfontfamily\#4%
4035 [\bbbl@cs{lsys@languagename},#2]}{#3}% ie \bbbl@exp{.}{#3}

```

```

4036 \beginngroup
4037   #4%
4038   \xdef#1{\f@family}%      eg, \bbl@rmdflt@lang{FreeSerif(0)}
4039 \endgroup
4040 \let#4\bbl@temp@fam
4041 \bbl@exp{\let\<\bbl@stripslash#4\space>}\bbl@temp@pfam
4042 \let\bbl@mapselect\bbl@tempe}%

```

font@rst and famrst are only used when there is no global settings, to save and restore de previous families. Not really necessary, but done for optimization.

```

4043 \def\bbl@font@rst#1#2#3#4{%
4044   \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.

```

4045 \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 :-).

```

4046 \newcommand\babelFSstore[2][{%
4047   \bbl@ifblank{#1}%
4048   {\bbl@csarg\def{sname@#2}{Latin}}%
4049   {\bbl@csarg\def{sname@#2}{#1}}%
4050   \bbl@provide@dirs{#2}%
4051   \bbl@csarg\ifnum{wdir@#2}>\z@
4052     \let\bbl@beforeforeign\leavevmode
4053     \EnableBabelHook{babel-bidi}%
4054   \fi
4055   \bbl@foreach{#2}{%
4056     \bbl@FSstore{##1}{rm}\rmdefault\bbl@save@rmdefault
4057     \bbl@FSstore{##1}{sf}\sfdefault\bbl@save@sfdefault
4058     \bbl@FSstore{##1}{tt}\ttdefault\bbl@save@ttdefault}}
4059 \def\bbl@FSstore#1#2#3#4{%
4060   \bbl@csarg\edef{#2default#1}{#3}%
4061   \expandafter\addto\csname extras#1\endcsname{%
4062     \let#4#3%
4063     \ifx#3\f@family
4064       \edef#3{\csname bbl@#2default#1\endcsname}%
4065       \fontfamily{#3}\selectfont
4066     \else
4067       \edef#3{\csname bbl@#2default#1\endcsname}%
4068       \fi}%
4069   \expandafter\addto\csname noextras#1\endcsname{%
4070     \ifx#3\f@family
4071       \fontfamily{#4}\selectfont
4072     \fi
4073     \let#3#4}}
4074 \let\bbl@langfeatures\@empty
4075 \def\babelFSfeatures{% make sure \fontspec is redefined once
4076   \let\bbl@ori@fontspec\fontspec
4077   \renewcommand\fontspec[1][{%
4078     \bbl@ori@fontspec[\bbl@langfeatures##1]}
4079   \let\babelFSfeatures\bbl@FSfeatures
4080   \babelFSfeatures}
4081 \def\bbl@FSfeatures#1#2{%
4082   \expandafter\addto\csname extras#1\endcsname{%
4083     \babel@save\bbl@langfeatures
4084     \edef\bbl@langfeatures{#2,}}

```

4085 <>

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.

```

4086 <<*Footnote changes>> ≡
4087 \bbl@trace{Bidi footnotes}
4088 \ifnum\bbl@bidimode>\z@
4089   \def\bbl@footnote#1#2#3{%
4090     \ifnextchar[%
4091       {\bbl@footnote@o{#1}{#2}{#3}}%
4092       {\bbl@footnote@x{#1}{#2}{#3}}}
4093   \def\bbl@footnote@x#1#2#3#4{%
4094     \bgroup
4095     \select@language@x{\bbl@main@language}%
4096     \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
4097     \egroup}
4098   \def\bbl@footnote@o#1#2#3[#4]#5{%
4099     \bgroup
4100     \select@language@x{\bbl@main@language}%
4101     \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
4102     \egroup}
4103   \def\bbl@footnotetext#1#2#3{%
4104     \ifnextchar[%
4105       {\bbl@footnotetext@o{#1}{#2}{#3}}%
4106       {\bbl@footnotetext@x{#1}{#2}{#3}}}
4107   \def\bbl@footnotetext@x#1#2#3#4{%
4108     \bgroup
4109     \select@language@x{\bbl@main@language}%
4110     \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
4111     \egroup}
4112   \def\bbl@footnotetext@o#1#2#3[#4]#5{%
4113     \bgroup
4114     \select@language@x{\bbl@main@language}%
4115     \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
4116     \egroup}
4117   \def\BabelFootnote#1#2#3#4{%
4118     \ifx\bbl@fn@footnote\undefined
4119       \let\bbl@fn@footnote\footnote
4120     \fi
4121     \ifx\bbl@fn@footnotetext\undefined
4122       \let\bbl@fn@footnotetext\footnotetext
4123     \fi
4124     \bbl@ifblank{#2}%
4125       {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
4126        \@namedef{\bbl@stripslash#1text}%
4127          {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
4128       {\def#1{\bbl@exp{\bbl@footnote{\foreignlanguage{#2}}}{#3}{#4}}%
4129        \@namedef{\bbl@stripslash#1text}%
4130          {\bbl@exp{\bbl@footnotetext{\foreignlanguage{#2}}}{#3}{#4}}}}
4131 \fi
4132 <</Footnote changes>>

```

Now, the code.

```

4133 (*xetex)
4134 \def\BabelStringsDefault{unicode}
4135 \let\xebbl@stop\relax
4136 \AddBabelHook{xetex}{encodedcommands}{%
4137   \def\bbl@tempa{#1}%
4138   \ifx\bbl@tempa\@empty
4139     \XeTeXinputencoding"bytes"%
4140   \else
4141     \XeTeXinputencoding"#1"%
4142   \fi
4143   \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
4144 \AddBabelHook{xetex}{stopcommands}{%
4145   \xebbl@stop
4146   \let\xebbl@stop\relax}
4147 \def\bbl@intraspace#1 #2 #3\@@{%
4148   \bbl@csarg\gdef{xeisp@\language}%
4149   {\XeTeXlinebreakskip #1em plus #2em minus #3em\relax}}
4150 \def\bbl@intrapenalty#1\@@{%
4151   \bbl@csarg\gdef{xeipn@\language}%
4152   {\XeTeXlinebreakpenalty #1\relax}}
4153 \def\bbl@provide@intraspace{%
4154   \bbl@xin@\bbl@cl{lnbrk}}{s}%
4155   \ifin\else\bbl@xin@\bbl@cl{lnbrk}}{c}\fi
4156   \ifin@
4157     \bbl@ifunset{bbl@intsp@\language}{}%
4158     {\expandafter\ifx\csname bbl@intsp@\language\endcsname\@empty\else
4159       \ifx\bbl@KVP@intraspace\@nil
4160         \bbl@exp{%
4161           \\bbl@intraspace\bbl@cl{intsp}\\@@}%
4162         \fi
4163         \ifx\bbl@KVP@intrapenalty\@nil
4164           \bbl@intrapenalty0\@@
4165         \fi
4166         \fi
4167         \ifx\bbl@KVP@intraspace\@nil\else % We may override the ini
4168           \expandafter\bbl@intraspace\bbl@KVP@intraspace\@@
4169         \fi
4170         \ifx\bbl@KVP@intrapenalty\@nil\else
4171           \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
4172         \fi
4173         \bbl@exp{%
4174           \\bbl@add\<extras\language>{%
4175             \XeTeXlinebreaklocale "\bbl@cl{lbc}}"%
4176             \<bbl@xeisp@\language>%
4177             \<bbl@xeipn@\language>}%
4178           \\bbl@toglobal\<extras\language>%
4179           \\bbl@add\<noextras\language>{%
4180             \XeTeXlinebreaklocale "en"%
4181             \\bbl@toglobal\<noextras\language>}}%
4182         \ifx\bbl@ispacesize\undefined
4183           \gdef\bbl@ispacesize{\bbl@cl{xeisp}}%
4184         \ifx\AtBeginDocument\@notprerr
4185           \expandafter\@secondoftwo % to execute right now
4186         \fi
4187         \AtBeginDocument{%
4188           \expandafter\bbl@add
4189           \csname selectfont \endcsname{\bbl@ispacesize}%
4190           \expandafter\bbl@toglobal\csname selectfont \endcsname}%
4191       \fi}%

```

```

4192 \fi}
4193 \ifx\DisableBabelHook\undefined\endinput\fi
4194 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
4195 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@ckeckstdfonts}
4196 \DisableBabelHook{babel-fontspec}
4197 <<Font selection>>
4198 \input txtbabel.def
4199 </xetex>

```

13.2 Layout

In progress.

Note 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 pdf_{TE}X and xetex.

```

4200 (*texxet)
4201 \providecommand\bbl@provide@intraspace{}
4202 \bbl@trace{Redefinitions for bidi layout}
4203 \def\bbl@sspre@caption{%
4204   \bbl@exp{\everyhbox{\bbl@textdir\bbl@cs{wdir@\bbl@main@language}}}}
4205 \ifx\bbl@opt@layout\@nnil\endinput\fi % No layout
4206 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
4207 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}
4208 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
4209   \def\@hangfrom#1{%
4210     \setbox\@tempboxa\hbox{#1}%
4211     \hangindent\ifcase\bbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
4212     \noindent\box\@tempboxa}
4213 \def\raggedright{%
4214   \let\@centercr
4215   \bbl@startskip\z@skip
4216   \@rightskip\@flushglue
4217   \bbl@endskip\@rightskip
4218   \parindent\z@
4219   \parfillskip\bbl@startskip}
4220 \def\raggedleft{%
4221   \let\@centercr
4222   \bbl@startskip\@flushglue
4223   \bbl@endskip\z@skip
4224   \parindent\z@
4225   \parfillskip\bbl@endskip}
4226 \fi
4227 \IfBabelLayout{lists}
4228 {\bbl@sreplace\list
4229   {\@totalleftmargin\leftmargin}{\@totalleftmargin\bbl@listleftmargin}%
4230   \def\bbl@listleftmargin{%
4231     \ifcase\bbl@thepardir\leftmargin\else\rightmargin\fi}%
4232   \ifcase\bbl@engine
4233     \def\labelenumii{}\theenumii}% pdfTEX doesn't reverse ()
4234     \def\p@enumiii{\p@enumii}\theenumii}%
4235   \fi
4236   \bbl@sreplace\@verbatim
4237   {\leftskip\@totalleftmargin}%

```

```

4238     {\bbl@startskip\textwidth
4239      \advance\bbl@startskip-\linewidth}%
4240     \bbl@sreplace\@verbatim
4241     {\rightskip\z@skip}%
4242     {\bbl@endskip\z@skip}}%
4243   {}
4244 \IfBabelLayout{contents}
4245   {\bbl@sreplace\@dottedtocline{\leftskip}{\bbl@startskip}%
4246    \bbl@sreplace\@dottedtocline{\rightskip}{\bbl@endskip}}
4247   {}
4248 \IfBabelLayout{columns}
4249   {\bbl@sreplace\@outputdblcol{\hb@xt\textwidth}{\bbl@outputbox}%
4250    \def\bbl@outputbox#1{%
4251      \hb@xt\textwidth{%
4252        \hskip\columnwidth
4253        \hfil
4254        {\normalcolor\vrule \@width\columnseprule}%
4255        \hfil
4256        \hb@xt\columnwidth{\box\@leftcolumn \hss}%
4257        \hskip-\textwidth
4258        \hb@xt\columnwidth{\box\@outputbox \hss}%
4259        \hskip\columnsep
4260        \hskip\columnwidth}}}%
4261   {}
4262 <<Footnote changes>>
4263 \IfBabelLayout{footnotes}%
4264   {\BabelFootnote\footnote\language{}{}}%
4265   \BabelFootnote\localfootnote\language{}{}}%
4266   \BabelFootnote\mainfootnote{}{}}{}
4267   {}

```

Implicitly reverses sectioning labels in bidi=basic, because the full stop is not in contact with L numbers any more. I think there must be a better way.

```

4268 \IfBabelLayout{counters}%
4269   {\let\bbl@latinarabic=\@arabic
4270    \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
4271    \let\bbl@asciroman=\@roman
4272    \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%
4273    \let\bbl@asciiRoman=\@Roman
4274    \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}{}}
4275 </texxet>

```

13.3 LuaTeX

The loader for luatex is based solely on language.dat, which is read on the fly. The code shouldn't be executed when the format is build, so we check if \AddBabelHook is defined. Then comes a modified version of the loader in hyphen.cfg (without the hyphenmins stuff, which is under the direct control of babel).

The names \l@<language> are defined and take some value from the beginning because all ldf files assume this for the corresponding language to be considered valid, but patterns are not loaded (except the first one). This is done later, when the language is first selected (which usually means when the ldf finishes). If a language has been loaded, \bbl@hyphendata@<num> exists (with the names of the files read).

The default setup preloads the first language into the format. This is intended mainly for 'english', so that it's available without further intervention from the user. To avoid duplicating it, the following rule applies: if the "0th" language and the first language in language.dat have the same name then just ignore the latter. If there are new

synonymous, they are added, but note if the language patterns have not been preloaded they won't at run time.

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

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

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

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

This file is read at three places: (1) when `plain.def`, `babel.sty` starts, to read the list of available languages from `language.dat` (for the base option); (2) at `hyphen.cfg`, to modify some macros; (3) in the middle of `plain.def` and `babel.sty`, by `babel.def`, with the commands and other definitions for luatex (eg, `\babelpatterns`).

```

4276 (*luatex)
4277 \ifx\AddBabelHook\undefined % When plain.def, babel.sty starts
4278 \bbl@trace{Read language.dat}
4279 \ifx\bbl@readstream\undefined
4280   \csname newread\endcsname\bbl@readstream
4281 \fi
4282 \begingroup
4283   \toks@{}
4284   \count@ \z@ % 0=start, 1=0th, 2=normal
4285   \def\bbl@process@line#1#2 #3 #4 {%
4286     \ifx=#1%
4287       \bbl@process@synonym{#2}%
4288     \else
4289       \bbl@process@language{#1#2}{#3}{#4}%
4290     \fi
4291     \ignorespaces}
4292   \def\bbl@manylang{%
4293     \ifnum\bbl@last>\@ne
4294       \bbl@info{Non-standard hyphenation setup}%
4295     \fi
4296     \let\bbl@manylang\relax}
4297   \def\bbl@process@language#1#2#3{%
4298     \ifcase\count@
4299       \@ifundefined{zth#1}{\count@ \tw@}{\count@ \@ne}%
4300     \or
4301       \count@ \tw@
4302     \fi
4303     \ifnum\count@=\tw@
4304       \expandafter\addlanguage\csname l@#1\endcsname
4305       \language\allocationnumber
4306       \chardef\bbl@last\allocationnumber
4307       \bbl@manylang
4308       \let\bbl@elt\relax
4309     \xdef\bbl@languages{%
4310       \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
4311   \fi

```

```

4312 \the\toks@
4313 \toks@{}}
4314 \def\bbl@process@synonym@aux#1#2{%
4315 \global\expandafter\chardef\csname l@#1\endcsname#2\relax
4316 \let\bbl@elt\relax
4317 \xdef\bbl@languages{%
4318 \bbl@languages\bbl@elt{#1}{#2}{}}}%
4319 \def\bbl@process@synonym#1{%
4320 \ifcase\count@
4321 \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
4322 \or
4323 \@ifundefined{zth#1}{\bbl@process@synonym@aux{#1}{0}}}%
4324 \else
4325 \bbl@process@synonym@aux{#1}{\the\bbl@last}%
4326 \fi}
4327 \ifx\bbl@languages\@undefined % Just a (sensible?) guess
4328 \chardef\l@english\z@
4329 \chardef\l@USenglish\z@
4330 \chardef\bbl@last\z@
4331 \global\@namedef{bbl@hyphendata@0}{{hyphen.tex}}
4332 \gdef\bbl@languages{%
4333 \bbl@elt{english}{0}{hyphen.tex}}%
4334 \bbl@elt{USenglish}{0}{}}
4335 \else
4336 \global\let\bbl@languages@format\bbl@languages
4337 \def\bbl@elt#1#2#3#4{% Remove all except language 0
4338 \ifnum#2>\z@\else
4339 \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
4340 \fi}%
4341 \xdef\bbl@languages{\bbl@languages}%
4342 \fi
4343 \def\bbl@elt#1#2#3#4{\@namedef{zth#1}{}} % Define flags
4344 \bbl@languages
4345 \openin\bbl@readstream=language.dat
4346 \ifeof\bbl@readstream
4347 \bbl@warning{I couldn't find language.dat. No additional\\%
4348 patterns loaded. Reported}%
4349 \else
4350 \loop
4351 \endlinechar\m@ne
4352 \read\bbl@readstream to \bbl@line
4353 \endlinechar`\^^M
4354 \if T\ifeof\bbl@readstream F\fi T\relax
4355 \ifx\bbl@line\empty\else
4356 \edef\bbl@line{\bbl@line\space\space\space}%
4357 \expandafter\bbl@process@line\bbl@line\relax
4358 \fi
4359 \repeat
4360 \fi
4361 \endgroup
4362 \bbl@trace{Macros for reading patterns files}
4363 \def\bbl@get@enc#1:#2:#3\@@{\def\bbl@hyph@enc{#2}}
4364 \ifx\babelcatcodetablenum\undefined
4365 \ifx\newcatcodetable\@undefined
4366 \def\babelcatcodetablenum{5211}
4367 \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4368 \else
4369 \newcatcodetable\babelcatcodetablenum
4370 \newcatcodetable\bbl@pattcodes

```

```

4371 \fi
4372 \else
4373 \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
4374 \fi
4375 \def\bbl@luapatterns#1#2{%
4376 \bbl@get@enc#1::@@@
4377 \setbox\z@\hbox\bgroup
4378 \begingroup
4379 \savecatcodetable\babelcatcodetablenum\relax
4380 \initcatcodetable\bbl@pattcodes\relax
4381 \catcodetable\bbl@pattcodes\relax
4382 \catcode`\#=6 \catcode`\$=3 \catcode`\&=4 \catcode`\^=7
4383 \catcode`\_ =8 \catcode`\{=1 \catcode`\}=2 \catcode`\-=13
4384 \catcode`\@=11 \catcode`\^^I=10 \catcode`\^^J=12
4385 \catcode`\<=12 \catcode`\>=12 \catcode`\*=12 \catcode`\.=12
4386 \catcode`\-=12 \catcode`\/=12 \catcode`\|=12 \catcode`\|=12
4387 \catcode`\`=12 \catcode`\'=12 \catcode`\`=12
4388 \input #1\relax
4389 \catcodetable\babelcatcodetablenum\relax
4390 \endgroup
4391 \def\bbl@tempa{#2}%
4392 \ifx\bbl@tempa@empty\else
4393 \input #2\relax
4394 \fi
4395 \egroup}%
4396 \def\bbl@patterns@lua#1{%
4397 \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
4398 \csname l@#1\endcsname
4399 \edef\bbl@tempa{#1}%
4400 \else
4401 \csname l@#1:\f@encoding\endcsname
4402 \edef\bbl@tempa{#1:\f@encoding}%
4403 \fi\relax
4404 \@namedef{lu@texhyphen@loaded@the\language}{}% Temp
4405 \@ifundefined{bbl@hyphendata@the\language}%
4406 {\def\bbl@elt##1##2##3##4{%
4407 \ifnum##2=\csname l@#1:\f@encoding\endcsname % #2=spanish, dutch:OT1...
4408 \def\bbl@tempb{##3}%
4409 \ifx\bbl@tempb@empty\else % if not a synonymous
4410 \def\bbl@tempc{##3}{##4}%
4411 \fi
4412 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
4413 \fi}%
4414 \bbl@languages
4415 \@ifundefined{bbl@hyphendata@the\language}%
4416 {\bbl@info{No hyphenation patterns were set for\%
4417 language '\bbl@tempa'. Reported}}%
4418 {\expandafter\expandafter\expandafter\bbl@luapatterns
4419 \csname bbl@hyphendata@the\language\endcsname}}}%
4420 \endinput\fi
4421 % Here ends \ifx\AddBabelHook\undefined
4422 % A few lines are only read by hyphen.cfg
4423 \ifx\DisableBabelHook\undefined
4424 \AddBabelHook{luatex}{everylanguage}{%
4425 \def\process@language##1##2##3{%
4426 \def\process@line####1####2 ####3 ####4 {}}%
4427 \AddBabelHook{luatex}{loadpatterns}{%
4428 \input #1\relax
4429 \expandafter\gdef\csname bbl@hyphendata@the\language\endcsname

```

```

4430      {{#1}}}}
4431 \AddBabelHook{luatex}{loadexceptions}{%
4432   \input #1\relax
4433   \def\bbl@tempb##1##2{{##1}{#1}}%
4434   \expandafter\xdef\csname bbl@hyphendata@the\language\endcsname
4435     {\expandafter\expandafter\expandafter\bbl@tempb
4436       \csname bbl@hyphendata@the\language\endcsname}}
4437 \endinput\fi
4438 % Here stops reading code for hyphen.cfg
4439 % The following is read the 2nd time it's loaded
4440 \begingroup
4441 \catcode`\%=12
4442 \catcode`\'=12
4443 \catcode`\%=12
4444 \catcode`\:=12
4445 \directlua{
4446   Babel = Babel or {}
4447   function Babel.bytes(line)
4448     return line:gsub(".",
4449       function (chr) return unicode.utf8.char(string.byte(chr)) end)
4450   end
4451   function Babel.begin_process_input()
4452     if luatexbase and luatexbase.add_to_callback then
4453       luatexbase.add_to_callback('process_input_buffer',
4454         Babel.bytes, 'Babel.bytes')
4455     else
4456       Babel.callback = callback.find('process_input_buffer')
4457       callback.register('process_input_buffer', Babel.bytes)
4458     end
4459   end
4460   function Babel.end_process_input ()
4461     if luatexbase and luatexbase.remove_from_callback then
4462       luatexbase.remove_from_callback('process_input_buffer', 'Babel.bytes')
4463     else
4464       callback.register('process_input_buffer', Babel.callback)
4465     end
4466   end
4467   function Babel.addpatterns(pp, lg)
4468     local lg = lang.new(lg)
4469     local pats = lang.patterns(lg) or ''
4470     lang.clear_patterns(lg)
4471     for p in pp:gmatch('[^%s]+') do
4472       ss = ''
4473       for i in string.utfcharacters(p:gsub('%d', '')) do
4474         ss = ss .. '%d?' .. i
4475       end
4476       ss = ss:gsub('^%%d%?%', '%%.') .. '%d?'
4477       ss = ss:gsub('%.%d%?$', '%%.')
4478       pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
4479       if n == 0 then
4480         tex.sprint(
4481           [[\string\csname\space bbl@info\endcsname{New pattern: }
4482             .. p .. [{}]])
4483         pats = pats .. ' ' .. p
4484       else
4485         tex.sprint(
4486           [[\string\csname\space bbl@info\endcsname{Renew pattern: }
4487             .. p .. [{}]])
4488       end

```

```

4489     end
4490     lang.patterns(lg, pats)
4491 end
4492 }
4493 \endgroup
4494 \ifx\newattribute\@undefined\else
4495   \newattribute\bbl@attr@locale
4496   \AddBabelHook{luatex}{beforeextras}{%
4497     \setattribute\bbl@attr@locale\localeid}
4498 \fi
4499 \def\BabelStringsDefault{unicode}
4500 \let\luabbbl@stop\relax
4501 \AddBabelHook{luatex}{encodedcommands}{%
4502   \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
4503   \ifx\bbl@tempa\bbl@tempb\else
4504     \directlua{Babel.begin_process_input()}%
4505     \def\luabbbl@stop{%
4506       \directlua{Babel.end_process_input()}}%
4507   \fi}%
4508 \AddBabelHook{luatex}{stopcommands}{%
4509   \luabbbl@stop
4510   \let\luabbbl@stop\relax}
4511 \AddBabelHook{luatex}{patterns}{%
4512   \@ifundefined{bbl@hyphendata@the\language}%
4513     {\def\bbl@elt##1##2##3##4{%
4514       \ifnum##2=\csname l@##2\endcsname % #2=spanish, dutch:OT1...
4515       \def\bbl@tempb{##3}%
4516       \ifx\bbl@tempb@empty\else % if not a synonymous
4517         \def\bbl@tempc{##3}{##4}%
4518       \fi
4519       \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
4520     \fi}%
4521   \bbl@languages
4522   \@ifundefined{bbl@hyphendata@the\language}%
4523     {\bbl@info{No hyphenation patterns were set for\the
4524       language '#2'. Reported}}%
4525     {\expandafter\expandafter\expandafter\bbl@luapatterns
4526       \csname bbl@hyphendata@the\language\endcsname}}}%
4527   \@ifundefined{bbl@patterns@}{}%
4528   \begingroup
4529     \bbl@xin@{,\number\language,}{,\bbl@pttnlist}%
4530   \ifin@else
4531     \ifx\bbl@patterns@@empty\else
4532       \directlua{ Babel.addpatterns(
4533         [[\bbl@patterns@]], \number\language) }%
4534     \fi
4535     \@ifundefined{bbl@patterns@#1}%
4536     \@empty
4537     {\directlua{ Babel.addpatterns(
4538       [[\space\csname bbl@patterns@#1\endcsname]],
4539       \number\language) }}%
4540     \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
4541   \fi
4542 \endgroup}%
4543 \bbl@exp{%
4544   \bbl@ifunset{bbl@prehc@languagename}{}%
4545   {\bbl@ifblank{\bbl@cs{prehc@languagename}}}%
4546   {\prehyphenchar=\bbl@c1{prehc}\relax}}

```

`\babelpatterns` This macro adds patterns. Two macros are used to store them: `\bbl@patterns@` for the global ones and `\bbl@patterns@<lang>` for language ones. We make sure there is a space between words when multiple commands are used.

```

4547 \@onlypreamble\babelpatterns
4548 \AtEndOfPackage{%
4549   \newcommand\babelpatterns[2][\@empty]{%
4550     \ifx\bbl@patterns@relax
4551       \let\bbl@patterns@\@empty
4552     \fi
4553     \ifx\bbl@pttnlist\@empty\else
4554       \bbl@warning{%
4555         You must not intermingle \string\selectlanguage\space and\%
4556         \string\babelpatterns\space or some patterns will not\%
4557         be taken into account. Reported}%
4558     \fi
4559     \ifx\@empty#1%
4560       \protected@edef\bbl@patterns@\bbl@patterns@\space#2}%
4561     \else
4562       \edef\bbl@tempb{\zap@space#1 \@empty}%
4563       \bbl@for\bbl@tempa\bbl@tempb{%
4564         \bbl@fixname\bbl@tempa
4565         \bbl@iflanguage\bbl@tempa{%
4566           \bbl@csarg\protected@edef{patterns@\bbl@tempa}{%
4567             \ifundefined\bbl@patterns@\bbl@tempa}%
4568             \@empty
4569             {\csname bbl@patterns@\bbl@tempa\endcsname\space}%
4570             #2}}}%
4571     \fi}}

```

13.4 Southeast Asian scripts

First, some general code for line breaking, used by `\babelposthyphenation`.

In progress. Replace regular (ie, implicit) discretionaries by spaceskips, based on the previous glyph (which I think makes sense, because the hyphen and the previous char go always together). Other discretionaries are not touched.

For the moment, only 3 SA languages are activated by default (see Unicode UAX 14).

```

4572 \directlua{
4573   Babel = Babel or {}
4574   Babel.linebreaking = Babel.linebreaking or {}
4575   Babel.linebreaking.before = {}
4576   Babel.linebreaking.after = {}
4577   Babel.locale = {} % Free to use, indexed with \localeid
4578   function Babel.linebreaking.add_before(func)
4579     tex.print([[noexpand\csname bbl@luahyphenate\endcsname]])
4580     table.insert(Babel.linebreaking.before , func)
4581   end
4582   function Babel.linebreaking.add_after(func)
4583     tex.print([[noexpand\csname bbl@luahyphenate\endcsname]])
4584     table.insert(Babel.linebreaking.after, func)
4585   end
4586 }
4587 \def\bbl@intraspace#1 #2 #3\@@{%
4588   \directlua{
4589     Babel = Babel or {}
4590     Babel.intraspaces = Babel.intraspaces or {}
4591     Babel.intraspaces['\csname bbl@sbc@language\endcsname'] = %
4592       {b = #1, p = #2, m = #3}

```

```

4593     Babel.locale_props[\the\localeid].intraspace = %
4594     {b = #1, p = #2, m = #3}
4595   }}
4596 \def\bbl@intrapenalty#1\@@{%
4597   \directlua{
4598     Babel = Babel or {}
4599     Babel.intrapenalties = Babel.intrapenalties or {}
4600     Babel.intrapenalties['\csname bbl@sbcpr@languagename\endcsname'] = #1
4601     Babel.locale_props[\the\localeid].intrapenalty = #1
4602   }}
4603 \begingroup
4604 \catcode`\%=12
4605 \catcode`\^=14
4606 \catcode`\'=12
4607 \catcode`\~=12
4608 \gdef\bbl@seaintraspace{^
4609   \let\bbl@seaintraspace\relax
4610   \directlua{
4611     Babel = Babel or {}
4612     Babel.sea_enabled = true
4613     Babel.sea_ranges = Babel.sea_ranges or {}
4614     function Babel.set_chranges (script, chrng)
4615       local c = 0
4616       for s, e in string.gmatch(chrng..' ', '(.-%.%.(-)%s') do
4617         Babel.sea_ranges[script..c]={tonumber(s,16), tonumber(e,16)}
4618         c = c + 1
4619       end
4620     end
4621     function Babel.sea_disc_to_space (head)
4622       local sea_ranges = Babel.sea_ranges
4623       local last_char = nil
4624       local quad = 655360      ^^ 10 pt = 655360 = 10 * 65536
4625       for item in node.traverse(head) do
4626         local i = item.id
4627         if i == node.id'glyph' then
4628           last_char = item
4629         elseif i == 7 and item.subtype == 3 and last_char
4630           and last_char.char > 0x0C99 then
4631           quad = font.getfont(last_char.font).size
4632           for lg, rg in pairs(sea_ranges) do
4633             if last_char.char > rg[1] and last_char.char < rg[2] then
4634               lg = lg:sub(1, 4) ^^ Remove trailing number of, eg, Cyr11
4635               local intraspace = Babel.intraspaces[lg]
4636               local intrapenalty = Babel.intrapenalties[lg]
4637               local n
4638               if intrapenalty ~= 0 then
4639                 n = node.new(14, 0) ^^ penalty
4640                 n.penalty = intrapenalty
4641                 node.insert_before(head, item, n)
4642               end
4643               n = node.new(12, 13) ^^ (glue, spaceskip)
4644               node.setglue(n, intraspace.b * quad,
4645                 intraspace.p * quad,
4646                 intraspace.m * quad)
4647               node.insert_before(head, item, n)
4648               node.remove(head, item)
4649             end
4650           end
4651         end

```

```

4652     end
4653 end
4654 }^^
4655 \bbl@luahyphenate}
4656 \catcode`\%=14
4657 \gdef\bbl@cjkintraspac{%
4658   \let\bbl@cjkintraspac\relax
4659   \directlua{
4660     Babel = Babel or {}
4661     require'babel-data-cjk.lua'
4662     Babel.cjk_enabled = true
4663     function Babel.cjk_linebreak(head)
4664       local GLYPH = node.id'glyph'
4665       local last_char = nil
4666       local quad = 655360      % 10 pt = 655360 = 10 * 65536
4667       local last_class = nil
4668       local last_lang = nil
4669
4670       for item in node.traverse(head) do
4671         if item.id == GLYPH then
4672
4673           local lang = item.lang
4674
4675           local LOCALE = node.get_attribute(item,
4676             luatexbase.registernumber'bbl@attr@locale')
4677           local props = Babel.locale_props[LOCALE]
4678
4679           local class = Babel.cjk_class[item.char].c
4680
4681           if class == 'cp' then class = 'cl' end % )] as CL
4682           if class == 'id' then class = 'I' end
4683
4684           local br = 0
4685           if class and last_class and Babel.cjk_breaks[last_class][class] then
4686             br = Babel.cjk_breaks[last_class][class]
4687           end
4688
4689           if br == 1 and props.linebreak == 'c' and
4690             lang ~= \the\l@nohyphenation\space and
4691             last_lang ~= \the\l@nohyphenation then
4692             local intrapenalty = props.intrapenalty
4693             if intrapenalty ~= 0 then
4694               local n = node.new(14, 0)      % penalty
4695               n.penalty = intrapenalty
4696               node.insert_before(head, item, n)
4697             end
4698             local intraspac = props.intraspac
4699             local n = node.new(12, 13)      % (glue, spaceskip)
4700             node.setglue(n, intraspac.b * quad,
4701               intraspac.p * quad,
4702               intraspac.m * quad)
4703             node.insert_before(head, item, n)
4704           end
4705
4706           quad = font.getfont(item.font).size
4707           last_class = class
4708           last_lang = lang
4709         else % if penalty, glue or anything else
4710           last_class = nil

```



```

4711         end
4712     end
4713     lang.hyphenate(head)
4714 end
4715 }%
4716 \bbl@luahyphenate}
4717 \gdef\bbl@luahyphenate{%
4718 \let\bbl@luahyphenate\relax
4719 \directlua{
4720     luatexbase.add_to_callback('hyphenate',
4721     function (head, tail)
4722         if Babel.linebreaking.before then
4723             for k, func in ipairs(Babel.linebreaking.before) do
4724                 func(head)
4725             end
4726         end
4727         if Babel.cjk_enabled then
4728             Babel.cjk_linebreak(head)
4729         end
4730         lang.hyphenate(head)
4731         if Babel.linebreaking.after then
4732             for k, func in ipairs(Babel.linebreaking.after) do
4733                 func(head)
4734             end
4735         end
4736         if Babel.sea_enabled then
4737             Babel.sea_disc_to_space(head)
4738         end
4739     end,
4740     'Babel.hyphenate')
4741 }
4742 }
4743 \endgroup
4744 \def\bbl@provide@intraspace{%
4745 \bbl@ifunset{\bbl@intsp@{language}}{%
4746 {\expandafter\ifx\csname\bbl@intsp@{language}\endcsname\@empty\else
4747 \bbl@xin@{\bbl@cl{lnbrk}}{c}%
4748 \ifin@ % cjk
4749 \bbl@cjkintraspace
4750 \directlua{
4751     Babel = Babel or {}
4752     Babel.locale_props = Babel.locale_props or {}
4753     Babel.locale_props[\the\localeid].linebreak = 'c'
4754 }%
4755 \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}{\@}%
4756 \ifx\bbl@KVP@intrapenalty\@nil
4757 \bbl@intrapenalty0\@@
4758 \fi
4759 \else % sea
4760 \bbl@seaintraspace
4761 \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}{\@}%
4762 \directlua{
4763     Babel = Babel or {}
4764     Babel.sea_ranges = Babel.sea_ranges or {}
4765     Babel.set_chranges('\bbl@cl{sbc}',
4766                       '\bbl@cl{chrng}')
4767 }%
4768 \ifx\bbl@KVP@intrapenalty\@nil
4769 \bbl@intrapenalty0\@@

```

```

4770         \fi
4771     \fi
4772 \fi
4773 \ifx\bbl@KVP@intrapenalty\@nil\else
4774     \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
4775 \fi}}

```

13.5 CJK line breaking

Minimal line breaking for CJK scripts, mainly intended for simple documents and short texts as a secondary language. Only line breaking, with a little stretching for justification, without any attempt to adjust the spacing. It is based on (but does not strictly follow) the Unicode algorithm.

We first need a little table with the corresponding line breaking properties. A few characters have an additional key for the width (fullwidth vs. halfwidth), not yet used. There is a separate file, defined below.

Work in progress.

Common stuff.

```

4776 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
4777 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@cckstdfonts}
4778 \DisableBabelHook{babel-fontspec}
4779 <<Font selection>>

```

13.6 Automatic fonts and ids switching

After defining the blocks for a number of scripts (must be extended and very likely fine tuned), we define a short function which just traverse the node list to carry out the replacements. The table `loc_to_scr` gets the locale from a script range (note the locale is the key, and that there is an intermediate table built on the fly for optimization). This locale is then used to get the `\language` and the `\localeid` as stored in `locale_props`, as well as the font (as requested). In the latter table a key starting with `/` maps the font from the global one (the key) to the local one (the value). Maths are skipped and discretionaries are handled in a special way.

```

4780 \directlua{
4781 Babel.script_blocks = {
4782   ['Arab'] = {{0x0600, 0x06FF}, {0x08A0, 0x08FF}, {0x0750, 0x077F},
4783             {0xFE70, 0xFEFF}, {0xFB50, 0xFDFF}, {0x1EE00, 0x1EEFF}},
4784   ['Armn'] = {{0x0530, 0x058F}},
4785   ['Beng'] = {{0x0980, 0x09FF}},
4786   ['Cher'] = {{0x13A0, 0x13FF}, {0xAB70, 0ABBF}},
4787   ['Copt'] = {{0x03E2, 0x03EF}, {0x2C80, 0x2CFF}, {0x102E0, 0x102FF}},
4788   ['Cyr1'] = {{0x0400, 0x04FF}, {0x0500, 0x052F}, {0x1C80, 0x1C8F},
4789             {0x2DE0, 0x2DFF}, {0xA640, 0xA69F}},
4790   ['Deva'] = {{0x0900, 0x097F}, {0xA8E0, 0xA8FF}},
4791   ['Ethi'] = {{0x1200, 0x137F}, {0x1380, 0x139F}, {0x2D80, 0x2DDF},
4792             {0xAB00, 0xAB2F}},
4793   ['Geor'] = {{0x10A0, 0x10FF}, {0x2D00, 0x2D2F}},
4794   % Don't follow strictly Unicode, which places some Coptic letters in
4795   % the 'Greek and Coptic' block
4796   ['Grek'] = {{0x0370, 0x03E1}, {0x03F0, 0x03FF}, {0x1F00, 0x1FFF}},
4797   ['Hans'] = {{0x2E80, 0x2EFF}, {0x3000, 0x303F}, {0x31C0, 0x31EF},
4798             {0x3300, 0x33FF}, {0x3400, 0x4DBF}, {0x4E00, 0x9FFF},
4799             {0xF900, 0xFAFF}, {0xFE30, 0xFE4F}, {0xFF00, 0xFFEF},
4800             {0x20000, 0x2A6DF}, {0x2A700, 0x2B73F},
4801             {0x2B740, 0x2B81F}, {0x2B820, 0x2CEAF},
4802             {0x2CEB0, 0x2EBEF}, {0x2F800, 0x2FA1F}},

```

```

4803 ['Hebr'] = {{0x0590, 0x05FF}},
4804 ['Jpan'] = {{0x3000, 0x303F}, {0x3040, 0x309F}, {0x30A0, 0x30FF},
4805           {0x4E00, 0x9FAF}, {0xFF00, 0xFFEF}},
4806 ['Khmr'] = {{0x1780, 0x17FF}, {0x19E0, 0x19FF}},
4807 ['Knda'] = {{0x0C80, 0x0CFF}},
4808 ['Kore'] = {{0x1100, 0x11FF}, {0x3000, 0x303F}, {0x3130, 0x318F},
4809           {0x4E00, 0x9FAF}, {0xA960, 0xA97F}, {0xAC00, 0xD7AF},
4810           {0xD7B0, 0xD7FF}, {0xFF00, 0xFFEF}},
4811 ['Lao'] = {{0x0E80, 0x0EFF}},
4812 ['Latn'] = {{0x0000, 0x007F}, {0x0080, 0x00FF}, {0x0100, 0x017F},
4813           {0x0180, 0x024F}, {0x1E00, 0x1EFF}, {0x2C60, 0x2C7F},
4814           {0xA720, 0xA7FF}, {0xAB30, 0xAB6F}},
4815 ['Mahj'] = {{0x11150, 0x1117F}},
4816 ['Mlym'] = {{0x0D00, 0x0D7F}},
4817 ['Mymr'] = {{0x1000, 0x109F}, {0xAA60, 0xAA7F}, {0xA9E0, 0xA9FF}},
4818 ['Orya'] = {{0x0B00, 0x0B7F}},
4819 ['Sinh'] = {{0x0D80, 0x0DFF}, {0x111E0, 0x111FF}},
4820 ['Syr'] = {{0x0700, 0x074F}, {0x0860, 0x086F}},
4821 ['Taml'] = {{0x0B80, 0x0BFF}},
4822 ['Telu'] = {{0x0C00, 0x0C7F}},
4823 ['Tfng'] = {{0x2D30, 0x2D7F}},
4824 ['Thai'] = {{0x0E00, 0x0E7F}},
4825 ['Tibt'] = {{0x0F00, 0x0FFF}},
4826 ['Vaii'] = {{0xA500, 0xA63F}},
4827 ['Yiii'] = {{0xA000, 0xA48F}, {0xA490, 0xA4CF}}
4828 }
4829
4830 Babel.script_blocks.Cyrs = Babel.script_blocks.Cyrl
4831 Babel.script_blocks.Hant = Babel.script_blocks.Hans
4832 Babel.script_blocks.Kana = Babel.script_blocks.Jpan
4833
4834 function Babel.locale_map(head)
4835   if not Babel.locale_mapped then return head end
4836
4837   local LOCALE = luatexbase.registernumber'bbl@attr@locale'
4838   local GLYPH = node.id('glyph')
4839   local inmath = false
4840   local toloc_save
4841   for item in node.traverse(head) do
4842     local toloc
4843     if not inmath and item.id == GLYPH then
4844       % Optimization: build a table with the chars found
4845       if Babel.chr_to_loc[item.char] then
4846         toloc = Babel.chr_to_loc[item.char]
4847       else
4848         for lc, maps in pairs(Babel.loc_to_scr) do
4849           for _, rg in pairs(maps) do
4850             if item.char >= rg[1] and item.char <= rg[2] then
4851               Babel.chr_to_loc[item.char] = lc
4852               toloc = lc
4853               break
4854             end
4855           end
4856         end
4857       end
4858       % Now, take action, but treat composite chars in a different
4859       % fashion, because they 'inherit' the previous locale. Not yet
4860       % optimized.
4861       if not toloc and

```

```

4862         (item.char >= 0x0300 and item.char <= 0x036F) or
4863         (item.char >= 0x1AB0 and item.char <= 0x1AFF) or
4864         (item.char >= 0x1DC0 and item.char <= 0x1DFF) then
4865         toloc = toloc_save
4866     end
4867     if toloc and toloc > -1 then
4868         if Babel.locale_props[toloc].lg then
4869             item.lang = Babel.locale_props[toloc].lg
4870             node.set_attribute(item, LOCALE, toloc)
4871         end
4872         if Babel.locale_props[toloc]['/'..item.font] then
4873             item.font = Babel.locale_props[toloc]['/'..item.font]
4874         end
4875         toloc_save = toloc
4876     end
4877     elseif not inmath and item.id == 7 then
4878         item.replace = item.replace and Babel.locale_map(item.replace)
4879         item.pre      = item.pre and Babel.locale_map(item.pre)
4880         item.post     = item.post and Babel.locale_map(item.post)
4881     elseif item.id == node.id'math' then
4882         inmath = (item.subtype == 0)
4883     end
4884 end
4885 return head
4886 end
4887 }

```

The code for `\babelcharproperty` is straightforward. Just note the modified lua table can be different.

```

4888 \newcommand\babelcharproperty[1]{%
4889   \count@=#1\relax
4890   \ifvmode
4891     \expandafter\bbl@chprop
4892   \else
4893     \bbl@error{\string\babelcharproperty\space can be used only in\%
4894               vertical mode (preamble or between paragraphs)}%
4895     {See the manual for futher info}%
4896   \fi}
4897 \newcommand\bbl@chprop[3][\the\count@]{%
4898   \@tempcnta=#1\relax
4899   \bbl@ifunset{\bbl@chprop@#2}%
4900   {\bbl@error{No property named '#2'. Allowed values are\%
4901             direction (bc), mirror (bmg), and linebreak (lb)}%
4902    {See the manual for futher info}}%
4903   {}%
4904   \loop
4905     \bbl@cs{chprop@#2}{#3}%
4906     \ifnum\count@<\@tempcnta
4907       \advance\count@\@ne
4908     \repeat}
4909 \def\bbl@chprop@direction#1{%
4910   \directlua{
4911     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
4912     Babel.characters[\the\count@]['d'] = '#1'
4913   }}
4914 \let\bbl@chprop@bc\bbl@chprop@direction
4915 \def\bbl@chprop@mirror#1{%
4916   \directlua{
4917     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}

```

```

4918   Babel.characters[\the\count@][\m'] = '\number#1'
4919   }}
4920 \let\bbl@chprop@bmg\bbl@chprop@mirror
4921 \def\bbl@chprop@linebreak#1{%
4922   \directlua{
4923     Babel.cjk_characters[\the\count@] = Babel.cjk_characters[\the\count@] or {}
4924     Babel.cjk_characters[\the\count@][\c'] = '#1'
4925   }}
4926 \let\bbl@chprop@lb\bbl@chprop@linebreak
4927 \def\bbl@chprop@locale#1{%
4928   \directlua{
4929     Babel.chr_to_loc = Babel.chr_to_loc or {}
4930     Babel.chr_to_loc[\the\count@] =
4931       \bbl@ifblank{#1}{-1000}{\the\bbl@cs{id@@#1}}\space
4932   }}

```

Post-handling hyphenation patterns for non-standard rules, like ff to ff-f. There are still some issues with speed (not very slow, but still slow).

After declaring the table containing the patterns with their replacements, we define some auxiliary functions: `str_to_nodes` converts the string returned by a function to a node list, taking the node at base as a model (font, language, etc.); `fetch_word` fetches a series of glyphs and discretionaries, which pattern is matched against (if there is a match, it is called again before trying other patterns, and this is very likely the main bottleneck). `post_hyphenate_replace` is the callback applied after `lang.hyphenate`. This means the automatic hyphenation points are known. As empty captures return a byte position (as explained in the `luatex` manual), we must convert it to a utf8 position. With `first`, the last byte can be the leading byte in a utf8 sequence, so we just remove it and add 1 to the resulting length. With `last` we must take into account the capture position points to the next character. Here `word_head` points to the starting node of the text to be matched.

```

4933 \begingroup
4934 \catcode`\#=12
4935 \catcode`\%=12
4936 \catcode`\&=14
4937 \directlua{
4938   Babel.linebreaking.replacements = {}
4939
4940   function Babel.str_to_nodes(fn, matches, base)
4941     local n, head, last
4942     if fn == nil then return nil end
4943     for s in string.utfvalues(fn(matches)) do
4944       if base.id == 7 then
4945         base = base.replace
4946       end
4947       n = node.copy(base)
4948       n.char = s
4949       if not head then
4950         head = n
4951       else
4952         last.next = n
4953       end
4954       last = n
4955     end
4956     return head
4957   end
4958
4959   function Babel.fetch_word(head, funct)
4960     local word_string = ''
4961     local word_nodes = {}

```

```

4962     local lang
4963     local item = head
4964
4965     while item do
4966
4967         if item.id == 29
4968             and not(item.char == 124) &% ie, not |
4969             and not(item.char == 61) &% ie, not =
4970             and (item.lang == lang or lang == nil) then
4971             lang = lang or item.lang
4972             word_string = word_string .. unicode.utf8.char(item.char)
4973             word_nodes[#word_nodes+1] = item
4974
4975         elseif item.id == 7 and item.subtype == 2 then
4976             word_string = word_string .. '='
4977             word_nodes[#word_nodes+1] = item
4978
4979         elseif item.id == 7 and item.subtype == 3 then
4980             word_string = word_string .. '|'
4981             word_nodes[#word_nodes+1] = item
4982
4983         elseif word_string == '' then
4984             &% pass
4985
4986         else
4987             return word_string, word_nodes, item, lang
4988         end
4989
4990         item = item.next
4991     end
4992 end
4993
4994 function Babel.post_hyphenate_replace(head)
4995     local u = unicode.utf8
4996     local lbkr = Babel.linebreaking.replacements
4997     local word_head = head
4998
4999     while true do
5000         local w, wn, nw, lang = Babel.fetch_word(word_head)
5001         if not lang then return head end
5002
5003         if not lbkr[lang] then
5004             break
5005         end
5006
5007         for k=1, #lbkr[lang] do
5008             local p = lbkr[lang][k].pattern
5009             local r = lbkr[lang][k].replace
5010
5011             while true do
5012                 local matches = { u.match(w, p) }
5013                 if #matches < 2 then break end
5014
5015                 local first = table.remove(matches, 1)
5016                 local last = table.remove(matches, #matches)
5017
5018                 &% Fix offsets, from bytes to unicode.
5019                 first = u.len(w:sub(1, first-1)) + 1
5020                 last = u.len(w:sub(1, last-1))

```

```

5021
5022     local new  %% used when inserting and removing nodes
5023     local changed = 0
5024
5025     %% This loop traverses the replace list and takes the
5026     %% corresponding actions
5027     for q = first, last do
5028         local crep = r[q-first+1]
5029         local char_node = wn[q]
5030         local char_base = char_node
5031
5032         if crep and crep.data then
5033             char_base = wn[crep.data+first-1]
5034         end
5035
5036         if crep == {} then
5037             break
5038         elseif crep == nil then
5039             changed = changed + 1
5040             node.remove(head, char_node)
5041         elseif crep and (crep.pre or crep.no or crep.post) then
5042             changed = changed + 1
5043             d = node.new(7, 0)  %% (disc, discretionary)
5044             d.pre = Babel.str_to_nodes(crep.pre, matches, char_base)
5045             d.post = Babel.str_to_nodes(crep.post, matches, char_base)
5046             d.replace = Babel.str_to_nodes(crep.no, matches, char_base)
5047             d.attr = char_base.attr
5048             if crep.pre == nil then  %% TeXbook p96
5049                 d.penalty = crep.penalty or tex.hyphenpenalty
5050             else
5051                 d.penalty = crep.penalty or tex.exhyphenpenalty
5052             end
5053             head, new = node.insert_before(head, char_node, d)
5054             node.remove(head, char_node)
5055             if q == 1 then
5056                 word_head = new
5057             end
5058         elseif crep and crep.string then
5059             changed = changed + 1
5060             local str = crep.string(matches)
5061             if str == '' then
5062                 if q == 1 then
5063                     word_head = char_node.next
5064                 end
5065                 head, new = node.remove(head, char_node)
5066             elseif char_node.id == 29 and u.len(str) == 1 then
5067                 char_node.char = string.utfvalue(str)
5068             else
5069                 local n
5070                 for s in string.utfvalues(str) do
5071                     if char_node.id == 7 then
5072                         log('Automatic hyphens cannot be replaced, just removed.')
5073                     else
5074                         n = node.copy(char_base)
5075                     end
5076                     n.char = s
5077                     if q == 1 then
5078                         head, new = node.insert_before(head, char_node, n)
5079                     end
5080                 end

```

```

5080         else
5081             node.insert_before(head, char_node, n)
5082         end
5083     end
5084
5085     node.remove(head, char_node)
5086     end %% string length
5087     end %% if char and char.string
5088     end %% for char in match
5089     if changed > 20 then
5090         texio.write('Too many changes. Ignoring the rest.')
5091     elseif changed > 0 then
5092         w, wn, nw = Babel.fetch_word(word_head)
5093     end
5094
5095     end %% for match
5096     end %% for patterns
5097     word_head = nw
5098     end %% for words
5099     return head
5100 end
5101
5102 %% The following functions belong to the next macro
5103
5104 %% This table stores capture maps, numbered consecutively
5105 Babel.capture_maps = {}
5106
5107 function Babel.capture_func(key, cap)
5108     local ret = "[[" .. cap:gsub('{([0-9])}', "]]..m[%1]..[(") .. "]"
5109     ret = ret:gsub('{([0-9])|([^\]|+)|(.-)}', Babel.capture_func_map)
5110     ret = ret:gsub("%[%[%]%%.", '')
5111     ret = ret:gsub("%.%[%[%]%%", '')
5112     return key .. "[[=function(m) return ]] .. ret .. [[ end]]"
5113 end
5114
5115 function Babel.capt_map(from, mapno)
5116     return Babel.capture_maps[mapno][from] or from
5117 end
5118
5119 %% Handle the {n|abc|ABC} syntax in captures
5120 function Babel.capture_func_map(capno, from, to)
5121     local froms = {}
5122     for s in string.utfcharacters(from) do
5123         table.insert(froms, s)
5124     end
5125     local cnt = 1
5126     table.insert(Babel.capture_maps, {})
5127     local mlen = table.getn(Babel.capture_maps)
5128     for s in string.utfcharacters(to) do
5129         Babel.capture_maps[mlen][froms[cnt]] = s
5130         cnt = cnt + 1
5131     end
5132     return "]]..Babel.capt_map(m[" .. capno .. "], " ..
5133         (mlen) .. ").. " .. "[["
5134 end
5135
5136 }

```

Now the T_EX high level interface, which requires the function defined above for converting

strings to functions returning a string. These functions handle the $\{n\}$ syntax. For example, `pre={1}{1}`- becomes `function(m) return m[1]..m[1]..'-' end`, where `m` are the matches returned after applying the pattern. With a mapped capture the functions are similar to `function(m) return Babel.capt_map(m[1],1) end`, where the last argument identifies the mapping to be applied to `m[1]`. The way it is carried out is somewhat tricky, but the effect is not dissimilar to `lua load` – save the code as string in a TeX macro, and expand this macro at the appropriate place. As `\directlua` does not take into account the current catcode of `@`, we just avoid this character in macro names (which explains the internal group, too).

```

5137 \catcode\#=6
5138 \gdef\babelposthyphenation#1#2#3{%&
5139   \bbl@activateposthyphen
5140   \begingroup
5141     \def\babeltempa{\bbl@add@list\babeltempb}%&
5142     \let\babeltempb\@empty
5143     \bbl@foreach{#3}{&
5144       \bbl@ifsamestring{##1}{remove}%&
5145       {\bbl@add@list\babeltempb{nil}}&
5146       {\directlua{
5147         local rep = {[##1]}
5148         rep = rep:gsub(' (no)s*=%s*([^\s,]*)', Babel.capture_func)
5149         rep = rep:gsub(' (pre)s*=%s*([^\s,]*)', Babel.capture_func)
5150         rep = rep:gsub(' (post)s*=%s*([^\s,]*)', Babel.capture_func)
5151         rep = rep:gsub(' (string)s*=%s*([^\s,]*)', Babel.capture_func)
5152         tex.print([[\string\babeltempa{}}] .. rep .. [{}]])
5153       }}&
5154     \directlua{
5155       local lbkr = Babel.linebreaking.replacements
5156       local u = unicode.utf8
5157       & Convert pattern:
5158       local patt = string.gsub([[#2]], '%s', '')
5159       if not u.find(patt, '()', nil, true) then
5160         patt = '()' .. patt .. '()'
5161       end
5162       patt = u.gsub(patt, '{(.)}',
5163         function (n)
5164           return '%' .. (tonumber(n) and (tonumber(n)+1) or n)
5165         end)
5166       lbkr[\the\csname l@#1\endcsname] = lbkr[\the\csname l@#1\endcsname] or {}
5167       table.insert(lbkr[\the\csname l@#1\endcsname],
5168         { pattern = patt, replace = { \babeltempb } })
5169     }&
5170   \endgroup}
5171 \endgroup
5172 \def\bbl@activateposthyphen{%
5173   \let\bbl@activateposthyphen\relax
5174   \directlua{
5175     Babel.linebreaking.add_after(Babel.post_hyphenate_replace)
5176   }}

```

13.7 Layout

Work in progress.

Unlike xetex, luatex requires only minimal changes for right-to-left layouts, particularly in monolingual documents (the engine itself reverses boxes – including column order or headings –, margins, etc.) with `bidi=basic`, without having to patch almost any macro where text direction is relevant.

\@hangfrom is useful in many contexts and it is redefined always with the layout option. There are, however, a number of issues when the text direction is not the same as the box direction (as set by \bodydir), and when \parbox and \hangindent are involved. Fortunately, latest releases of luatex simplify a lot the solution with \shapemode. With the issue #15 I realized commands are best patched, instead of redefined. With a few lines, a modification could be applied to several classes and packages. Now, tabular seems to work (at least in simple cases) with array, tabularx, hline, colortbl, longtable, booktabs, etc. However, dcolumn still fails.

```

5177 \bbl@trace{Redefinitions for bidi layout}
5178 \ifx\@eqnnum\undefined\else
5179   \ifx\bbl@attr@dir\undefined\else
5180     \edef\@eqnnum{%
5181       \unexpanded{\ifcase\bbl@attr@dir\else\bbl@textdir\@ne\fi}%
5182       \unexpanded\expandafter{\@eqnnum}}%
5183   \fi
5184 \fi
5185 \ifx\bbl@opt@layout\@nnil\endinput\fi % if no layout
5186 \ifnum\bbl@bidimode>\z@
5187   \def\bbl@nextfake#1{% non-local changes, use always inside a group!
5188     \bbl@exp{%
5189       \mathdir\the\bodydir
5190       #1%           Once entered in math, set boxes to restore values
5191       \<ifmmode>%
5192         \everyvbox{%
5193           \the\everyvbox
5194           \bodydir\the\bodydir
5195           \mathdir\the\mathdir
5196           \everyhbox{\the\everyhbox}%
5197           \everyvbox{\the\everyvbox}}%
5198         \everyhbox{%
5199           \the\everyhbox
5200           \bodydir\the\bodydir
5201           \mathdir\the\mathdir
5202           \everyhbox{\the\everyhbox}%
5203           \everyvbox{\the\everyvbox}}%
5204       \<fi>}}%
5205   \def\@hangfrom#1{%
5206     \setbox\@tempboxa\hbox{#1}%
5207     \hangindent\wd\@tempboxa
5208     \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
5209       \shapemode\@ne
5210     \fi
5211     \noindent\box\@tempboxa}
5212 \fi
5213 \IfBabelLayout{tabular}
5214   {\let\bbl@OL@tabular\@tabular
5215     \bbl@replace\@tabular{$}{\bbl@nextfake$}%
5216     \let\bbl@NL@tabular\@tabular
5217     \AtBeginDocument{%
5218       \ifx\bbl@NL@tabular\@tabular\else
5219         \bbl@replace\@tabular{$}{\bbl@nextfake$}%
5220         \let\bbl@NL@tabular\@tabular
5221       \fi}}
5222   {}
5223 \IfBabelLayout{lists}
5224   {\let\bbl@OL@list\list
5225     \bbl@sreplace\list{\parshape}{\bbl@listparshape}%
5226     \let\bbl@NL@list\list

```

```

5227 \def\bbl@listparshape#1#2#3{%
5228   \parshape #1 #2 #3 %
5229   \ifnum\bbl@getluadir{page}=\bbl@getluadir{par}\else
5230     \shapemode\tw@
5231   \fi}}
5232 {}
5233 \IfBabelLayout{graphics}
5234 {\let\bbl@pictresetdir\relax
5235   \def\bbl@pictsetdir{%
5236     \ifcase\bbl@thetextdir
5237       \let\bbl@pictresetdir\relax
5238     \else
5239       \textdir TLT\relax
5240     \def\bbl@pictresetdir{\textdir TRT\relax}%
5241   \fi}%
5242   \let\bbl@OL@@picture\@picture
5243   \let\bbl@OL@put\put
5244   \bbl@sreplace\@picture{\hskip-}\bbl@pictsetdir\hskip-}%
5245   \def\put(#1,#2)#3{% Not easy to patch. Better redefine.
5246     \@killglue
5247     \raise#2\unitlength
5248     \hb@xt@#2@{\kern#1\unitlength\bbl@pictresetdir#3}\hss}}%
5249   \AtBeginDocument
5250     {\ifx\tikz@atbegin@node\undefined\else
5251       \let\bbl@OL@pgfpicture\pgfpicture
5252       \bbl@sreplace\pgfpicture{\pgfpicturetrue}\bbl@pictsetdir\pgfpicturetrue}%
5253       \bbl@add\pgfsys@beginpicture{\bbl@pictsetdir}%
5254       \bbl@add\tikz@atbegin@node{\bbl@pictresetdir}%
5255     \fi}}
5256 {}

```

Implicitly reverses sectioning labels in bidi=basic-r, because the full stop is not in contact with L numbers any more. I think there must be a better way. Assumes bidi=basic, but there are some additional readjustments for bidi=default.

```

5257 \IfBabelLayout{counters}%
5258 {\let\bbl@OL@@textsuperscript\textsuperscript
5259   \bbl@sreplace\textsuperscript{\m@th}\m@th\mathdir\pagedir}%
5260   \let\bbl@latinarabic=\@arabic
5261   \let\bbl@OL@@arabic\@arabic
5262   \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
5263   \@ifpackagewith{babel}{bidi=default}%
5264     {\let\bbl@asciroman=\@roman
5265       \let\bbl@OL@@roman\@roman
5266       \def\@roman#1{\babelsublr{\ensureascii\bbl@asciroman#1}}}%
5267     \let\bbl@asciiRoman=\@Roman
5268     \let\bbl@OL@@roman\@Roman
5269     \def\@Roman#1{\babelsublr{\ensureascii\bbl@asciiRoman#1}}}%
5270     \let\bbl@OL@labelenumii\labelenumii
5271     \def\labelenumii{}\theenumii{}%
5272     \let\bbl@OL@p@enumiii\p@enumiii
5273     \def\p@enumiii{\p@enumii}\theenumii{}\{}\{}%
5274   <<Footnote changes>>
5275   \IfBabelLayout{footnotes}%
5276     {\let\bbl@OL@footnote\footnote
5277       \BabelFootnote\footnote\languagename{}\}%
5278     \BabelFootnote\localfootnote\languagename{}\}%
5279     \BabelFootnote\mainfootnote{}\{}\{}%
5280   {}

```

Some \TeX macros use internally the math mode for text formatting. They have very little in common and are grouped here, as a single option.

```

5281 \IfBabelLayout{extras}%
5282   {\let\bbl@OL@underline\underline
5283    \bbl@sreplace\underline{$\@@underline}\bbl@nextfake$\@@underline}%
5284   \let\bbl@OL@LaTeX2e\LaTeX2e
5285   \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
5286     \if b\expandafter\car\@series\@nil\boldmath\fi
5287     \babelsublr{%
5288       \LaTeX\kern.15em2\bbl@nextfake$_{\textstyle\varepsilon}$}}}}
5289   {}
5290 \end{luatex}

```

13.8 Auto bidi with basic and basic-r

The file `babel-data-bidi.lua` currently only contains data. It is a large and boring file and it is not shown here (see the generated file), but here is a sample:

```

[0x25]={d='et'},
[0x26]={d='on'},
[0x27]={d='on'},
[0x28]={d='on', m=0x29},
[0x29]={d='on', m=0x28},
[0x2A]={d='on'},
[0x2B]={d='es'},
[0x2C]={d='cs'},

```

For the meaning of these codes, see the Unicode standard.

Now the `basic-r` bidi mode. One of the aims is to implement a fast and simple bidi algorithm, with a single loop. I managed to do it for R texts, with a second smaller loop for a special case. The code is still somewhat chaotic, but its behavior is essentially correct. I cannot resist copying the following text from Emacs `bidi.c` (which also attempts to implement the bidi algorithm with a single loop):

Arrrgh!! The UAX#9 algorithm is too deeply entrenched in the assumption of batch-style processing [...]. May the fleas of a thousand camels infest the armpits of those who design supposedly general-purpose algorithms by looking at their own implementations, and fail to consider other possible implementations!

Well, it took me some time to guess what the batch rules in UAX#9 actually mean (in other word, *what* they do and *why*, and not only *how*), but I think (or I hope) I've managed to understand them.

In some sense, there are two bidi modes, one for numbers, and the other for text. Furthermore, setting just the direction in R text is not enough, because there are actually *two* R modes (set explicitly in Unicode with RLM and ALM). In `babel` the `dir` is set by a higher protocol based on the language/script, which in turn sets the correct `dir` (`<l>`, `<r>` or `<al>`).

From UAX#9: “Where available, markup should be used instead of the explicit formatting characters”. So, this simple version just ignores formatting characters. Actually, most of that annex is devoted to how to handle them.

BD14-BD16 are not implemented. Unicode (and the W3C) are making a great effort to deal with some special problematic cases in “streamed” plain text. I don’t think this is the way to go – particular issues should be fixed by a high level interface taking into account the needs of the document. And here is where `luatex` excels, because everything related to bidi writing is under our control.

```

5291 (*basic-r)
5292 Babel = Babel or {}
5293
5294 Babel.bidi_enabled = true
5295
5296 require('babel-data-bidi.lua')
5297
5298 local characters = Babel.characters
5299 local ranges = Babel.ranges
5300
5301 local DIR = node.id("dir")
5302
5303 local function dir_mark(head, from, to, outer)
5304   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
5305   local d = node.new(DIR)
5306   d.dir = '+' .. dir
5307   node.insert_before(head, from, d)
5308   d = node.new(DIR)
5309   d.dir = '-' .. dir
5310   node.insert_after(head, to, d)
5311 end
5312
5313 function Babel.bidi(head, ispar)
5314   local first_n, last_n          -- first and last char with nums
5315   local last_es                  -- an auxiliary 'last' used with nums
5316   local first_d, last_d          -- first and last char in L/R block
5317   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):

```

5318   local strong = ('TRT' == tex.pardir) and 'r' or 'l'
5319   local strong_lr = (strong == 'l') and 'l' or 'r'
5320   local outer = strong
5321
5322   local new_dir = false
5323   local first_dir = false
5324   local inmath = false
5325
5326   local last_lr
5327
5328   local type_n = ''
5329
5330   for item in node.traverse(head) do
5331
5332     -- three cases: glyph, dir, otherwise
5333     if item.id == node.id'glyph'
5334       or (item.id == 7 and item.subtype == 2) then
5335
5336       local itemchar
5337       if item.id == 7 and item.subtype == 2 then
5338         itemchar = item.replace.char
5339       else
5340         itemchar = item.char
5341       end
5342       local chardata = characters[itemchar]
5343       dir = chardata and chardata.d or nil
5344       if not dir then
5345         for nn, et in ipairs(ranges) do

```

```

5346         if itemchar < et[1] then
5347             break
5348         elseif itemchar <= et[2] then
5349             dir = et[3]
5350             break
5351         end
5352     end
5353 end
5354 dir = dir or 'l'
5355 if inmath then dir = ('TRT' == tex.mathdir) and 'r' or 'l' end

```

Next is based on the assumption babel sets the language AND switches the script with its dir. We treat a language block as a separate Unicode sequence. The following piece of code is executed at the first glyph after a 'dir' node. We don't know the current language until then. This is not exactly true, as the math mode may insert explicit dirs in the node list, so, for the moment there is a hack by brute force (just above).

```

5356     if new_dir then
5357         attr_dir = 0
5358         for at in node.traverse(item.attr) do
5359             if at.number == luatexbase.registernumber'bbl@attr@dir' then
5360                 attr_dir = at.value % 3
5361             end
5362         end
5363         if attr_dir == 1 then
5364             strong = 'r'
5365         elseif attr_dir == 2 then
5366             strong = 'al'
5367         else
5368             strong = 'l'
5369         end
5370         strong_lr = (strong == 'l') and 'l' or 'r'
5371         outer = strong_lr
5372         new_dir = false
5373     end
5374
5375     if dir == 'nsm' then dir = strong end -- W1

```

Numbers. The dual <al>/<r> system for R is somewhat cumbersome.

```

5376     dir_real = dir -- We need dir_real to set strong below
5377     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:

```

5378     if strong == 'al' then
5379         if dir == 'en' then dir = 'an' end -- W2
5380         if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
5381         strong_lr = 'r' -- W3
5382     end

```

Once finished the basic setup for glyphs, consider the two other cases: dir node and the rest.

```

5383     elseif item.id == node.id'dir' and not inmath then
5384         new_dir = true
5385         dir = nil
5386     elseif item.id == node.id'math' then
5387         inmath = (item.subtype == 0)
5388     else
5389         dir = nil -- Not a char
5390     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>.

```

5391   if dir == 'en' or dir == 'an' or dir == 'et' then
5392       if dir ~= 'et' then
5393           type_n = dir
5394       end
5395       first_n = first_n or item
5396       last_n = last_es or item
5397       last_es = nil
5398   elseif dir == 'es' and last_n then -- W3+W6
5399       last_es = item
5400   elseif dir == 'cs' then             -- it's right - do nothing
5401   elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
5402       if strong_lr == 'r' and type_n ~= '' then
5403           dir_mark(head, first_n, last_n, 'r')
5404       elseif strong_lr == 'l' and first_d and type_n == 'an' then
5405           dir_mark(head, first_n, last_n, 'r')
5406           dir_mark(head, first_d, last_d, outer)
5407           first_d, last_d = nil, nil
5408       elseif strong_lr == 'l' and type_n ~= '' then
5409           last_d = last_n
5410       end
5411       type_n = ''
5412       first_n, last_n = nil, nil
5413   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:

```

5414   if dir == 'l' or dir == 'r' then
5415       if dir ~= outer then
5416           first_d = first_d or item
5417           last_d = item
5418       elseif first_d and dir ~= strong_lr then
5419           dir_mark(head, first_d, last_d, outer)
5420           first_d, last_d = nil, nil
5421       end
5422   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.

```

5423   if dir and not last_lr and dir ~= 'l' and outer == 'r' then
5424       item.char = characters[item.char] and
5425           characters[item.char].m or item.char
5426   elseif (dir or new_dir) and last_lr ~= item then
5427       local mir = outer .. strong_lr .. (dir or outer)
5428       if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
5429           for ch in node.traverse(node.next(last_lr)) do
5430               if ch == item then break end

```

```

5431         if ch.id == node.id'glyph' and characters[ch.char] then
5432             ch.char = characters[ch.char].m or ch.char
5433         end
5434     end
5435 end
5436 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).

```

5437     if dir == 'l' or dir == 'r' then
5438         last_lr = item
5439         strong = dir_real          -- Don't search back - best save now
5440         strong_lr = (strong == 'l') and 'l' or 'r'
5441     elseif new_dir then
5442         last_lr = nil
5443     end
5444 end

```

Mirror the last chars if they are no directed. And make sure any open block is closed, too.

```

5445     if last_lr and outer == 'r' then
5446         for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
5447             if characters[ch.char] then
5448                 ch.char = characters[ch.char].m or ch.char
5449             end
5450         end
5451     end
5452     if first_n then
5453         dir_mark(head, first_n, last_n, outer)
5454     end
5455     if first_d then
5456         dir_mark(head, first_d, last_d, outer)
5457     end

```

In boxes, the dir node could be added before the original head, so the actual head is the previous node.

```

5458     return node.prev(head) or head
5459 end
5460 </basic-r>

```

And here the Lua code for bidi=basic:

```

5461 (*basic)
5462 Babel = Babel or {}
5463
5464 -- eg, Babel.fontmap[1][<prefontid>]=<dirfontid>
5465
5466 Babel.fontmap = Babel.fontmap or {}
5467 Babel.fontmap[0] = {}          -- l
5468 Babel.fontmap[1] = {}          -- r
5469 Babel.fontmap[2] = {}          -- al/an
5470
5471 Babel.bidi_enabled = true
5472 Babel.mirroring_enabled = true
5473
5474 require('babel-data-bidi.lua')
5475
5476 local characters = Babel.characters
5477 local ranges = Babel.ranges
5478
5479 local DIR = node.id('dir')

```



```

5480 local GLYPH = node.id('glyph')
5481
5482 local function insert_implicit(head, state, outer)
5483   local new_state = state
5484   if state.sim and state.eim and state.sim ~= state.eim then
5485     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
5486     local d = node.new(DIR)
5487     d.dir = '+' .. dir
5488     node.insert_before(head, state.sim, d)
5489     local d = node.new(DIR)
5490     d.dir = '-' .. dir
5491     node.insert_after(head, state.eim, d)
5492   end
5493   new_state.sim, new_state.eim = nil, nil
5494   return head, new_state
5495 end
5496
5497 local function insert_numeric(head, state)
5498   local new
5499   local new_state = state
5500   if state.san and state.ean and state.san ~= state.ean then
5501     local d = node.new(DIR)
5502     d.dir = '+TLT'
5503     _, new = node.insert_before(head, state.san, d)
5504     if state.san == state.sim then state.sim = new end
5505     local d = node.new(DIR)
5506     d.dir = '-TLT'
5507     _, new = node.insert_after(head, state.ean, d)
5508     if state.ean == state.eim then state.eim = new end
5509   end
5510   new_state.san, new_state.ean = nil, nil
5511   return head, new_state
5512 end
5513
5514 -- TODO - \hbox with an explicit dir can lead to wrong results
5515 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>. A small attempt
5516 -- was s made to improve the situation, but the problem is the 3-dir
5517 -- model in babel/Unicode and the 2-dir model in LuaTeX don't fit
5518 -- well.
5519
5520 function Babel.bidi(head, ispar, hdir)
5521   local d -- d is used mainly for computations in a loop
5522   local prev_d = ''
5523   local new_d = false
5524
5525   local nodes = {}
5526   local outer_first = nil
5527   local inmath = false
5528
5529   local glue_d = nil
5530   local glue_i = nil
5531
5532   local has_en = false
5533   local first_et = nil
5534
5535   local ATDIR = luatexbase.registernumber'bbl@attr@dir'
5536
5537   local save_outer
5538   local temp = node.get_attribute(head, ATDIR)

```

```

5539 if temp then
5540     temp = temp % 3
5541     save_outer = (temp == 0 and 'l') or
5542                 (temp == 1 and 'r') or
5543                 (temp == 2 and 'al')
5544 elseif ispar then -- Or error? Shouldn't happen
5545     save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
5546 else -- Or error? Shouldn't happen
5547     save_outer = ('TRT' == hdir) and 'r' or 'l'
5548 end
5549 -- when the callback is called, we are just _after_ the box,
5550 -- and the textdir is that of the surrounding text
5551 -- if not ispar and hdir ~= tex.textdir then
5552 --     save_outer = ('TRT' == hdir) and 'r' or 'l'
5553 -- end
5554 local outer = save_outer
5555 local last = outer
5556 -- 'al' is only taken into account in the first, current loop
5557 if save_outer == 'al' then save_outer = 'r' end
5558
5559 local fontmap = Babel.fontmap
5560
5561 for item in node.traverse(head) do
5562
5563     -- In what follows, #node is the last (previous) node, because the
5564     -- current one is not added until we start processing the neutrals.
5565
5566     -- three cases: glyph, dir, otherwise
5567     if item.id == GLYPH
5568         or (item.id == 7 and item.subtype == 2) then
5569
5570         local d_font = nil
5571         local item_r
5572         if item.id == 7 and item.subtype == 2 then
5573             item_r = item.replace -- automatic discs have just 1 glyph
5574         else
5575             item_r = item
5576         end
5577         local chardata = characters[item_r.char]
5578         d = chardata and chardata.d or nil
5579         if not d or d == 'nsm' then
5580             for nn, et in ipairs(ranges) do
5581                 if item_r.char < et[1] then
5582                     break
5583                 elseif item_r.char <= et[2] then
5584                     if not d then d = et[3]
5585                     elseif d == 'nsm' then d_font = et[3]
5586                     end
5587                     break
5588                 end
5589             end
5590         end
5591         d = d or 'l'
5592
5593         -- A short 'pause' in bidi for mapfont
5594         d_font = d_font or d
5595         d_font = (d_font == 'l' and 0) or
5596                 (d_font == 'nsm' and 0) or
5597                 (d_font == 'r' and 1) or

```

```

5598             (d_font == 'al' and 2) or
5599             (d_font == 'an' and 2) or nil
5600         if d_font and fontmap and fontmap[d_font][item_r.font] then
5601             item_r.font = fontmap[d_font][item_r.font]
5602         end
5603
5604         if new_d then
5605             table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
5606             if inmath then
5607                 attr_d = 0
5608             else
5609                 attr_d = node.get_attribute(item, ATDIR)
5610                 attr_d = attr_d % 3
5611             end
5612             if attr_d == 1 then
5613                 outer_first = 'r'
5614                 last = 'r'
5615             elseif attr_d == 2 then
5616                 outer_first = 'r'
5617                 last = 'al'
5618             else
5619                 outer_first = 'l'
5620                 last = 'l'
5621             end
5622             outer = last
5623             has_en = false
5624             first_et = nil
5625             new_d = false
5626         end
5627
5628         if glue_d then
5629             if (d == 'l' and 'l' or 'r') ~= glue_d then
5630                 table.insert(nodes, {glue_i, 'on', nil})
5631             end
5632             glue_d = nil
5633             glue_i = nil
5634         end
5635
5636         elseif item.id == DIR then
5637             d = nil
5638             new_d = true
5639
5640         elseif item.id == node.id'glue' and item.subtype == 13 then
5641             glue_d = d
5642             glue_i = item
5643             d = nil
5644
5645         elseif item.id == node.id'math' then
5646             inmath = (item.subtype == 0)
5647
5648         else
5649             d = nil
5650         end
5651
5652         -- AL <= EN/ET/ES      -- W2 + W3 + W6
5653         if last == 'al' and d == 'en' then
5654             d = 'an'          -- W3
5655         elseif last == 'al' and (d == 'et' or d == 'es') then
5656             d = 'on'          -- W6

```

```

5657 end
5658
5659 -- EN + CS/ES + EN      -- W4
5660 if d == 'en' and #nodes >= 2 then
5661     if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
5662         and nodes[#nodes-1][2] == 'en' then
5663         nodes[#nodes][2] = 'en'
5664     end
5665 end
5666
5667 -- AN + CS + AN          -- W4 too, because uax9 mixes both cases
5668 if d == 'an' and #nodes >= 2 then
5669     if (nodes[#nodes][2] == 'cs')
5670         and nodes[#nodes-1][2] == 'an' then
5671         nodes[#nodes][2] = 'an'
5672     end
5673 end
5674
5675 -- ET/EN                -- W5 + W7->1 / W6->on
5676 if d == 'et' then
5677     first_et = first_et or (#nodes + 1)
5678 elseif d == 'en' then
5679     has_en = true
5680     first_et = first_et or (#nodes + 1)
5681 elseif first_et then      -- d may be nil here !
5682     if has_en then
5683         if last == 'l' then
5684             temp = 'l'      -- W7
5685         else
5686             temp = 'en'     -- W5
5687         end
5688     else
5689         temp = 'on'         -- W6
5690     end
5691     for e = first_et, #nodes do
5692         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
5693     end
5694     first_et = nil
5695     has_en = false
5696 end
5697
5698 if d then
5699     if d == 'al' then
5700         d = 'r'
5701         last = 'al'
5702     elseif d == 'l' or d == 'r' then
5703         last = d
5704     end
5705     prev_d = d
5706     table.insert(nodes, {item, d, outer_first})
5707 end
5708
5709 outer_first = nil
5710
5711 end
5712
5713 -- TODO -- repeated here in case EN/ET is the last node. Find a
5714 -- better way of doing things:
5715 if first_et then      -- dir may be nil here !

```

```

5716     if has_en then
5717         if last == 'l' then
5718             temp = 'l'    -- W7
5719         else
5720             temp = 'en'    -- W5
5721         end
5722     else
5723         temp = 'on'        -- W6
5724     end
5725     for e = first_et, #nodes do
5726         if nodes[e][1].id == GLYPH then nodes[e][2] = temp end
5727     end
5728 end
5729
5730 -- dummy node, to close things
5731 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
5732
5733 ----- NEUTRAL -----
5734
5735 outer = save_outer
5736 last = outer
5737
5738 local first_on = nil
5739
5740 for q = 1, #nodes do
5741     local item
5742
5743     local outer_first = nodes[q][3]
5744     outer = outer_first or outer
5745     last = outer_first or last
5746
5747     local d = nodes[q][2]
5748     if d == 'an' or d == 'en' then d = 'r' end
5749     if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
5750
5751     if d == 'on' then
5752         first_on = first_on or q
5753     elseif first_on then
5754         if last == d then
5755             temp = d
5756         else
5757             temp = outer
5758         end
5759         for r = first_on, q - 1 do
5760             nodes[r][2] = temp
5761             item = nodes[r][1]    -- MIRRORING
5762             if Babel.mirroring_enabled and item.id == GLYPH
5763                 and temp == 'r' and characters[item.char] then
5764                 local font_mode = font.fonts[item.font].properties.mode
5765                 if font_mode ~= 'harf' and font_mode ~= 'plug' then
5766                     item.char = characters[item.char].m or item.char
5767                 end
5768             end
5769         end
5770         first_on = nil
5771     end
5772
5773     if d == 'r' or d == 'l' then last = d end
5774 end

```

```

5775
5776 ----- IMPLICIT, REORDER -----
5777
5778 outer = save_outer
5779 last = outer
5780
5781 local state = {}
5782 state.has_r = false
5783
5784 for q = 1, #nodes do
5785
5786     local item = nodes[q][1]
5787
5788     outer = nodes[q][3] or outer
5789
5790     local d = nodes[q][2]
5791
5792     if d == 'nsm' then d = last end          -- W1
5793     if d == 'en' then d = 'an' end
5794     local isdir = (d == 'r' or d == 'l')
5795
5796     if outer == 'l' and d == 'an' then
5797         state.san = state.san or item
5798         state.ean = item
5799     elseif state.san then
5800         head, state = insert_numeric(head, state)
5801     end
5802
5803     if outer == 'l' then
5804         if d == 'an' or d == 'r' then      -- im -> implicit
5805             if d == 'r' then state.has_r = true end
5806             state.sim = state.sim or item
5807             state.eim = item
5808         elseif d == 'l' and state.sim and state.has_r then
5809             head, state = insert_implicit(head, state, outer)
5810         elseif d == 'l' then
5811             state.sim, state.eim, state.has_r = nil, nil, false
5812         end
5813     else
5814         if d == 'an' or d == 'l' then
5815             if nodes[q][3] then -- nil except after an explicit dir
5816                 state.sim = item -- so we move sim 'inside' the group
5817             else
5818                 state.sim = state.sim or item
5819             end
5820             state.eim = item
5821         elseif d == 'r' and state.sim then
5822             head, state = insert_implicit(head, state, outer)
5823         elseif d == 'r' then
5824             state.sim, state.eim = nil, nil
5825         end
5826     end
5827
5828     if isdir then
5829         last = d          -- Don't search back - best save now
5830     elseif d == 'on' and state.san then
5831         state.san = state.san or item
5832         state.ean = item
5833     end

```

```

5834
5835   end
5836
5837   return node.prev(head) or head
5838 end
5839  $\langle$ /basic $\rangle$ 

```

14 Data for CJK

It is a boring file and it is not shown here (see the generated file), but here is a sample:

```

[0x0021]={c='ex'},
[0x0024]={c='pr'},
[0x0025]={c='po'},
[0x0028]={c='op'},
[0x0029]={c='cp'},
[0x002B]={c='pr'},

```

For the meaning of these codes, see the Unicode standard.

15 The ‘nil’ language

This ‘language’ does nothing, except setting the hyphenation patterns to nohyphenation. For this language currently no special definitions are needed or available.

The macro `\LdfInit` takes care of preventing that this file is loaded more than once, checking the category code of the `@` sign, etc.

```

5840  $\langle$ *nil $\rangle$ 
5841 \ProvidesLanguage{nil}[\mathbb{<date>}] [\mathbb{<version>}] Nil language]
5842 \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.

```

5843 \ifx\l@nil\@undefined
5844   \newlanguage\l@nil
5845   \namedef{bbl@hyphendata@the\l@nil}{\{}}{\{}}% Remove warning
5846   \let\bbl@elt\relax
5847   \edef\bbl@languages{% Add it to the list of languages
5848     \bbl@languages\bbl@elt{nil}{the\l@nil}{\{}}{\{}}
5849 \fi

```

This macro is used to store the values of the hyphenation parameters `\lefthyphenmin` and `\righthyphenmin`.

```

5850 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}

```

The next step consists of defining commands to switch to (and from) the ‘nil’ language.

```

\captionnil
\datenil
5851 \let\captionnil\@empty
5852 \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.

```

5853 \ldf@finish{nil}
5854  $\langle$ /nil $\rangle$ 

```

16.1 Not renaming hyphen.tex

That file name is “sacred”, and if anybody changes it they will cause severe upward/downward compatibility headaches.

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`.

If a file called `hyphen.cfg` can be found, we make sure that *it* will be read instead of the file `hyphen.tex`. We do this by first saving the original meaning of `\input` (and I use a one letter control sequence for that so as not to waste multi-letter control sequence on this in the format).

Then `\input` is defined to forget about its argument and load `hyphen.cfg` instead. Once that's done the original meaning of `\input` can be restored and the definition of `\a` can be forgotten.

Now that we have made sure that `hyphen.cfg` will be loaded at the right moment it is time to load `plain.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.

When you are using a different format, based on plain.tex you can make a copy of blplain.tex, rename it and replace plain.tex with the name of your format file.

16.2 Emulating some L^AT_EX features

The following code duplicates or emulates parts of L^AT_EX 2_ε that are needed for babel.

```
5874 <<*Emulate LaTeX>> ≡
5875 % == Code for plain ==
5876 \def\@empty{}
5877 \def\loadlocalcfg#1{%
5878   \openin0#1.cfg
5879   \ifeof0
5880     \closein0
5881   \else
5882     \closein0
5883     {\immediate\write16{*****}%
5884      \immediate\write16{* Local config file #1.cfg used}%
5885      \immediate\write16{*}%
5886     }
5887     \input #1.cfg\relax
5888   \fi
5889   \@endofldf}
```

16.3 General tools

A number of L^AT_EX macro's that are needed later on.

```
5890 \long\def\@firstofone#1{#1}
5891 \long\def\@firstoftwo#1#2{#1}
5892 \long\def\@secondoftwo#1#2{#2}
5893 \def\@nnil{\@nil}
5894 \def\@gobbletwo#1#2{}
5895 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
5896 \def\@star@or@long#1{%
5897   \@ifstar
5898   {\let\l@ngrel@x\relax#1}%
5899   {\let\l@ngrel@x\long#1}}
5900 \let\l@ngrel@x\relax
5901 \def\@car#1#2\@nil{#1}
5902 \def\@cdr#1#2\@nil{#2}
5903 \let\@typeset@protect\relax
5904 \let\protected@edef\edef
5905 \long\def\@gobble#1{}
5906 \edef\@backslashchar{\expandafter\@gobble\string\}
5907 \def\strip@prefix#1>{}
5908 \def\g@addto@macro#1#2{%
5909   \toks@\expandafter{#1#2}%
5910   \xdef#1{\the\toks@}}
5911 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
5912 \def\@nameuse#1{\csname #1\endcsname}
5913 \def\@ifundefined#1{%
5914   \expandafter\ifx\csname#1\endcsname\relax
5915     \expandafter\@firstoftwo
5916   \else
5917     \expandafter\@secondoftwo
5918   \fi}
5919 \def\@expandtwoargs#1#2#3{%
5920   \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
5921 \def\zap@space#1 #2{%
5922   #1%
5923   \ifx#2\@empty\else\expandafter\zap@space\fi
5924   #2}
```

```
5925 \let\bbl@trace@gobble
```

$\LaTeX 2_{\epsilon}$ has the command `\@onlypreamble` which adds commands to a list of commands that are no longer needed after `\begin{document}`.

```
5926 \ifx\@preamblecmds\undefined
5927   \def\@preamblecmds{}
5928 \fi
5929 \def\@onlypreamble#1{%
5930   \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
5931     \@preamblecmds\do#1}}
5932 \@onlypreamble\@onlypreamble
```

Mimick \LaTeX 's `\AtBeginDocument`; for this to work the user needs to add `\begindocument` to his file.

```
5933 \def\begindocument{%
5934   \@begindocumenthook
5935   \global\let\@begindocumenthook\undefined
5936   \def\do##1{\global\let##1\undefined}%
5937   \@preamblecmds
5938   \global\let\do\noexpand}
5939 \ifx\@begindocumenthook\undefined
5940   \def\@begindocumenthook{}
5941 \fi
5942 \@onlypreamble\@begindocumenthook
5943 \def\AtBeginDocument{\g@addto@macro\@begindocumenthook}
```

We also have to mimick \LaTeX 's `\AtEndOfPackage`. Our replacement macro is much simpler; it stores its argument in `\@endofldf`.

```
5944 \def\AtEndOfPackage#1{\g@addto@macro\@endofldf{#1}}
5945 \@onlypreamble\AtEndOfPackage
5946 \def\@endofldf{}
5947 \@onlypreamble\@endofldf
5948 \let\bbl@afterlang@empty
5949 \chardef\bbl@opt@hyphenmap\z@
```

\LaTeX needs to be able to switch off writing to its auxiliary files; plain doesn't have them by default. There is a trick to hide some conditional commands from the outer `\ifx`. The same trick is applied below.

```
5950 \catcode`\&=\z@
5951 \ifx&\if@files\@undefined
5952   \expandafter\let\csname if@files\expandafter\endcsname
5953     \csname iffalse\endcsname
5954 \fi
5955 \catcode`\&=4
```

Mimick \LaTeX 's commands to define control sequences.

```
5956 \def\newcommand{\@star@or@long\new@command}
5957 \def\new@command#1{%
5958   \@testopt{\@newcommand#1}0}
5959 \def\@newcommand#1[#2]{%
5960   \@ifnextchar [{\@xargdef#1[#2]}%
5961     {\@argdef#1[#2]}}
5962 \long\def\@argdef#1[#2]#3{%
5963   \@yargdef#1\@ne{#2}{#3}}
5964 \long\def\@xargdef#1[#2][#3]#4{%
5965   \expandafter\def\expandafter#1\expandafter{%
5966     \expandafter\@protected@testopt\expandafter #1%
5967     \csname\string#1\expandafter\endcsname{#3}}}%

```

```

5968 \expandafter\@yargdef \csname\string#1\endcsname
5969 \tw@{#2}{#4}}
5970 \long\def\@yargdef#1#2#3{%
5971 \@tempcnta#3\relax
5972 \advance \@tempcnta \@ne
5973 \let\@hash@\relax
5974 \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
5975 \@tempcntb #2%
5976 \@whilenum\@tempcntb <\@tempcnta
5977 \do{%
5978 \edef\reserved@a{\reserved@a\@hash@\the\@tempcntb}%
5979 \advance\@tempcntb \@ne}%
5980 \let\@hash@###
5981 \l@ngrelx\expandafter\def\expandafter#1\reserved@a}
5982 \def\providecommand{\@star@or@long\provide@command}
5983 \def\provide@command#1{%
5984 \begingroup
5985 \escapechar\m@ne\xdef\@gtempa{\string#1}}%
5986 \endgroup
5987 \expandafter\ifundefined\@gtempa
5988 {\def\reserved@a{\new@command#1}}%
5989 {\let\reserved@a\relax
5990 \def\reserved@a{\new@command\reserved@a}}%
5991 \reserved@a}%

5992 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
5993 \def\declare@robustcommand#1{%
5994 \edef\reserved@a{\string#1}%
5995 \def\reserved@b{#1}%
5996 \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
5997 \edef#1{%
5998 \ifx\reserved@a\reserved@b
5999 \noexpand\x@protect
6000 \noexpand#1%
6001 \fi
6002 \noexpand\protect
6003 \expandafter\noexpand\csname
6004 \expandafter\@gobble\string#1 \endcsname
6005 }%
6006 \expandafter\new@command\csname
6007 \expandafter\@gobble\string#1 \endcsname
6008 }
6009 \def\x@protect#1{%
6010 \ifx\protect\@typeset@protect\else
6011 \@x@protect#1%
6012 \fi
6013 }
6014 \catcode`\&=\z@ % Trick to hide conditionals
6015 \def\@x@protect#1&fi#2#3{&fi\protect#1}

```

The following little macro `\in@` is taken from `latex.ltx`; it checks whether its first argument is part of its second argument. It uses the boolean `\in@`; allocating a new boolean inside conditionally executed code is not possible, hence the construct with the temporary definition of `\bbl@tempa`.

```

6016 \def\bbl@tempa{\csname newif\endcsname&fin@}
6017 \catcode`\&=4
6018 \ifx\in@\@undefined
6019 \def\in@#1#2{%
6020 \def\in@@##1#1##2##3\in@@{%

```

```

6021 \ifx\in@##2\in@false\else\in@true\fi}%
6022 \in@@#2#1\in@\in@@}
6023 \else
6024 \let\bbl@tempa\@empty
6025 \fi
6026 \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).

```

6027 \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.

```

6028 \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.

```

6029 \ifx\@tempcnta\@undefined
6030 \csname newcount\endcsname\@tempcnta\relax
6031 \fi
6032 \ifx\@tempcntb\@undefined
6033 \csname newcount\endcsname\@tempcntb\relax
6034 \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`).

```

6035 \ifx\bye\@undefined
6036 \advance\count10 by -2\relax
6037 \fi
6038 \ifx\ifnextchar\@undefined
6039 \def\ifnextchar#1#2#3{%
6040 \let\reserved@d=#1%
6041 \def\reserved@a{#2}\def\reserved@b{#3}%
6042 \futurelet\@let@token\ifnch}
6043 \def\ifnch{%
6044 \ifx\@let@token@sptoken
6045 \let\reserved@c\@xifnch
6046 \else
6047 \ifx\@let@token\reserved@d
6048 \let\reserved@c\reserved@a
6049 \else
6050 \let\reserved@c\reserved@b
6051 \fi
6052 \fi
6053 \reserved@c}
6054 \def\:{\let@sptoken= } \: % this makes \@sptoken a space token
6055 \def\:{\@xifnch} \expandafter\def\:{\futurelet\@let@token\ifnch}
6056 \fi
6057 \def\@testopt#1#2{%
6058 \@ifnextchar[#{1}{#1[#2]}}
6059 \def\@protected@testopt#1{%
6060 \ifx\protect\@typeset@protect
6061 \expandafter\@testopt

```

```

6062 \else
6063 \x@protect#1%
6064 \fi}
6065 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
6066 #2\relax}\fi}
6067 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
6068 \else\expandafter\@gobble\fi{#1}}

```

16.4 Encoding related macros

Code from `ltoutenc.dtx`, adapted for use in the plain \TeX environment.

```

6069 \def\DeclareTextCommand{%
6070 \@dec@text@cmd\providecommand
6071 }
6072 \def\ProvideTextCommand{%
6073 \@dec@text@cmd\providecommand
6074 }
6075 \def\DeclareTextSymbol#1#2#3{%
6076 \@dec@text@cmd\chardef#1{#2}#3\relax
6077 }
6078 \def\@dec@text@cmd#1#2#3{%
6079 \expandafter\def\expandafter#2%
6080 \expandafter{%
6081 \csname#3-cmd\expandafter\endcsname
6082 \expandafter#2%
6083 \csname#3\string#2\endcsname
6084 }%
6085 % \let\@ifdefinable\@rc@ifdefinable
6086 \expandafter#1\csname#3\string#2\endcsname
6087 }
6088 \def\@current@cmd#1{%
6089 \ifx\protect\@typeset@protect\else
6090 \noexpand#1\expandafter\@gobble
6091 \fi
6092 }
6093 \def\@changed@cmd#1#2{%
6094 \ifx\protect\@typeset@protect
6095 \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
6096 \expandafter\ifx\csname ?\string#1\endcsname\relax
6097 \expandafter\def\csname ?\string#1\endcsname{%
6098 \@changed@x@err{#1}%
6099 }%
6100 \fi
6101 \global\expandafter\let
6102 \csname\cf@encoding\string#1\expandafter\endcsname
6103 \csname ?\string#1\endcsname
6104 \fi
6105 \csname\cf@encoding\string#1%
6106 \expandafter\endcsname
6107 \else
6108 \noexpand#1%
6109 \fi
6110 }
6111 \def\@changed@x@err#1{%
6112 \errhelp{Your command will be ignored, type <return> to proceed}%
6113 \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
6114 \def\DeclareTextCommandDefault#1{%
6115 \DeclareTextCommand#1?%

```

```

6116 }
6117 \def\ProvideTextCommandDefault#1{%
6118   \ProvideTextCommand#1?%
6119 }
6120 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
6121 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
6122 \def\DeclareTextAccent#1#2#3{%
6123   \DeclareTextCommand#1{#2}[1]{\accent#3 #1}
6124 }
6125 \def\DeclareTextCompositeCommand#1#2#3#4{%
6126   \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
6127   \edef\reserved@b{\string##1}%
6128   \edef\reserved@c{%
6129     \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
6130   \ifx\reserved@b\reserved@c
6131     \expandafter\expandafter\expandafter\ifx
6132       \expandafter\@car\reserved@a\relax\relax\@nil
6133       \@text@composite
6134     \else
6135       \edef\reserved@b##1{%
6136         \def\expandafter\noexpand
6137           \csname#2\string#1\endcsname####1{%
6138             \noexpand\@text@composite
6139             \expandafter\noexpand\csname#2\string#1\endcsname
6140             ####1\noexpand\@empty\noexpand\@text@composite
6141             {##1}%
6142           }%
6143       }%
6144       \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
6145     \fi
6146     \expandafter\def\csname\expandafter\string\csname
6147       #2\endcsname\string#1-\string#3\endcsname{#4}
6148   \else
6149     \errhelp{Your command will be ignored, type <return> to proceed}%
6150     \errmessage{\string\DeclareTextCompositeCommand\space used on
6151       inappropriate command \protect#1}
6152   \fi
6153 }
6154 \def\@text@composite#1#2#3\@text@composite{%
6155   \expandafter\@text@composite@x
6156   \csname\string#1-\string#2\endcsname
6157 }
6158 \def\@text@composite@x#1#2{%
6159   \ifx#1\relax
6160     #2%
6161   \else
6162     #1%
6163   \fi
6164 }
6165 %
6166 \def\@strip@args#1:#2-#3\@strip@args{#2}
6167 \def\DeclareTextComposite#1#2#3#4{%
6168   \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
6169   \bgroup
6170     \lccode`\@=#4%
6171     \lowercase{%
6172   \egroup
6173     \reserved@a @%
6174   }%

```

```

6175 }
6176 %
6177 \def\UseTextSymbol#1#2{%
6178 %   \let\@curr@enc\cf@encoding
6179 %   \@use@text@encoding{#1}%
6180 %   #2%
6181 %   \@use@text@encoding\@curr@enc
6182 }
6183 \def\UseTextAccent#1#2#3{%
6184 %   \let\@curr@enc\cf@encoding
6185 %   \@use@text@encoding{#1}%
6186 %   #2{\@use@text@encoding\@curr@enc\selectfont#3}%
6187 %   \@use@text@encoding\@curr@enc
6188 }
6189 \def\@use@text@encoding#1{%
6190 %   \edef\font@encoding{#1}%
6191 %   \xdef\font@name{%
6192 %       \csname\curr@fontshape/\font@size\endcsname
6193 %   }%
6194 %   \pickup@font
6195 %   \font@name
6196 %   \@@enc@update
6197 }
6198 \def\DeclareTextSymbolDefault#1#2{%
6199 %   \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
6200 }
6201 \def\DeclareTextAccentDefault#1#2{%
6202 %   \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
6203 }
6204 \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.

```

6205 \DeclareTextAccent{"}{OT1}{127}
6206 \DeclareTextAccent{'}{OT1}{19}
6207 \DeclareTextAccent{^}{OT1}{94}
6208 \DeclareTextAccent`}{OT1}{18}
6209 \DeclareTextAccent{~}{OT1}{126}

```

The following control sequences are used in `babel.def` but are not defined for PLAIN \TeX .

```

6210 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
6211 \DeclareTextSymbol{\textquotedblright}{OT1}{`\"}
6212 \DeclareTextSymbol{\textquoteleft}{OT1}{`\'}
6213 \DeclareTextSymbol{\textquoteright}{OT1}{`\' }
6214 \DeclareTextSymbol{\i}{OT1}{16}
6215 \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`.

```

6216 \ifx\scriptsize\@undefined
6217 % \let\scriptsize\sevenrm
6218 \fi
6219 % End of code for plain
6220 <</Emulate LaTeX>>

```

A proxy file:

```

6221 < *plain>
6222 \input babel.def
6223 </plain>

```

17 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.

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