

Babel

Code

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Localization and
internationalization

Unicode

TEX

pdfTEX

LuaTEX

XeTEX

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The babel package 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 in real documents only as documented (except, of course, if you want to explore and test them).

1 Identification and loading of required files

Code documentation is still under revision.

The babel package after unpacking consists of the following files:

babel.sty is the L^AT_EX package, which set options and load language styles.

babel.def is loaded by Plain.

switch.def defines macros to set and switch languages (it loads part babel.def).

plain.def is not used, and just loads babel.def, for compatibility.

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

There some additional tex, def and lua files

The babel installer extends docstrip with a few “pseudo-guards” to set “variables” used at installation time. They are used with <@name> at the appropriate places in the source code and defined with either <<name=value>>, or with a series of lines between <<*name>> and <</name>>. The latter is cumulative (eg, with *More package options*). That brings a little bit of literate programming. The guards <-name> and <+name> have been redefined, too. See babel.ins for further details.

2 locale directory

A required component of babel is a set of ini files with basic definitions for about 250 languages. They are distributed as a separate zip file, not packed as dtx. 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, there are no geographic areas in Spanish). Not all include LICR variants.

babel-*.ini files contain the actual data; babel-*.tex files are basically proxies to the corresponding ini files.

See [Keys in ini files](#) in the the babel site.

3 Tools

```
1 <<version=24.4>>
2 <<date=2024/04/20>>
```

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@carg#1#2{\expandafter#1\csname#2\endcsname}%
12 \def\bbl@ncarg#1#2#3{\expandafter#1\expandafter#2\csname#3\endcsname}%
13 \def\bbl@ccarg#1#2#3{%
14   \expandafter#1\csname#2\expandafter\endcsname\csname#3\endcsname}%
15 \def\bbl@csarg#1#2{\expandafter#1\csname bbl@#2\endcsname}%
16 \def\bbl@cs#1{\csname bbl@#1\endcsname}
17 \def\bbl@c#1{\csname bbl@#1\@language\endcsname}
```

```

18 \def\bbl@loop#1#2#3{\bbl@loop#1{#3}#2,\@nnil,}
19 \def\bbl@loopx#1#2{\expandafter\bbl@loop\expandafter#1\expandafter{#2}}
20 \def\bbl@loop#1#2#3,{%
21   \ifx\@nnil#3\relax\else
22     \def#1{#3}#2\bbl@afterfi\bbl@loop#1{#2}%
23   \fi}
24 \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.

```

25 \def\bbl@add@list#1#2{%
26   \edef#1{%
27     \bbl@ifunset{\bbl@stripslash#1}%
28     }%
29     {\ifx#1\@empty\else#1,\fi}%
30   #2}}

```

`\bbl@afterelse` 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`-statement¹. These macros will break if another `\if... \fi` statement appears in one of the arguments and it is not enclosed in braces.

```

31 \long\def\bbl@afterelse#1\else#2\fi{\fi#1}
32 \long\def\bbl@afterfi#1\fi{\fi#1}

```

`\bbl@exp` Now, just syntactical sugar, but it makes partial expansion of some code a lot more simple and readable. Here `\` stands for `\noexpand`, `\<. .>` for `\noexpand` applied to a built macro name (which does not define the macro if undefined to `\relax`, because it is created locally), and `\[. .]` for one-level expansion (where `. .` is the macro name without the backslash). The result may be followed by extra arguments, if necessary.

```

33 \def\bbl@exp#1{%
34   \begingroup
35   \let\<\noexpand
36   \let\<\bbl@exp@en
37   \let\[\bbl@exp@ue
38   \edef\bbl@exp@aux{\endgroup#1}%
39   \bbl@exp@aux}
40 \def\bbl@exp@en#1>{\expandafter\noexpand\csname#1\endcsname}%
41 \def\bbl@exp@ue#1]{%
42   \unexpanded\expandafter\expandafter\expandafter{\csname#1\endcsname}}%

```

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

```

43 \def\bbl@tempa#1{%
44   \long\def\bbl@trim##1##2{%
45     \futurelet\bbl@trim@a\bbl@trim@c##2\@nil\@nil#1\@nil\relax{##1}}%
46   \def\bbl@trim@c{%
47     \ifx\bbl@trim@a\sptoken
48       \expandafter\bbl@trim@b
49     \else
50       \expandafter\bbl@trim@b\expandafter#1%
51     \fi}%
52   \long\def\bbl@trim@b##1 \@nil{\bbl@trim@i##1}}
53 \bbl@tempa{ }
54 \long\def\bbl@trim@i#1\@nil#2\relax#3{#3{#1}}
55 \long\def\bbl@trim@def#1{\bbl@trim{def#1}}

```

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

¹This code is based on code presented in TUGboat vol. 12, no2, June 1991 in “An expansion Power Lemma” by Sonja Maus.

memory. Defined inside a group, to avoid `\ifcsname` being implicitly set to `\relax` by the `\csname` test.

```

56 \beginingroup
57   \gdef\bbl@ifunset#1{%
58     \expandafter\ifx\csname#1\endcsname\relax
59     \expandafter\@firstoftwo
60   \else
61     \expandafter\@secondoftwo
62   \fi}
63 \bbl@ifunset{ifcsname}%
64 {}%
65 {\gdef\bbl@ifunset#1{%
66   \ifcsname#1\endcsname
67   \expandafter\ifx\csname#1\endcsname\relax
68     \bbl@afterelse\expandafter\@firstoftwo
69   \else
70     \bbl@afterfi\expandafter\@secondoftwo
71   \fi
72   \else
73     \expandafter\@firstoftwo
74   \fi}}
75 \endgroup

```

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

```

76 \def\bbl@ifblank#1{%
77   \bbl@ifblank@i#1\@nil\@nil\@secondoftwo\@firstoftwo\@nil}
78 \long\def\bbl@ifblank@i#1#2\@nil#3#4#5\@nil{#4}
79 \def\bbl@ifset#1#2#3{%
80   \bbl@ifunset{#1}{#3}{\bbl@exp{\@nameuse{#1}}{#3}{#2}}}

```

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

```

81 \def\bbl@forkv#1#2{%
82   \def\bbl@kvcmd##1##2##3{#2}%
83   \bbl@kvnnext#1,\@nil,}
84 \def\bbl@kvnnext#1,{%
85   \ifx\@nil#1\relax\else
86     \bbl@ifblank{#1}{\bbl@forkv@eq#1=\@empty=\@nil{#1}}%
87     \expandafter\bbl@kvnnext
88   \fi}
89 \def\bbl@forkv@eq#1=#2=#3\@nil#4{%
90   \bbl@trim@def\bbl@forkv@a{#1}%
91   \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).

```

92 \def\bbl@vforeach#1#2{%
93   \def\bbl@forcmd##1{#2}%
94   \bbl@fornext#1,\@nil,}
95 \def\bbl@fornext#1,{%
96   \ifx\@nil#1\relax\else
97     \bbl@ifblank{#1}{\bbl@trim\bbl@forcmd{#1}}%
98     \expandafter\bbl@fornext
99   \fi}
100 \def\bbl@foreach#1{\expandafter\bbl@vforeach\expandafter{#1}}

```

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

```

101 \def\bbl@replace#1#2#3{% in #1 -> repl #2 by #3
102   \toks@{}}
103 \def\bbl@replace@aux##1#2##2#2{%

```

```

104 \ifx\bbbl@nil##2%
105   \toks@\expandafter{\the\toks@##1}%
106   \else
107     \toks@\expandafter{\the\toks@##1#3}%
108     \bbbl@afterfi
109     \bbbl@replace@aux##2#2%
110   \fi}%
111 \expandafter\bbbl@replace@aux#1#2\bbbl@nil#2%
112 \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 \bbbl@TG@@date, and also fails if there are macros with spaces, because they are retokenized). It may change! (or even merged with \bbbl@replace; I'm not sure checking the replacement is really necessary or just paranoia).

```

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

```

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

```

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

```

```

156 \else
157 \tw@
158 \fi
159 \else
160 \@ne
161 \fi

```

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

```

162 \def\bb@bsphack{%
163 \ifhmode
164 \hskip\z@skip
165 \def\bb@esphack{\loop\ifdim\lastskip>\z@\unskip\repeat\unskip}%
166 \else
167 \let\bb@esphack\@empty
168 \fi}

```

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

```

169 \def\bb@cased{%
170 \ifx\oe\OE
171 \expandafter\in@\expandafter
172 {\expandafter\OE\expandafter}\expandafter{\oe}%
173 \ifin@
174 \bb@afterelse\expandafter\MakeUppercase
175 \else
176 \bb@afterfi\expandafter\MakeLowercase
177 \fi
178 \else
179 \expandafter\@firstofone
180 \fi}

```

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

```

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

```

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

```

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

```

3.1 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.

```

199 <<*Define core switching macros>> ≡

```



```

200 \ifx\language\@undefined
201   \csname newcount\endcsname\language
202 \fi
203 <</Define core switching macros>>

```

`\last@language` Another counter is used to keep track of the allocated languages. \TeX and \LaTeX reserves for this purpose the count 19.

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

```

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

```

Now we make sure all required files are loaded. When the command `\AtBeginDocument` doesn't exist we assume that we are dealing with a plain-based format. In that case the file `plain.def` is needed (which also defines `\AtBeginDocument`, and therefore it is not loaded twice). We need the first part when the format is created, and `\orig@dump` is used as a flag. Otherwise, we need to use the second part, so `\orig@dump` is not defined (`plain.def` undefines it). Check if the current version of `switch.def` has been previously loaded (mainly, `hyphen.cfg`). If not, load it now. We cannot load `babel.def` here because we first need to declare and process the package options.

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

```

208 (*package)
209 \NeedsTeXFormat{LaTeX2e}[2005/12/01]
210 \ProvidesPackage{babel}[<<date>> v<<version>> The Babel package]

```

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

```

211 \@ifpackagewith{babel}{debug}
212   {\providecommand\bbbl@trace[1]{\message{^^J[ #1 ]}}%
213    \let\bbbl@debug\@firstofone
214    \ifx\directlua\@undefined\else
215      \directlua{ Babel = Babel or {}
216        Babel.debug = true }%
217      \input{babel-debug.tex}%
218    \fi}
219 {\providecommand\bbbl@trace[1]{}%
220  \let\bbbl@debug@gobble
221  \ifx\directlua\@undefined\else
222    \directlua{ Babel = Babel or {}
223      Babel.debug = false }%
224  \fi}
225 \def\bbbl@error#1{% Implicit #2#3#4
226   \begingroup
227     \catcode`\=0 \catcode`\=12 \catcode`\`=12
228     \input errbabel.def
229   \endgroup
230   \bbbl@error{#1}}
231 \def\bbbl@warning#1{%
232   \begingroup
233     \def\{\MessageBreak}%
234     \PackageWarning{babel}{#1}%
235   \endgroup}
236 \def\bbbl@infowarn#1{%
237   \begingroup
238     \def\{\MessageBreak}%
239     \PackageNote{babel}{#1}%
240   \endgroup}
241 \def\bbbl@info#1{%
242   \begingroup
243     \def\{\MessageBreak}%
244     \PackageInfo{babel}{#1}%

```

```
245 \endgroup}
```

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

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

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

```
246 <<Basic macros>>
247 \ifpackagewith{babel}{silent}
248   {\let\bbl@info@gobble
249    \let\bbl@infowarn@gobble
250    \let\bbl@warning@gobble}
251   {}
252 %
253 \def\AfterBabelLanguage#1{%
254   \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.

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

3.3 base

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

```
273 \bbl@trace{Defining option 'base'}
274 \ifpackagewith{babel}{base}{%
275   \let\bbl@onlyswitch@empty
276   \let\bbl@provide@locale\relax
277   \input babel.def
278   \let\bbl@onlyswitch\@undefined
279   \ifx\directlua\@undefined
280     \DeclareOption*{\bbl@patterns{CurrentOption}}%
281   \else
282     \input luababel.def
283     \DeclareOption*{\bbl@patterns@lua{CurrentOption}}%
284   \fi
285   \DeclareOption{base}{}%
286   \DeclareOption{showlanguages}{}%
287   \ProcessOptions
288   \global\expandafter\let\csname opt@babel.sty\endcsname\relax
289   \global\expandafter\let\csname ver@babel.sty\endcsname\relax
290   \global\let\@ifl@ter@@\@ifl@ter
291   \def\@ifl@ter#1#2#3#4#5{\global\let\@ifl@ter\@ifl@ter@@}%
```

```
292 \endinput}{}%
```

3.4 key=value options and other general option

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

```
293 \bbl@trace{key=value and another general options}
294 \bbl@csarg\let{tempa\expandafter}\csname opt@babel.sty\endcsname
295 \def\bbl@tempb#1.#2{% Remove trailing dot
296   #1\ifx\@empty#2\else,\bbl@afterfi\bbl@tempb#2\fi}%
297 \def\bbl@tempe#1=#2\@@{%
298   \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}}
299 \def\bbl@tempd#1.#2\@nnil{% TODO. Refactor lists?
300   \ifx\@empty#2%
301     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
302   \else
303     \in@{,provide=}{,#1}%
304     \ifin@
305       \edef\bbl@tempc{%
306         \ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.\bbl@tempb#2}%
307     \else
308       \in@{${modifiers$}${$#1$}% TODO. Allow spaces.
309       \ifin@
310         \bbl@tempe#2\@@
311       \else
312         \in@{=}{#1}%
313         \ifin@
314           \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.#2}%
315         \else
316           \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
317         \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}%
318         \fi
319       \fi
320     \fi
321   \fi}
322 \let\bbl@tempc\@empty
323 \bbl@foreach\bbl@tempa{\bbl@tempd#1.\@empty\@nnil}
324 \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.

```
325 \DeclareOption{KeepShorthandsActive}{}
326 \DeclareOption{activeacute}{}
327 \DeclareOption{activegrave}{}
328 \DeclareOption{debug}{}
329 \DeclareOption{noconfigs}{}
330 \DeclareOption{showlanguages}{}
331 \DeclareOption{silent}{}
332 % \DeclareOption{mono}{}
333 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
334 \chardef\bbl@iniflag\z@
335 \DeclareOption{provide=*}{\chardef\bbl@iniflag@ne} % main -> +1
336 \DeclareOption{provide+=*}{\chardef\bbl@iniflag\tw@} % add = 2
337 \DeclareOption{provide*=*}{\chardef\bbl@iniflag\thr@@} % add + main
338 % A separate option
339 \let\bbl@autoload@options\@empty
340 \DeclareOption{provide=@*}{\def\bbl@autoload@options{import}}
341 % Don't use. Experimental. TODO.
342 \newif\ifbbl@single
343 \DeclareOption{selectors=off}{\bbl@singletrue}
```

344 <<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.

```
345 \let\bbbl@opt@shorthands\@nnil
346 \let\bbbl@opt@config\@nnil
347 \let\bbbl@opt@main\@nnil
348 \let\bbbl@opt@headfoot\@nnil
349 \let\bbbl@opt@layout\@nnil
350 \let\bbbl@opt@provide\@nnil
```

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

```
351 \def\bbbl@tempa#1=#2\bbbl@tempa{%
352   \bbbl@csarg\ifx{opt@#1}\@nnil
353   \bbbl@csarg\edef{opt@#1}{#2}%
354   \else
355   \bbbl@error{bad-package-option}{#1}{#2}{}%
356   \fi}
```

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

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

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

```
365 \ProcessOptions*
366 \ifx\bbbl@opt@provide\@nnil
367   \let\bbbl@opt@provide\@empty % %%% MOVE above
368 \else
369   \chardef\bbbl@iniflag\@ne
370   \bbbl@exp{\bbbl@forkv{\@nameuse{@raw@opt@babel.sty}}}{%
371     \in@{,provide,}{, #1,}%
372     \ifin@
373       \def\bbbl@opt@provide{#2}%
374       \bbbl@replace\bbbl@opt@provide{;}{,}%
375     \fi}
376 \fi
377 %
```

3.5 Conditional loading of shorthands

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

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

```
378 \bbbl@trace{Conditional loading of shorthands}
379 \def\bbbl@sh@string#1{%
380   \ifx#1\@empty\else
381     \ifx#1t\string~%
382     \else\ifx#1c\string,%
383     \else\string#1%
384     \fi\fi
385     \expandafter\bbbl@sh@string
386   \fi}
```

```

387 \ifx\bbbl@opt@shorthands\@nnil
388 \def\bbbl@ifshorthand#1#2#3{#2}%
389 \else\ifx\bbbl@opt@shorthands\@empty
390 \def\bbbl@ifshorthand#1#2#3{#3}%
391 \else

```

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

```

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

```

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

```

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

```

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

```

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

```

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

```

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

```

For the option `safe` we use a different approach – `\bbbl@opt@safe` says which macros are redefined (B for bibs and R for refs). By default, both are currently set, but in a future release it will be set to none.

```

412 \ifx\bbbl@opt@safe\@undefined
413 \def\bbbl@opt@safe{BR}
414 % \let\bbbl@opt@safe\@empty % Pending of \cite
415 \fi

```

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

```

416 \bbbl@trace{Defining IfBabelLayout}
417 \ifx\bbbl@opt@layout\@nnil
418 \newcommand\IfBabelLayout[3]{#3}%
419 \else
420 \bbbl@exp{\bbbl@forkv{\@nameuse{@raw@opt@babel.sty}}}{%
421 \in@{, layout, }{, #1, }%
422 \ifin@
423 \def\bbbl@opt@layout{#2}%
424 \bbbl@replace\bbbl@opt@layout{ }{.}%
425 \fi}
426 \newcommand\IfBabelLayout[1]{%
427 \@expandtwoargs\in@{.#1.}{.\bbbl@opt@layout.}%
428 \ifin@
429 \expandafter\@firstoftwo
430 \else
431 \expandafter\@secondoftwo
432 \fi}
433 \fi
434 </package>
435 <*core>

```

3.6 Interlude for Plain

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

```
436 \ifx\ldf@quit\@undefined\else
437 \endinput\fi % Same line!
438 <<Make sure ProvidesFile is defined>>
439 \ProvidesFile{babel.def}[\<<date>>] v\<<version>> Babel common definitions]
440 \ifx\AtBeginDocument\@undefined % TODO. change test.
441 <<Emulate LaTeX>>
442 \fi
443 <<Basic macros>>
```

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

```
444 </core>
445 <*package | core>
```

4 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.

```
446 \def\bb@version{\<<version>>}
447 \def\bb@date{\<<date>>}
448 <<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.

```
449 \def\adddialect#1#2{%
450   \global\chardef#1#2\relax
451   \bb@usehooks{adddialect}{#1}{#2}%
452   \begingroup
453     \count@#1\relax
454     \def\bb@elt##1##2###3###4{%
455       \ifnum\count@=#2\relax
456         \edef\bb@tempa{\expandafter\@gobbletwo\string#1}%
457         \bb@info{Hyphen rules for '\expandafter\@gobble\bb@tempa'
458               set to \expandafter\string\csname l@##1\endcsname\%
459               (\string\language\the\count@). Reported}%
460         \def\bb@elt####1####2####3####4{%
461           \fi}%
462         \bb@cs{languages}%
463       \endgroup}
```

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

```
464 \def\bb@fixname#1{%
465   \begingroup
466     \def\bb@tempe{l@}%
467     \edef\bb@tempd{\noexpand\@ifundefined{\noexpand\bb@tempe#1}}%
468     \bb@tempd
469     {\lowercase\expandafter{\bb@tempd}%
470     {\uppercase\expandafter{\bb@tempd}%
471     \@empty
472     {\edef\bb@tempd{\def\noexpand#1{#1}}%
473     \uppercase\expandafter{\bb@tempd}}}%
```

```

474     {\edef\bbl@tempd{\def\noexpand#1{#1}}%
475     \lowercase\expandafter{\bbl@tempd}}}%
476     \@empty
477     \edef\bbl@tempd{\endgroup\def\noexpand#1{#1}}%
478     \bbl@tempd
479     \bbl@exp{\bbl@usehooks{language}{\language}{#1}}
480 \def\bbl@iflanguage#1{%
481   \ifundefined{l@#1}{\@noanerr{#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`.

```

482 \def\bbl@bcpcase#1#2#3#4\@#5{%
483   \ifx\@empty#3%
484     \uppercase{\def#5{#1#2}}%
485   \else
486     \uppercase{\def#5{#1}}%
487     \lowercase{\edef#5{#5#2#3#4}}%
488   \fi}
489 \def\bbl@bcpllookup#1-#2-#3-#4\@#5{%
490   \let\bbl@bcp\relax
491   \lowercase{\def\bbl@tempa{#1}}%
492   \ifx\@empty#2%
493     \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
494   \else\ifx\@empty#3%
495     \bbl@bcpcase#2\@empty\@empty\@#5\bbl@tempb
496     \IfFileExists{babel-\bbl@tempa-\bbl@tempb.ini}%
497       {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb}}%
498     {}%
499     \ifx\bbl@bcp\relax
500       \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
501     \fi
502   \else
503     \bbl@bcpcase#2\@empty\@empty\@#5\bbl@tempb
504     \bbl@bcpcase#3\@empty\@empty\@#5\bbl@tempc
505     \IfFileExists{babel-\bbl@tempa-\bbl@tempb-\bbl@tempc.ini}%
506       {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb-\bbl@tempc}}%
507     {}%
508     \ifx\bbl@bcp\relax
509       \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
510       {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}%
511     {}%
512     \fi
513     \ifx\bbl@bcp\relax
514       \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
515       {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}%
516     {}%
517     \fi
518     \ifx\bbl@bcp\relax
519       \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
520     \fi
521   \fi\fi}
522 \let\bbl@initoload\relax
523 (-core)
524 \def\bbl@provide@locale{%
525   \ifx\babelprovide\@undefined
526     \bbl@error{base-on-the-fly}{}}}%
527   \fi
528   \let\bbl@auxname\language % Still necessary. TODO
529   \bbl@ifunset{bbl@bcp@map@\language}{}% Move uplevel??
530   {\edef\language{\@nameuse{bbl@bcp@map@\language}}}%

```

```

531 \ifbbl@bcpallowed
532   \expandafter\ifx\csname date\language\endcsname\relax
533     \expandafter
534     \bbl@bcplookup\language-\@empty-\@empty-\@empty\@@
535     \ifx\bbl@bcp\relax\else % Returned by \bbl@bcplookup
536       \edef\language{\bbl@bcp@prefix\bbl@bcp}%
537       \edef\localename{\bbl@bcp@prefix\bbl@bcp}%
538       \expandafter\ifx\csname date\language\endcsname\relax
539         \let\bbl@initoload\bbl@bcp
540         \bbl@exp{\bbl@babelprovide[\bbl@autoload@bcptoptions]{\language}}%
541         \let\bbl@initoload\relax
542       \fi
543       \bbl@csarg\xdef{bcp@map@\bbl@bcp}{\localename}%
544     \fi
545   \fi
546 \fi
547 \expandafter\ifx\csname date\language\endcsname\relax
548   \IfFileExists{babel-\language.tex}%
549   {\bbl@exp{\bbl@babelprovide[\bbl@autoload@options]{\language}}}%
550   {}%
551 \fi}
552 (+core)

```

`\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.

```

553 \def\iflanguage#1{%
554   \bbl@iflanguage{#1}%
555   \ifnum\csname l@#1\endcsname=\language
556     \expandafter\@firstoftwo
557   \else
558     \expandafter\@secondoftwo
559   \fi}}

```

4.1 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.

```

560 \let\bbl@select@type\z@
561 \edef\selectlanguage{%
562   \noexpand\protect
563   \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`.

```

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

```

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

```

565 \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.

```
566 \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`

```
567 \def\bbl@push@language{%
568   \ifx\languagename\undefined\else
569     \ifx\currentgrouplevel\undefined
570       \xdef\bbl@language@stack{\languagename+\bbl@language@stack}%
571     \else
572       \ifnum\currentgrouplevel=\z@
573         \xdef\bbl@language@stack{\languagename+}%
574       \else
575         \xdef\bbl@language@stack{\languagename+\bbl@language@stack}%
576       \fi
577     \fi
578   \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 `\languagename`. For this we first define a helper function.

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

```
579 \def\bbl@pop@lang#1+#2\@@{%
580   \edef\languagename{#1}%
581   \xdef\bbl@language@stack{#2}}
```

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

```
582 \let\bbl@ifrestoring\@secondoftwo
583 \def\bbl@pop@language{%
584   \expandafter\bbl@pop@lang\bbl@language@stack\@@
585   \let\bbl@ifrestoring\@firstoftwo
586   \expandafter\bbl@set@language\expandafter{\languagename}%
587   \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).

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

```

602     }%
603     \fi}%
604     }%
605     \chardef\localeid\bbl@c{l{id@}}

```

The unprotected part of `\selectlanguage`. In case it is used as environment, declare `\endselectlanguage`, just for safety.

```

606 \expandafter\def\csname selectlanguage \endcsname#1{%
607   \ifnum\bbl@hymapsel=\@cclv\let\bbl@hymapsel\tw@\fi
608   \bbl@push@language
609   \aftergroup\bbl@pop@language
610   \bbl@set@language{#1}}
611 \let\endselectlanguage\relax

```

`\bbl@set@language` The macro `\bbl@set@language` takes care of switching the language environment *and* of writing entries on the auxiliary files. For historical reasons, language names can be either language of `\language`. To catch either form a trick is used, but unfortunately as a side effect the catcodes of letters in `\language` are messed up. This is a bug, but preserved for backwards compatibility. The list of auxiliary files can be extended by redefining `\BabelContentsFiles`, but make sure they are loaded inside a group (as `aux`, `toc`, `lof`, and `lot` do) or the last language of the document will remain active afterwards.

We also write a command to change the current language in the auxiliary files. `\bbl@savelastskip` is used to deal with skips before the write whatsit (as suggested by U Fischer). Adapted from `hyperref`, but it might fail, so I'll consider it a temporary hack, while I study other options (the ideal, but very likely unfeasible except perhaps in `luatex`, is to avoid the `\write` altogether when not needed).

```

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

```

```

649 \fi}
650 %
651 \let\bbl@restorelastskip\relax
652 \let\bbl@savelastskip\relax
653 %
654 \newif\ifbbl@bcppallowed
655 \bbl@bcppallowedfalse
656 \def\select@language#1{% from set@, babel@aux
657 \ifx\bbl@selectorname\empty
658 \def\bbl@selectorname{select}%
659 % set hymap
660 \fi
661 \ifnum\bbl@hymapsel=\cclv\chardef\bbl@hymapsel4\relax\fi
662 % set name
663 \edef\language#1}%
664 \bbl@fixname\language
665 % TODO. name@map must be here?
666 \bbl@provide@locale
667 \bbl@iflanguage\language{%
668 \let\bbl@select@type\z@
669 \expandafter\bbl@switch\expandafter{\language}}
670 \def\babel@aux#1#2{%
671 \select@language{#1}%
672 \bbl@foreach\BabelContentsFiles{% \relax -> don't assume vertical mode
673 \@writefile{##1}{\babel@toc{#1}{#2}\relax}}% TODO - plain?
674 \def\babel@toc#1#2{%
675 \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 `\select language`, 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.

No text is supposed to be added with switching captions and date, so we remove any spurious spaces with `\bbl@bsphack` and `\bbl@esphack`.

```

676 \newif\ifbbl@usedategroup
677 \let\bbl@savedextras\empty
678 \def\bbl@switch#1{% from select@, foreign@
679 % make sure there is info for the language if so requested
680 \bbl@ensureinfo{#1}%
681 % restore
682 \originalTeX
683 \expandafter\def\expandafter\originalTeX\expandafter{%
684 \csname noextras#1\endcsname
685 \let\originalTeX\empty
686 \babel@beginsave}%
687 \bbl@usehooks{afterreset}}%
688 \languageshorthands{none}%
689 % set the locale id
690 \bbl@id@assign
691 % switch captions, date
692 \bbl@bsphack
693 \ifcase\bbl@select@type
694 \csname captions#1\endcsname\relax
695 \csname date#1\endcsname\relax
696 \else

```

```

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

```

```

760 \csname #1hyphenmins\endcsname\relax
761 \fi
762 % reset selector name
763 \let\bbbl@selectorname\@empty}

```

`otherlanguage (env.)` The `otherlanguage` environment can be used as an alternative to using the `\selectlanguage` declarative command. The `\ignorespaces` command is necessary to hide the environment when it is entered in horizontal mode.

```

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

```

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

```

769 \long\def\endotherlanguage{\@ignoretrue\ignorespaces}

```

`otherlanguage* (env.)` 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`.

```

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

```

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

```

777 \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`.

`\bbbl@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`.

```

778 \providecommand\bbbl@beforeforeign{}
779 \edef\foreignlanguage{%
780 \noexpand\protect
781 \expandafter\noexpand\csname foreignlanguage \endcsname}
782 \expandafter\def\csname foreignlanguage \endcsname{%
783 \@ifstar\bbbl@foreign@s\bbbl@foreign@x}
784 \providecommand\bbbl@foreign@x[3][]{%
785 \beginngroup
786 \def\bbbl@selectorname{foreign}%

```

```

787 \def\bbl@select@opts{#1}%
788 \let\BabelText\@firstofone
789 \bbl@beforeforeign
790 \foreign@language{#2}%
791 \bbl@usehooks{foreign}{}%
792 \BabelText{#3}% Now in horizontal mode!
793 \endgroup}
794 \def\bbl@foreign@s#1#2{% TODO - \shapemode, \@setpar, ?\@@par
795 \begingroup
796 {\par}%
797 \def\bbl@selectorname{foreign*}%
798 \let\bbl@select@opts\@empty
799 \let\BabelText\@firstofone
800 \foreign@language{#1}%
801 \bbl@usehooks{foreign*}{}%
802 \bbl@dirparastext
803 \BabelText{#2}% Still in vertical mode!
804 {\par}%
805 \endgroup}

```

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

```

806 \def\foreign@language#1{%
807 % set name
808 \edef\languagename{#1}%
809 \ifbbl@usedategroup
810 \bbl@add\bbl@select@opts{,date,}%
811 \bbl@usedategroupfalse
812 \fi
813 \bbl@fixname\languagename
814 % TODO. name@map here?
815 \bbl@provide@locale
816 \bbl@iflanguage\languagename{%
817 \let\bbl@select@type\@ne
818 \expandafter\bbl@switch\expandafter{\languagename}}

```

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

```

819 \def\IfBabelSelectorTF#1{%
820 \bbl@xin@{,\bbl@selectorname,}{,\zap@space#1 \@empty,}%
821 \ifin@
822 \expandafter\@firstoftwo
823 \else
824 \expandafter\@secondoftwo
825 \fi}

```

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

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

```

826 \let\bbl@hyphlist\@empty
827 \let\bbl@hyphenation@relax
828 \let\bbl@pttnlist\@empty
829 \let\bbl@patterns@relax
830 \let\bbl@hymapsel=\@cclv
831 \def\bbl@patterns#1{%
832 \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
833 \csname l@#1\endcsname
834 \edef\bbl@tempa{#1}%

```

```

835 \else
836 \csname l@#1:\f@encoding\endcsname
837 \edef\bbl@tempa{#1:\f@encoding}%
838 \fi
839 \@expandtwoargs\bbl@usehooks{patterns}{{#1}{\bbl@tempa}}%
840 % > luatex
841 \@ifundefined{bbl@hyphenation@}{}{% Can be \relax!
842 \begingroup
843 \bbl@xin@{,\number\language,}{,\bbl@hyphlist}%
844 \ifin@else
845 \@expandtwoargs\bbl@usehooks{hyphenation}{{#1}{\bbl@tempa}}%
846 \hyphenation{%
847 \bbl@hyphenation@
848 \@ifundefined{bbl@hyphenation@#1}%
849 \@empty
850 { \space\csname bbl@hyphenation@#1\endcsname}}%
851 \xdef\bbl@hyphlist{\bbl@hyphlist\number\language,}%
852 \fi
853 \endgroup}}

```

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

```

854 \def\hyphenrules#1{%
855 \edef\bbl@tempf{#1}%
856 \bbl@fixname\bbl@tempf
857 \bbl@iflanguage\bbl@tempf{%
858 \expandafter\bbl@patterns\expandafter{\bbl@tempf}%
859 \ifx\languageshorthands@undefined\else
860 \languageshorthands{none}%
861 \fi
862 \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
863 \set@hyphenmins\tw@\thr@@\relax
864 \else
865 \expandafter\expandafter\expandafter\set@hyphenmins
866 \csname\bbl@tempf hyphenmins\endcsname\relax
867 \fi}}
868 \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.

```

869 \def\providehyphenmins#1#2{%
870 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
871 \@namedef{#1hyphenmins}{#2}%
872 \fi}

```

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

```

873 \def\set@hyphenmins#1#2{%
874 \lefthyphenmin#1\relax
875 \righthyphenmin#2\relax}

```

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

```

876 \ifx\ProvidesFile\undefined
877 \def\ProvidesLanguage#1[#2 #3 #4]{%
878 \wlog{Language: #1 #4 #3 <#2>}%
879 }

```

```

880 \else
881 \def\ProvidesLanguage#1{%
882 \begingroup
883 \catcode\ 10 %
884 \makeother\/%
885 \ifnextchar[%
886 {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}]
887 \def\@provideslanguage#1[#2]{%
888 \wlog{Language: #1 #2}%
889 \expandafter\xdef\csname ver@#1.ldf\endcsname{#2}%
890 \endgroup}
891 \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`.

```
892 \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.

```
893 \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’:

```

894 \providecommand\setlocale{\bbl@error{not-yet-available}}{}{}
895 \let\uselocale\setlocale
896 \let\locale\setlocale
897 \let\selectlocale\setlocale
898 \let\textlocale\setlocale
899 \let\textlanguage\setlocale
900 \let\languagegettext\setlocale

```

4.2 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.

```

901 \edef\bbl@nulllanguage{\string\language=0}
902 \def\bbl@nocaption{\protect\bbl@nocaption@i}
903 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
904 \global\@namedef{#2}{\textbf{?#1?}}%
905 \@nameuse{#2}%
906 \edef\bbl@tempa{#1}%
907 \bbl@sreplace\bbl@tempa{name}}}%
908 \bbl@warning{%
909 \@backslashchar#1 not set for '\language'. Please,\\%
910 define it after the language has been loaded\\%
911 (typically in the preamble) with:\\%
912 \string\setlocalecaption{\language}{\bbl@tempa}{.}\\%
913 Feel free to contribute on github.com/latex3/babel.\\%
914 Reported}}
915 \def\bbl@tentative{\protect\bbl@tentative@i}
916 \def\bbl@tentative@i#1{%
917 \bbl@warning{%
918 Some functions for '#1' are tentative.\\%
919 They might not work as expected and their behavior\\%
920 could change in the future.\\%

```



```

921   Reported}}
922 \def\@nolanerr#1{\bbl@error{undefined-language}{#1}{}}
923 \def\@nopatterns#1{%
924   \bbl@warning
925   {No hyphenation patterns were preloaded for\%
926    the language '#1' into the format.\%
927    Please, configure your TeX system to add them and\%
928    rebuild the format. Now I will use the patterns\%
929    preloaded for \bbl@nulllanguage\space instead}}
930 \let\bbl@usehooks\@gobbletwo
931 \ifx\bbl@onlyswitch\@empty\endinput\fi
932 % Here ended switch.def

```

Here ended the now discarded switch.def. Here also (currently) ends the base option.

```

933 \ifx\directlua\undefined\else
934   \ifx\bbl@luapatterns\undefined
935     \input luababel.def
936   \fi
937 \fi
938 \bbl@trace{Compatibility with language.def}
939 \ifx\bbl@languages\undefined
940   \ifx\directlua\undefined
941     \openin1 = language.def % TODO. Remove hardcoded number
942     \ifeof1
943       \closein1
944       \message{I couldn't find the file language.def}
945     \else
946       \closein1
947       \begingroup
948         \def\addlanguage#1#2#3#4#5{%
949           \expandafter\ifx\csname lang@#1\endcsname\relax\else
950             \global\expandafter\let\csname l@#1\expandafter\endcsname
951             \csname lang@#1\endcsname
952           \fi}%
953         \def\uselanguage#1{%
954           \input language.def
955         \endgroup
956       \fi
957     \fi
958   \chardef\l@english\z@
959 \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.

```

960 \def\addto#1#2{%
961   \ifx#1\undefined
962     \def#1{#2}%
963   \else
964     \ifx#1\relax
965       \def#1{#2}%
966     \else
967       {\toks@\expandafter{#1#2}%
968        \xdef#1{\the\toks@}}%
969     \fi
970   \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.

```

971 \def\bbl@withactive#1#2{%
972   \begingroup

```

```

973 \lccode`~=#2\relax
974 \lowercase{\endgroup#1~}}

```

`\bbl@redefine` To redefine a command, we save the old meaning of the macro. Then we redefine it to call the original macro with the ‘sanitized’ argument. The reason why we do it this way is that we don’t want to redefine the \TeX macros completely in case their definitions change (they have changed in the past). A macro named `\macro` will be saved new control sequences named `\org@macro`.

```

975 \def\bbl@redefine#1{%
976 \edef\bbl@tempa{\bbl@stripslash#1}%
977 \expandafter\let\csname org@\bbl@tempa\endcsname#1%
978 \expandafter\def\csname\bbl@tempa\endcsname}
979 \@onlypreamble\bbl@redefine

```

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

```

980 \def\bbl@redefine@long#1{%
981 \edef\bbl@tempa{\bbl@stripslash#1}%
982 \expandafter\let\csname org@\bbl@tempa\endcsname#1%
983 \long\expandafter\def\csname\bbl@tempa\endcsname}
984 \@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_`.

```

985 \def\bbl@redefineroobust#1{%
986 \edef\bbl@tempa{\bbl@stripslash#1}%
987 \bbl@ifunset{\bbl@tempa\space}%
988   {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
989     \bbl@exp{\def\#1{\protect\<\bbl@tempa\space>}}}%
990   {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}}%
991   \@namedef{\bbl@tempa\space}}
992 \@onlypreamble\bbl@redefineroobust

```

4.3 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.

```

993 \bbl@trace{Hooks}
994 \newcommand\AddBabelHook[3][[]]{%
995 \bbl@ifunset{\bbl@hk@#2}{\EnableBabelHook{#2}}}%
996 \def\bbl@tempa##1,##2,##3\@empty{\def\bbl@tempb{##2}}%
997 \expandafter\bbl@tempa\bbl@evargs,##3=,\@empty
998 \bbl@ifunset{\bbl@ev@#2@#3@#1}%
999   {\bbl@csarg\bbl@add{ev@#3@#1}{\bbl@elth{#2}}}%
1000   {\bbl@csarg\let{ev@#2@#3@#1}\relax}%
1001 \bbl@csarg\newcommand{ev@#2@#3@#1}{\bbl@tempb}}
1002 \newcommand\EnableBabelHook[1]{\bbl@csarg\let{hk@#1}\@firstofone}
1003 \newcommand\DisableBabelHook[1]{\bbl@csarg\let{hk@#1}\@gobble}
1004 \def\bbl@usehooks{\bbl@usehooks@lang\languagename}
1005 \def\bbl@usehooks@lang#1#2#3{% Test for Plain
1006 \ifx\UseHook\undefined\else\UseHook{babel/*/#2}\fi
1007 \def\bbl@elth##1{%
1008 \bbl@cs{hk@##1}{\bbl@cs{ev@##1@#2@#3}}}%
1009 \bbl@cs{ev@#2@#3}%
1010 \ifx\languagename\undefined\else % Test required for Plain (?)
1011 \ifx\UseHook\undefined\else\UseHook{babel/#1/#2}\fi
1012 \def\bbl@elth##1{%
1013 \bbl@cs{hk@##1}{\bbl@cs{ev@##1@#2@#1@#3}}}%
1014 \bbl@cs{ev@#2@#1}%
1015 \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).

```

1016 \def\bbl@evargs{,% <- don't delete this comma
1017   everylanguage=1,loadkernel=1,loadpatterns=1,loadexceptions=1,%
1018   adddialect=2,patterns=2,defaultcommands=0,encodedcommands=2,write=0,%
1019   beforeextras=0,afterextras=0,stopcommands=0,stringprocess=0,%
1020   hyphenation=2,initiateactive=3,afterreset=0,foreign=0,foreign*=0,%
1021   beforestart=0,language=2,begindocument=1}
1022 \ifx\NewHook\@undefined\else % Test for Plain (?)
1023   \def\bbl@tempa#1=#2\@{\NewHook{babel/#1}}
1024   \bbl@foreach\bbl@evargs{\bbl@tempa#1\@}
1025 \fi

```

`\babelensure` The user command just parses the optional argument and creates a new macro named `\bbl@e@<language>`. We register a hook at the `afterextras` event which just executes this macro in a “complete” selection (which, if undefined, is `\relax` and does nothing). This part is somewhat involved because we have to make sure things are expanded the correct number of times. The macro `\bbl@e@<language>` contains `\bbl@ensure{<include>}{<exclude>}{<fontenc>}`, which in turn loops over the macros names in `\bbl@captionslist`, excluding (with the help of `\in@`) those in the exclude list. If the fontenc is given (and not `\relax`), the `\fontencoding` is also added. Then we loop over the include list, but if the macro already contains `\foreignlanguage`, nothing is done. Note this macro (1) is not restricted to the preamble, and (2) changes are local.

```

1026 \bbl@trace{Defining babelensure}
1027 \newcommand\babelensure[2][]{%
1028   \AddBabelHook{babel-ensure}{afterextras}{%
1029     \ifcase\bbl@select@type
1030       \bbl@cl{e}%
1031     \fi}%
1032   \begingroup
1033     \let\bbl@ens@include\@empty
1034     \let\bbl@ens@exclude\@empty
1035     \def\bbl@ens@fontenc{\relax}%
1036     \def\bbl@tempb##1{%
1037       \ifx\@empty##1\else\noexpand##1\expandafter\bbl@tempb\fi}%
1038     \edef\bbl@tempa{\bbl@tempb#1\@empty}%
1039     \def\bbl@tempb##1=##2\@{\@namedef{\bbl@ens@##1}{##2}}%
1040     \bbl@foreach\bbl@tempa{\bbl@tempb##1\@}%
1041     \def\bbl@tempc{\bbl@ensure}%
1042     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1043       \expandafter{\bbl@ens@include}}%
1044     \expandafter\bbl@add\expandafter\bbl@tempc\expandafter{%
1045       \expandafter{\bbl@ens@exclude}}%
1046     \toks@\expandafter{\bbl@tempc}%
1047     \bbl@exp{%
1048   \endgroup
1049   \def\<bbl@e@#2>{\the\toks@{\bbl@ens@fontenc}}}}
1050 \def\bbl@ensure#1#2#3% 1: include 2: exclude 3: fontenc
1051 \def\bbl@tempb##1% elt for (excluding) \bbl@captionslist list
1052 \ifx##1\@undefined % 3.32 - Don't assume the macro exists
1053   \edef##1{\noexpand\bbl@nocaption
1054     {\bbl@stripslash##1}{\language\bbl@stripslash##1}}%
1055   \fi
1056   \ifx##1\@empty\else
1057     \in@{##1}{#2}%
1058     \ifin\@else
1059       \bbl@ifunset{\bbl@ensure@\language}%
1060       {\bbl@exp{%
1061         \\DeclareRobustCommand\<bbl@ensure@\language>[1]{%
1062           \\foreignlanguage{\language}%
1063           {\ifx\relax#3\else
1064             \\fontencoding{#3}\\selectfont
1065           \fi

```

```

1066         #####1}}}%
1067     {}%
1068     \toks@\expandafter{##1}%
1069     \edef##1{%
1070         \bbl@csarg\noexpand{ensure@\language}%
1071         {\the\toks@}}%
1072     \fi
1073     \expandafter\bbl@tempb
1074     \fi}%
1075 \expandafter\bbl@tempb\bbl@captionslist\today\@empty
1076 \def\bbl@tempa##1{% elt for include list
1077     \ifx##1\@empty\else
1078         \bbl@csarg\in@{ensure@\language\expandafter}\expandafter{##1}%
1079         \ifin\@else
1080             \bbl@tempb##1\@empty
1081         \fi
1082         \expandafter\bbl@tempa
1083     \fi}%
1084 \bbl@tempa#1\@empty}
1085 \def\bbl@captionslist{%
1086     \prefacename\refname\abstractname\bibname\chaptername\appendixname
1087     \contentsname\listfigurename\listtablename\indexname\figurename
1088     \tablename\partname\enclname\ccname\headtoname\pagename\seename
1089     \alsoname\proofname\glossaryname}

```

4.4 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`.

```

1090 \bbl@trace{Macros for setting language files up}
1091 \def\bbl@ldfinit{%
1092     \let\bbl@screset\@empty
1093     \let\BabelStrings\bbl@opt@string
1094     \let\BabelOptions\@empty
1095     \let\BabelLanguages\relax
1096     \ifx\originalTeX\undefined
1097         \let\originalTeX\@empty
1098     \else
1099         \originalTeX
1100     \fi}
1101 \def\LdfInit#1#2{%
1102     \chardef\atcatcode=\catcode`\@
1103     \catcode`\@=11\relax
1104     \chardef\eqcatcode=\catcode`\=
1105     \catcode`\==12\relax
1106     \expandafter\if\expandafter\@backslashchar
1107         \expandafter\@car\string#2\@nil

```

```

1108 \ifx#2\undefined\else
1109 \ldf@quit{#1}%
1110 \fi
1111 \else
1112 \expandafter\ifx\csname#2\endcsname\relax\else
1113 \ldf@quit{#1}%
1114 \fi
1115 \fi
1116 \bbl@ldfinit}

```

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

```

1117 \def\ldf@quit#1{%
1118 \expandafter\main@language\expandafter{#1}%
1119 \catcode`\@=\atcatcode \let\atcatcode\relax
1120 \catcode`\==\eqcatcode \let\eqcatcode\relax
1121 \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.

```

1122 \def\bbl@afterldf#1{% TODO. Merge into the next macro? Unused elsewhere
1123 \bbl@afterlang
1124 \let\bbl@afterlang\relax
1125 \let\BabelModifiers\relax
1126 \let\bbl@screset\relax}%
1127 \def\ldf@finish#1{%
1128 \loadlocalcfg{#1}%
1129 \bbl@afterldf{#1}%
1130 \expandafter\main@language\expandafter{#1}%
1131 \catcode`\@=\atcatcode \let\atcatcode\relax
1132 \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 `LTEX`.

```

1133 \@onlypreamble\LdfInit
1134 \@onlypreamble\ldf@quit
1135 \@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.

```

1136 \def\main@language#1{%
1137 \def\bbl@main@language{#1}%
1138 \let\languagename\bbl@main@language % TODO. Set localename
1139 \bbl@id@assign
1140 \bbl@patterns{\languagename}}

```

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`.

```

1141 \def\bbl@beforestart{%
1142 \def\@nolanerr##1{%
1143 \bbl@warning{Undefined language '##1' in aux.\\Reported}}%
1144 \bbl@usehooks{beforestart}{}%
1145 \global\let\bbl@beforestart\relax}
1146 \AtBeginDocument{%
1147 {\@nameuse{bbl@beforestart}}% Group!
1148 \if@filesw
1149 \providecommand\babel@aux[2]{}%
1150 \immediate\write\@mainaux{%
1151 \string\providecommand\string\babel@aux[2]{}%

```

```

1152 \immediate\write\@mainaux{\string\@nameuse{bbl@beforestart}}%
1153 \fi
1154 \expandafter\selectlanguage\expandafter{\bbl@main@language}%
1155 (-core)
1156 \ifx\bbl@normalsf\@empty
1157 \ifnum\sfcodes\@.=\@m
1158 \let\normalsfcodes\frenchspacing
1159 \else
1160 \let\normalsfcodes\nonfrenchspacing
1161 \fi
1162 \else
1163 \let\normalsfcodes\bbl@normalsf
1164 \fi
1165 (+core)
1166 \ifbbl@single % must go after the line above.
1167 \renewcommand\selectlanguage[1]{%
1168 \renewcommand\foreignlanguage[2]{#2}%
1169 \global\let\babel@aux\@gobbletwo % Also as flag
1170 \fi}
1171 (-core)
1172 \AddToHook{begindocument/before}{%
1173 \let\bbl@normalsf\normalsfcodes
1174 \let\normalsfcodes\relax} % Hack, to delay the setting
1175 (+core)
1176 \ifcase\bbl@engine\or
1177 \AtBeginDocument{\pagedir\bodydir} % TODO - a better place
1178 \fi

```

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

```

1179 \def\select@language@x#1{%
1180 \ifcase\bbl@select@type
1181 \bbl@ifsamestring\languagename{#1}{\select@language{#1}}%
1182 \else
1183 \select@language{#1}%
1184 \fi}

```

4.5 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.

```

1185 \bbl@trace{Shorhands}
1186 \def\bbl@add@special#1{% l:a macro like \, \?, etc.
1187 \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
1188 \bbl@ifunset{@sanitize}{\bbl@add\@sanitize{\@makeother#1}}%
1189 \ifx\nfss@catcodes\undefined\else % TODO - same for above
1190 \beginingroup
1191 \catcode`#1\active
1192 \nfss@catcodes
1193 \ifnum\catcode`#1=\active
1194 \endgroup
1195 \bbl@add\nfss@catcodes{\@makeother#1}%
1196 \else
1197 \endgroup
1198 \fi
1199 \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.

```

1200 \def\bbl@remove@special#1{%
1201   \begingroup
1202     \def\x##1##2{\ifnum`#1=`##2\noexpand\empty
1203       \else\noexpand##1\noexpand##2\fi}%
1204     \def\do{\x\do}%
1205     \def\@makeother{\x\@makeother}%
1206   \edef\x{\endgroup
1207     \def\noexpand\dospecials{\dospecials}%
1208     \expandafter\ifx\csname @sanitize\endcsname\relax\else
1209       \def\noexpand\@sanitize{\@sanitize}%
1210     \fi}%
1211   \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).

```

1212 \def\bbl@active@def#1#2#3#4{%
1213   \@namedef{#3#1}{%
1214     \expandafter\ifx\csname#2@sh@#1\endcsname\relax
1215       \bbl@afterelse\bbl@sh@select#2#1{#3@arg#1}{#4#1}%
1216     \else
1217       \bbl@afterfi\csname#2@sh@#1\endcsname
1218     \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.

```

1219   \long\@namedef{#3@arg#1}##1{%
1220     \expandafter\ifx\csname#2@sh@#1\string##1\endcsname\relax
1221       \bbl@afterelse\csname#4#1\endcsname##1%
1222     \else
1223       \bbl@afterfi\csname#2@sh@#1\string##1\endcsname
1224     \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.

```

1225 \def\initiate@active@char#1{%
1226   \bbl@ifunset{active@char\string#1}%
1227   {\bbl@withactive
1228     {\expandafter\@initiate@active@char\expandafter}#1\string#1#1}%
1229   {}}

```

The very first thing to do is saving the original catcode and the original definition, even if not active, which is possible (undefined characters require a special treatment to avoid making them `\relax` and preserving some degree of protection).

```

1230 \def\@initiate@active@char#1#2#3{%
1231   \bbl@csarg\edef{oricat#2}{\catcode`#2=\the\catcode`#2\relax}%
1232   \ifx#1\undefined

```

```

1233   \bbl@csarg\def{oridef@#2}{\def#1{\active@prefix#1\undefined}}%
1234   \else
1235     \bbl@csarg\let{oridef@#2}#1%
1236     \bbl@csarg\edef{oridef@#2}{%
1237       \let\noexpand#1%
1238       \expandafter\noexpand\csname bbl@oridef@#2\endcsname}%
1239   \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`).

```

1240   \ifx#1#3\relax
1241     \expandafter\let\csname normal@char#2\endcsname#3%
1242   \else
1243     \bbl@info{Making #2 an active character}%
1244     \ifnum\mathcode`#2=\ifodd\bbl@engine"1000000 \else"8000 \fi
1245     \namedef{normal@char#2}{%
1246       \textormath{#3}{\csname bbl@oridef@#2\endcsname}}%
1247   \else
1248     \namedef{normal@char#2}{#3}%
1249   \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).

```

1250   \bbl@restoreactive{#2}%
1251   \AtBeginDocument{%
1252     \catcode`#2\active
1253     \if@filesw
1254       \immediate\write\@mainaux{\catcode`\string#2\active}%
1255     \fi}%
1256   \expandafter\bbl@add@special\csname#2\endcsname
1257   \catcode`#2\active
1258   \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⟩`).

```

1259   \let\bbl@tempa\@firstoftwo
1260   \if\string^#2%
1261     \def\bbl@tempa{\noexpand\textormath}%
1262   \else
1263     \ifx\bbl@mathnormal\@undefined\else
1264       \let\bbl@tempa\bbl@mathnormal
1265     \fi
1266   \fi
1267   \expandafter\edef\csname active@char#2\endcsname{%
1268     \bbl@tempa
1269     {\noexpand\if@safe@actives
1270       \noexpand\expandafter
1271       \expandafter\noexpand\csname normal@char#2\endcsname
1272     \noexpand\else
1273       \noexpand\expandafter
1274       \expandafter\noexpand\csname bbl@doactive#2\endcsname
1275     \noexpand\fi}%
1276   {\expandafter\noexpand\csname normal@char#2\endcsname}}%
1277   \bbl@csarg\edef{doactive#2}{%

```



```
1278 \expandafter\noexpand\csname user@active#2\endcsname}%
```

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

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

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

```
1279 \bbl@csarg\edef{active@#2}{%
1280 \noexpand\active@prefix\noexpand#1%
1281 \expandafter\noexpand\csname active@char#2\endcsname}%
1282 \bbl@csarg\edef{normal@#2}{%
1283 \noexpand\active@prefix\noexpand#1%
1284 \expandafter\noexpand\csname normal@char#2\endcsname}%
1285 \bbl@ncarg\let#1{\bbl@normal@#2}%
```

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.

```
1286 \bbl@active@def#2\user@group{user@active}{language@active}%
1287 \bbl@active@def#2\language@group{language@active}{system@active}%
1288 \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 $\text{T}_\text{E}\text{X}$ would see $\backslash\text{protect}'\backslash\text{protect}'$. To prevent this from happening a couple of shorthand needs to be defined at user level.

```
1289 \expandafter\edef\csname\user@group @sh#2@\endcsname
1290 {\expandafter\noexpand\csname normal@char#2\endcsname}%
1291 \expandafter\edef\csname\user@group @sh#2@\string\protect@\endcsname
1292 {\expandafter\noexpand\csname user@active#2\endcsname}%
```

Finally, a couple of special cases are taken care of. (1) If we are making the right quote (') active we need to change $\backslash\text{pr@ms}$ 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.

```
1293 \if\string'#2%
1294 \let\prim@s\bbl@prim@s
1295 \let\active@math@prime#1%
1296 \fi
1297 \bbl@usehooks{initiateactive}{{#1}{#2}{#3}}
```

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

```
1298 <<{*More package options}>> \equiv
1299 \DeclareOption{math=active}{}
1300 \DeclareOption{math=normal}{\def\bbl@mathnormal{\noexpand\textormath}}
1301 <</More package options>>
```

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

```
1302 \@ifpackagewith{babel}{KeepShorthandsActive}%
1303 {\let\bbl@restoreactive\@gobble}%
1304 {\def\bbl@restoreactive#1{%
1305 \bbl@exp{%
1306 \\\AfterBabelLanguage\\\CurrentOption
1307 {\catcode`#1=\the\catcode`#1\relax}%
1308 \\\AtEndOfPackage
1309 {\catcode`#1=\the\catcode`#1\relax}}}%
1310 \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.

```

1311 \def\bbl@sh@select#1#2{%
1312   \expandafter\ifx\csname#1@sh@#2@sel\endcsname\relax
1313   \bbl@afterelse\bbl@scndcs
1314   \else
1315   \bbl@afterfi\csname#1@sh@#2@sel\endcsname
1316   \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.

```

1317 \begingroup
1318 \bbl@ifunset{ifincsname}% TODO. Ugly. Correct? Only Plain?
1319 {\gdef\active@prefix#1{%
1320   \ifx\protect\@typeset@protect
1321   \else
1322   \ifx\protect\@unexpandable@protect
1323   \noexpand#1%
1324   \else
1325   \protect#1%
1326   \fi
1327   \expandafter\@gobble
1328   \fi}}
1329 {\gdef\active@prefix#1{%
1330   \ifincsname
1331   \string#1%
1332   \expandafter\@gobble
1333   \else
1334   \ifx\protect\@typeset@protect
1335   \else
1336   \ifx\protect\@unexpandable@protect
1337   \noexpand#1%
1338   \else
1339   \protect#1%
1340   \fi
1341   \expandafter\expandafter\expandafter\@gobble
1342   \fi
1343   \fi}}
1344 \endgroup

```

`\if@safe@actives` In some circumstances it is necessary to be able to reset the shorthand to its ‘normal’ value (usually the character with catcode ‘other’) 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>`. When this expansion mode is active (with `\@safe@activestrue`), something like `"13"13` becomes `"12"12` in an `\edef` (in other words, shorthands are `\string'ed`). This contrasts with `\protected@edef`, where catcodes are always left unchanged. Once converted, they can be used safely even after this expansion mode is deactivated (with `\@safe@activesfalse`).

```

1345 \newif\if@safe@actives
1346 \@safe@activesfalse

```

`\bbl@restore@actives` When the output routine kicks in while the active characters were made “safe” this must be undone in the headers to prevent unexpected typeset results. For this situation we define a command to make them “unsafe” again.

```

1347 \def\bbl@restore@actives{\if@safe@actives\@safe@activesfalse\fi}

```

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

```

1348 \chardef\bbl@activated\z@
1349 \def\bbl@activate#1{%
1350   \chardef\bbl@activated\@ne
1351   \bbl@withactive{\expandafter\let\expandafter}#1%
1352     \csname bbl@active@\string#1\endcsname}
1353 \def\bbl@deactivate#1{%
1354   \chardef\bbl@activated\tw@
1355   \bbl@withactive{\expandafter\let\expandafter}#1%
1356     \csname bbl@normal@\string#1\endcsname}

```

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

```

\bbl@scndcs 1357 \def\bbl@firstcs#1#2{\csname#1\endcsname}
1358 \def\bbl@scndcs#1#2{\csname#2\endcsname}

```

`\declare@shorthand` The command `\declare@shorthand` is used to declare a shorthand on a certain level. It takes three arguments:

1. a name for the collection of shorthands, i.e. ‘system’, or ‘dutch’;
2. the character (sequence) that makes up the shorthand, i.e. `~` or `"a`;
3. the code to be executed when the shorthand is encountered.

The auxiliary macro `\babel@texpdf` improves the interoperativity with `hyperref` and takes 4 arguments: (1) The \TeX code in text mode, (2) the string for `hyperref`, (3) the \TeX code in math mode, and (4), which is currently ignored, but it’s meant for a string in math mode, like a minus sign instead of an hyphen (currently `hyperref` doesn’t discriminate the mode). This macro may be used in `ldf` files.

```

1359 \def\babel@texpdf#1#2#3#4{%
1360   \ifx\texorpdfstring\@undefined
1361     \textormath{#1}{#3}%
1362   \else
1363     \texorpdfstring{\textormath{#1}{#3}}{#2}%
1364     % \texorpdfstring{\textormath{#1}{#3}}{\textormath{#2}{#4}}%
1365   \fi}
1366 %
1367 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
1368 \def\@decl@short#1#2#3\@nil#4{%
1369   \def\bbl@tempa{#3}%
1370   \ifx\bbl@tempa\@empty
1371     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
1372     \bbl@ifunset{#1@sh@\string#2@}{}%
1373     {\def\bbl@tempa{#4}%
1374       \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbl@tempa
1375         \else
1376           \bbl@info
1377             {Redefining #1 shorthand \string#2\%
1378              in language \CurrentOption}%
1379         \fi}%
1380     \@namedef{#1@sh@\string#2@}{#4}%
1381   \else
1382     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@firstcs
1383     \bbl@ifunset{#1@sh@\string#2@\string#3@}{}%
1384     {\def\bbl@tempa{#4}%
1385       \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bbl@tempa
1386         \else
1387           \bbl@info
1388             {Redefining #1 shorthand \string#2\string#3\%
1389              in language \CurrentOption}%
1390         \fi}%
1391     \@namedef{#1@sh@\string#2@\string#3@}{#4}%
1392   \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.

```

1393 \def\textormath{%
1394   \ifmmode
1395     \expandafter\@secondoftwo
1396   \else
1397     \expandafter\@firstoftwo
1398   \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 `\language@group` group ‘english’ and have a system group called ‘system’.

```

1399 \def\user@group{user}
1400 \def\language@group{english} % TODO. I don't like defaults
1401 \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.

```

1402 \def\useshorthands{%
1403   \@ifstar\bb@usesh@s{\bb@usesh@x{}}
1404 \def\bb@usesh@s#1{%
1405   \bb@usesh@x
1406   {\AddBabelHook{babel-sh-\string#1}{afterextras}{\bb@activate{#1}}}%
1407   {#1}}
1408 \def\bb@usesh@x#1#2{%
1409   \bb@ifshorthand{#2}%
1410   {\def\user@group{user}%
1411     \initiate@active@char{#2}%
1412     #1%
1413     \bb@activate{#2}}%
1414   {\bb@error{shorthand-is-off}{#2}{}}}

```

`\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 `\bb@set@user@generic`); we make also sure `{}` and `\protect` are taken into account in this new top level.

```

1415 \def\user@language@group{user@language@group}
1416 \def\bb@set@user@generic#1#2{%
1417   \bb@ifunset{user@generic@active#1}%
1418   {\bb@active@def#1\user@language@group{user@active}{user@generic@active}%
1419     \bb@active@def#1\user@group{user@generic@active}{language@active}%
1420     \expandafter\edef\csname#2@sh@#1@\endcsname{%
1421       \expandafter\noexpand\csname normal@char#1\endcsname}%
1422     \expandafter\edef\csname#2@sh@#1@\string\protect@\endcsname{%
1423       \expandafter\noexpand\csname user@active#1\endcsname}}%
1424   \@empty}
1425 \newcommand\defineshorthand[3][user]{%
1426   \edef\bb@tempa{\zap@space#1 \@empty}%
1427   \bb@for\bb@tempb\bb@tempa{%
1428     \if*\expandafter\@car\bb@tempb\@nil
1429     \edef\bb@tempb{user@\expandafter\@gobble\bb@tempb}%
1430     \@expandtwoargs
1431     \bb@set@user@generic{\expandafter\string\@car#2\@nil}\bb@tempb
1432   \fi
1433   \declare@shorthand{\bb@tempb}{#2}{#3}}

```

`\languageshorthands` A user level command to change the language from which shorthands are used. Unfortunately, `babel` currently does not keep track of defined groups, and therefore there is no way to catch a possible change in casing to fix it in the same way languages names are fixed. [TODO].

```

1434 \def\languageshorthands#1{\def\language@group{#1}}

```

`\aliasshorthand` *Deprecated*. 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 latter to `\active@char`.

```

1435 \def\aliasshorthand#1#2{%
1436   \bbl@ifshorthand{#2}%
1437   {\expandafter\ifx\csname active@char\string#2\endcsname\relax
1438     \ifx\document\@notprerr
1439       \@notshorthand{#2}%
1440     \else
1441       \initiate@active@char{#2}%
1442       \bbl@ccarg\let{active@char\string#2}{active@char\string#1}%
1443       \bbl@ccarg\let{normal@char\string#2}{normal@char\string#1}%
1444       \bbl@activate{#2}%
1445     \fi
1446   \fi}%
1447   {\bbl@error{shorthand-is-off}{#2}{}}}
```

`\@notshorthand`

```

1448 \def\@notshorthand#1{\bbl@error{not-a-shorthand}{#1}{}}
```

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

```

1449 \newcommand*\shorthandon[1]{\bbl@switch@sh\@ne#1\@nnil}
1450 \DeclareRobustCommand*\shorthandoff{%
1451   \@ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
1452 \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.

```

1453 \def\bbl@switch@sh#1#2{%
1454   \ifx#2\@nnil\else
1455     \bbl@ifunset{bbl@active@\string#2}%
1456     {\bbl@error{not-a-shorthand-b}{#2}{}}%
1457     {\ifcase#1%   off, on, off*
1458       \catcode`#2\relax
1459     \or
1460       \catcode`#2\active
1461       \bbl@ifunset{bbl@shdef@\string#2}%
1462       {}%
1463       {\bbl@withactive{\expandafter\let\expandafter}#2%
1464         \csname bbl@shdef@\string#2\endcsname
1465         \bbl@csarg\let{shdef@\string#2}\relax}%
1466       \ifcase\bbl@activated\or
1467         \bbl@activate{#2}%
1468       \else
1469         \bbl@deactivate{#2}%
1470       \fi
1471     \or
1472       \bbl@ifunset{bbl@shdef@\string#2}%
1473       {\bbl@withactive{\bbl@csarg\let{shdef@\string#2}}#2}%
1474       {}%
1475       \csname bbl@oricat@\string#2\endcsname
1476       \csname bbl@oridef@\string#2\endcsname
1477     \fi}%
1478   \bbl@afterfi\bbl@switch@sh#1%
1479   \fi}
```

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

```

1480 \def\babelshorthand{\active@prefix\babelshorthand\bb@putsh}
1481 \def\bb@putsh#1{%
1482   \bb@ifunset{bb@active@\string#1}%
1483     {\bb@putsh@i#1\@empty\@nnil}%
1484     {\csname bb@active@\string#1\endcsname}}
1485 \def\bb@putsh@i#1#2\@nnil{%
1486   \csname\language@group @sh@\string#1@%
1487     \ifx\@empty#2\else\string#2\fi\endcsname}
1488 %
1489 \ifx\bb@opt@shorthands\@nnil\else
1490   \let\bb@s@initiate@active@char\initiate@active@char
1491   \def\initiate@active@char#1{%
1492     \bb@ifshorthand{#1}{\bb@s@initiate@active@char{#1}}{}}
1493   \let\bb@s@switch@sh\bb@switch@sh
1494   \def\bb@switch@sh#1#2{%
1495     \ifx#2\@nnil\else
1496       \bb@afterfi
1497       \bb@ifshorthand{#2}{\bb@s@switch@sh#1{#2}}{\bb@switch@sh#1}%
1498       \fi}
1499   \let\bb@s@activate\bb@activate
1500   \def\bb@activate#1{%
1501     \bb@ifshorthand{#1}{\bb@s@activate{#1}}{}}
1502   \let\bb@s@deactivate\bb@deactivate
1503   \def\bb@deactivate#1{%
1504     \bb@ifshorthand{#1}{\bb@s@deactivate{#1}}{}}
1505 \fi

```

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

```

1506 \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.

```

1507 \def\bb@prim@s{%
1508   \prime\futurelet\@let@token\bb@pr@m@s}
1509 \def\bb@if@primes#1#2{%
1510   \ifx#1\@let@token
1511     \expandafter\@firstoftwo
1512   \else\ifx#2\@let@token
1513     \bb@afterelse\expandafter\@firstoftwo
1514   \else
1515     \bb@afterfi\expandafter\@secondoftwo
1516   \fi\fi}
1517 \begingroup
1518 \catcode\^=7 \catcode\*=\active \lccode\^=\^
1519 \catcode\'=12 \catcode\"=\active \lccode\"=\`
1520 \lowercase{%
1521   \gdef\bb@pr@m@s{%
1522     \bb@if@primes" '%
1523     \pr@@s
1524     {\bb@if@primes*\^{\pr@@t\egroup}}}}
1525 \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).

```

1526 \initiate@active@char{~}
1527 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }
1528 \bbl@activate{~}

```

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

```

1529 \expandafter\def\csname OT1dqpos\endcsname{127}
1530 \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

```

1531 \ifx\f@encoding\@undefined
1532 \def\f@encoding{OT1}
1533 \fi

```

4.6 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.

```

1534 \bbl@trace{Language attributes}
1535 \newcommand\languageattribute[2]{%
1536 \def\bbl@tempc{#1}%
1537 \bbl@fixname\bbl@tempc
1538 \bbl@iflanguage\bbl@tempc{%
1539 \bbl@vforeach{#2}{%

```

To make sure each attribute is selected only once, 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.

```

1540 \ifx\bbl@known@attrs\@undefined
1541 \in@false
1542 \else
1543 \bbl@xin@{,\bbl@tempc-##1,}{,\bbl@known@attrs,}%
1544 \fi
1545 \ifin@
1546 \bbl@warning{%
1547 You have more than once selected the attribute '##1'\%
1548 for language #1. Reported}%
1549 \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.

```

1550 \bbl@exp{%
1551 \bbl@add@list\bbl@known@attrs{\bbl@tempc-##1}}%
1552 \edef\bbl@tempa{\bbl@tempc-##1}%
1553 \expandafter\bbl@ifknown@trib\expandafter{\bbl@tempa}\bbl@attributes%
1554 {\csname\bbl@tempc @attr##1\endcsname}%
1555 {\@attrerr{\bbl@tempc}{##1}}%
1556 \fi}}
1557 \@onlypreamble\languageattribute

```

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

```

1558 \newcommand*\@attrerr}[2]{%
1559 \bbl@error{unknown-attribute}{#1}{#2}{}}

```

`\bbl@declare@attribute` 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}`.

```

1560 \def\bbld@declare@ttribute#1#2#3{%
1561   \bblexin@{,#2,}{,\BabelModifiers,}%
1562   \ifin@
1563     \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
1564   \fi
1565   \bbld@add@list\bbld@attributes{#1-#2}%
1566   \expandafter\def\csname#1@attr@#2\endcsname{#3}}

```

`\bbld@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.

```

1567 \def\bbld@ifattributeset#1#2#3#4{%
1568   \ifx\bbld@known@attribs\@undefined
1569     \in@false
1570   \else
1571     \bblexin@{,#1-#2,}{,\bbld@known@attribs,}%
1572   \fi
1573   \ifin@
1574     \bbld@afterelse#3%
1575   \else
1576     \bbld@afterfi#4%
1577   \fi}

```

`\bbld@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.

```

1578 \def\bbld@ifknown@ttrib#1#2{%
1579   \let\bbld@tempa\@secondoftwo
1580   \bbld@loopx\bbld@tempb{#2}{%
1581     \expandafter\in@\expandafter{\expandafter,\bbld@tempb,}{,#1,}%
1582   \ifin@
1583     \let\bbld@tempa\@firstoftwo
1584   \else
1585   \fi}%
1586   \bbld@tempa}

```

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

```

1587 \def\bbld@clear@ttribs{%
1588   \ifx\bbld@attributes\@undefined\else
1589     \bbld@loopx\bbld@tempa{\bbld@attributes}{%
1590       \expandafter\bbld@clear@ttrib\bbld@tempa.}%
1591     \let\bbld@attributes\@undefined
1592   \fi}
1593 \def\bbld@clear@ttrib#1-#2.{%
1594   \expandafter\let\csname#1@attr@#2\endcsname\@undefined}
1595 \AtBeginDocument{\bbld@clear@ttribs}

```

4.7 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`

```
1596 \bbl@trace{Macros for saving definitions}
1597 \def\babel@beginsave{\babel@savecnt\z@}
```

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

```
1598 \newcount\babel@savecnt
1599 \babel@beginsave
```

`\babel@save` The macro `\babel@save<csname>` saves the current meaning of the control sequence `<csname>` to `\originalTeX`². 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. To avoid messing saved definitions up, they are saved only the very first time.

```
1600 \def\babel@save#1{%
1601   \def\bbl@tempa{,{, #1,}}% Clumsy, for Plain
1602   \expandafter\bbl@add\expandafter\bbl@tempa\expandafter{%
1603     \expandafter{\expandafter, \bbl@savextras,}}%
1604   \expandafter\in@\bbl@tempa
1605   \ifin@ \else
1606     \bbl@add\bbl@savextras{, #1,}%
1607     \bbl@carg\let{babel@\number\babel@savecnt}#1\relax
1608     \toks@\expandafter{\originalTeX\let#1=}%
1609     \bbl@exp{%
1610       \def\originalTeX{\the\toks@<babel@\number\babel@savecnt>\relax}}%
1611     \advance\babel@savecnt@ne
1612   \fi}
1613 \def\babel@savevariable#1{%
1614   \toks@\expandafter{\originalTeX #1=}%
1615   \bbl@exp{\def\originalTeX{\the\toks@\the#1\relax}}}
```

`\bbl@frenchspacing` Some languages need to have `\frenchspacing` in effect. Others don't want that. The command `\bbl@nonfrenchspacing` switches it off if necessary. A more refined way to switch the catcodes is done with ini files. Here an auxiliary macro is defined, but the main part is in `\babelprovide`. This new method should be ideally the default one.

```
1616 \def\bbl@frenchspacing{%
1617   \ifnum\the\sfcode`.=\@m
1618     \let\bbl@nonfrenchspacing\relax
1619   \else
1620     \frenchspacing
1621     \let\bbl@nonfrenchspacing\nonfrenchspacing
1622   \fi}
1623 \let\bbl@nonfrenchspacing\nonfrenchspacing
1624 \let\bbl@elt\relax
1625 \edef\bbl@fs@chars{%
1626   \bbl@elt{\string.}\@m{3000}\bbl@elt{\string?}\@m{3000}%
1627   \bbl@elt{\string!}\@m{3000}\bbl@elt{\string:}\@m{2000}%
1628   \bbl@elt{\string;}\@m{1500}\bbl@elt{\string,}\@m{1250}}
1629 \def\bbl@pre@fs{%
1630   \def\bbl@elt##1##2##3{\sfcode`##1=\the\sfcode`##1\relax}%
1631   \edef\bbl@save@sfcodes{\bbl@fs@chars}%
1632 \def\bbl@post@fs{%
1633   \bbl@save@sfcodes
1634   \edef\bbl@tempa{\bbl@cl{frspc}}%
1635   \edef\bbl@tempa{\expandafter\@car\bbl@tempa@nil}%
1636   \if u\bbl@tempa % do nothing
1637   \else\if n\bbl@tempa % non french
1638     \def\bbl@elt##1##2##3{%
1639       \ifnum\sfcode`##1=##2\relax
1640       \babel@savevariable{\sfcode`##1}%
```

²`\originalTeX` has to be expandable, i. e. you shouldn't let it to `\relax`.

```

1641     \sfcode`##1=##3\relax
1642   \fi}%
1643   \bbl@fs@chars
1644   \else\if y\bbl@tempa    % french
1645     \def\bbl@elt##1##2##3{%
1646       \ifnum\sfcode`##1=##3\relax
1647         \babel@savevariable{\sfcode`##1}%
1648         \sfcode`##1=##2\relax
1649       \fi}%
1650   \bbl@fs@chars
1651   \fi\fi\fi}

```

4.8 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.

```

1652 \bbl@trace{Short tags}
1653 \def\babeltags#1{%
1654   \edef\bbl@tempa{\zap@space#1 \@empty}%
1655   \def\bbl@tempb##1=##2\@{%
1656     \edef\bbl@tempc{%
1657       \noexpand\newcommand
1658       \expandafter\noexpand\csname ##1\endcsname{%
1659         \noexpand\protect
1660         \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
1661       \noexpand\newcommand
1662       \expandafter\noexpand\csname text##1\endcsname{%
1663         \noexpand\foreignlanguage{##2}}
1664     \bbl@tempc}%
1665   \bbl@for\bbl@tempa\bbl@tempa{%
1666     \expandafter\bbl@tempb\bbl@tempa\@}}

```

4.9 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.

```

1667 \bbl@trace{Hyphens}
1668 \@onlypreamble\babelhyphenation
1669 \AtEndOfPackage{%
1670   \newcommand\babelhyphenation[2][\@empty]{%
1671     \ifx\bbl@hyphenation@ \relax
1672       \let\bbl@hyphenation@ \@empty
1673     \fi
1674     \ifx\bbl@hyphlist \@empty\else
1675       \bbl@warning{%
1676         You must not intermingle \string\selectlanguage\space and\%
1677         \string\babelhyphenation\space or some exceptions will not\%
1678         be taken into account. Reported}%
1679     \fi
1680     \ifx \@empty#1%
1681       \protected@edef\bbl@hyphenation@{\bbl@hyphenation@\space#2}%
1682     \else
1683       \bbl@vforeach{#1}{%
1684         \def\bbl@tempa{##1}%
1685         \bbl@fixname\bbl@tempa
1686         \bbl@iflanguage\bbl@tempa{%
1687           \bbl@csarg\protected@edef{hyphenation@\bbl@tempa}{%
1688             \bbl@ifunset{bbl@hyphenation@\bbl@tempa}%
1689             }%
1690           {\csname bbl@hyphenation@\bbl@tempa\endcsname\space}%

```

```
1691         #2}}}%
1692     \fi}}
```

`\bbl@allowhyphens` This macro makes hyphenation possible. Basically its definition is nothing more than `\nobreak \hskip 0pt plus 0pt`³.

```
1693 \def\bbl@allowhyphens{\ifvmode\else\nobreak\hskip\z@skip\fi}
1694 \def\bbl@t@one{T1}
1695 \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`.

```
1696 \newcommand\babellnullhyphen{\char\hyphenchar\font}
1697 \def\babelhyphen{\active@prefix\babelhyphen\bbl@hyphen}
1698 \def\bbl@hyphen{%
1699     \@ifstar{\bbl@hyphen@i @}{\bbl@hyphen@i \@empty}}
1700 \def\bbl@hyphen@i#1#2{%
1701     \bbl@ifunset{bbl@hy@#1#2\@empty}%
1702     {\csname bbl@#1usehyphen\endcsname{\discretionary{#2}{}{#2}}}%
1703     {\csname bbl@hy@#1#2\@empty\endcsname}}
```

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

There should not be a discretionary after a hyphen at the beginning of a word, so it is prevented if preceded by a skip. Unfortunately, this does handle cases like “(-suffix)”. `\nobreak` is always preceded by `\leavevmode`, in case the shorthand starts a paragraph.

```
1704 \def\bbl@usehyphen#1{%
1705     \leavevmode
1706     \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
1707     \nobreak\hskip\z@skip}
1708 \def\bbl@@usehyphen#1{%
1709     \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}
```

The following macro inserts the hyphen char.

```
1710 \def\bbl@hyphenchar{%
1711     \ifnum\hyphenchar\font=\m@ne
1712         \babellnullhyphen
1713     \else
1714         \char\hyphenchar\font
1715     \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.

```
1716 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
1717 \def\bbl@hy@@soft{\bbl@@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
1718 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
1719 \def\bbl@hy@@hard{\bbl@@usehyphen\bbl@hyphenchar}
1720 \def\bbl@hy@nobreak{\bbl@usehyphen{\mbox{\bbl@hyphenchar}}}
1721 \def\bbl@hy@@nobreak{\mbox{\bbl@hyphenchar}}
1722 \def\bbl@hy@repeat{%
1723     \bbl@usehyphen{%
1724         \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
1725 \def\bbl@hy@@repeat{%
1726     \bbl@@usehyphen{%
1727         \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
1728 \def\bbl@hy@empty{\hskip\z@skip}
1729 \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.

```
1730 \def\bbl@disc#1#2{\nobreak\discretionary{#2-}{}{#1}\bbl@allowhyphens}
```

³TeX begins and ends a word for hyphenation at a glue node. The penalty prevents a linebreak at this glue node.

4.10 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 tool. It makes global a local variable. This is not the best solution, but it works.

```
1731 \bbl@trace{Multiencoding strings}
1732 \def\bbl@tglobal#1{\global\let#1#1}
```

The following option is currently no-op. It was meant for the deprecated `\SetCase`.

```
1733 <<{*More package options}>> ≡
1734 \DeclareOption{nocase}{}
1735 <</More package options>>
```

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

```
1736 <<{*More package options}>> ≡
1737 \let\bbl@opt@strings\@nnil % accept strings=value
1738 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
1739 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
1740 \def\BabelStringsDefault{generic}
1741 <</More package options>>
```

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

```
1742 \@onlypreamble\StartBabelCommands
1743 \def\StartBabelCommands{%
1744   \begingroup
1745   \@tempcnta="7F
1746   \def\bbl@tempa{%
1747     \ifnum\@tempcnta>"FF\else
1748       \catcode\@tempcnta=11
1749       \advance\@tempcnta\@ne
1750       \expandafter\bbl@tempa
1751     \fi}%
1752   \bbl@tempa
1753   <<{Macros local to BabelCommands}>>
1754   \def\bbl@provstring##1##2{%
1755     \providecommand##1{##2}%
1756     \bbl@tglobal##1}%
1757   \global\let\bbl@scafter\@empty
1758   \let\StartBabelCommands\bbl@startcmds
1759   \ifx\BabelLanguages\relax
1760     \let\BabelLanguages\CurrentOption
1761   \fi
1762   \begingroup
1763   \let\bbl@sreset\@nnil % local flag - disable 1st stopcommands
1764   \StartBabelCommands}
1765 \def\bbl@startcmds{%
1766   \ifx\bbl@sreset\@nnil\else
1767     \bbl@usehooks{stopcommands}{}%
1768   \fi
1769   \endgroup
1770   \begingroup
1771   \ifstar
1772     {\ifx\bbl@opt@strings\@nnil
1773       \let\bbl@opt@strings\BabelStringsDefault
1774     \fi
1775     \bbl@startcmds@i}%
1776   \bbl@startcmds@i}
1777 \def\bbl@startcmds@i#1#2{%
1778   \edef\bbl@L{\zap@space#1 \@empty}%
```

```

1779 \edef\bbbl@G{\zap@space#2 \@empty}%
1780 \bbbl@startcmds@ii}
1781 \let\bbbl@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.

```

1782 \newcommand\bbbl@startcmds@ii[1][\@empty]{%
1783 \let\SetString\@gobbletwo
1784 \let\bbbl@stringdef\@gobbletwo
1785 \let\AfterBabelCommands\@gobble
1786 \ifx\@empty#1%
1787 \def\bbbl@sc@label{generic}%
1788 \def\bbbl@encstring##1##2{%
1789 \ProvideTextCommandDefault##1{##2}%
1790 \bbbl@tglobal##1%
1791 \expandafter\bbbl@tglobal\csname\string? \string##1\endcsname}%
1792 \let\bbbl@sctest\in@true
1793 \else
1794 \let\bbbl@sc@charset\space % <- zapped below
1795 \let\bbbl@sc@fontenc\space % <- " "
1796 \def\bbbl@tempa##1=##2\@nil{%
1797 \bbbl@csarg\edef{sc@zap@space##1 \@empty}{##2 }}%
1798 \bbbl@vforeach{label=#1}{\bbbl@tempa##1\@nil}%
1799 \def\bbbl@tempa##1 ##2{% space -> comma
1800 ##1%
1801 \ifx\@empty##2\else\ifx,##1,\else,\fi\bbbl@afterfi\bbbl@tempa##2\fi}%
1802 \edef\bbbl@sc@fontenc{\expandafter\bbbl@tempa\bbbl@sc@fontenc\@empty}%
1803 \edef\bbbl@sc@label{\expandafter\zap@space\bbbl@sc@label\@empty}%
1804 \edef\bbbl@sc@charset{\expandafter\zap@space\bbbl@sc@charset\@empty}%
1805 \def\bbbl@encstring##1##2{%
1806 \bbbl@foreach\bbbl@sc@fontenc{%
1807 \bbbl@ifunset{T@####1}%
1808 }%
1809 {\ProvideTextCommand##1{####1}{##2}%
1810 \bbbl@tglobal##1%
1811 \expandafter
1812 \bbbl@tglobal\csname####1\string##1\endcsname}}}%
1813 \def\bbbl@sctest{%
1814 \bbbl@xin@{\bbbl@opt@strings,}{\bbbl@sc@label,\bbbl@sc@fontenc,}}%
1815 \fi
1816 \ifx\bbbl@opt@strings\@nnil % ie, no strings key -> defaults
1817 \else\ifx\bbbl@opt@strings\relax % ie, strings=encoded
1818 \let\AfterBabelCommands\bbbl@aftercmds
1819 \let\SetString\bbbl@setstring
1820 \let\bbbl@stringdef\bbbl@encstring
1821 \else % ie, strings=value
1822 \bbbl@sctest
1823 \ifin@
1824 \let\AfterBabelCommands\bbbl@aftercmds
1825 \let\SetString\bbbl@setstring
1826 \let\bbbl@stringdef\bbbl@provstring
1827 \fi\fi\fi
1828 \bbbl@scswitch
1829 \ifx\bbbl@G\@empty
1830 \def\SetString##1##2{%
1831 \bbbl@error{missing-group}{##1}{}}%

```

```

1832 \fi
1833 \ifx\@empty#1%
1834 \bbl@usehooks{defaultcommands}{}%
1835 \else
1836 \@expandtwoargs
1837 \bbl@usehooks{encodedcommands}{\bbl@sc@charset}\bbl@sc@fontenc}%
1838 \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).

```

1839 \def\bbl@forlang#1#2{%
1840 \bbl@for#1\bbl@L{%
1841 \bbl@xin@{,#1,}{,\BabelLanguages,}%
1842 \ifin@#2\relax\fi}}
1843 \def\bbl@scswitch{%
1844 \bbl@forlang\bbl@tempa{%
1845 \ifx\bbl@G\@empty\else
1846 \ifx\SetString@gobbletwo\else
1847 \edef\bbl@GL{\bbl@G\bbl@tempa}%
1848 \bbl@xin@{,\bbl@GL,}{,\bbl@screset,}%
1849 \ifin@\else
1850 \global\expandafter\let\csname\bbl@GL\endcsname\undefined
1851 \xdef\bbl@screset{\bbl@screset,\bbl@GL}%
1852 \fi
1853 \fi
1854 \fi}}
1855 \AtEndOfPackage{%
1856 \def\bbl@forlang#1#2{\bbl@for#1\bbl@L{\bbl@ifunset{date#1}{#2}}}%
1857 \let\bbl@scswitch\relax}
1858 \@onlypreamble\EndBabelCommands
1859 \def\EndBabelCommands{%
1860 \bbl@usehooks{stopcommands}{}%
1861 \endgroup
1862 \endgroup
1863 \bbl@scafter}
1864 \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.

```

1865 \def\bbl@setstring#1#2{ eg, \prefacename{<string>}
1866 \bbl@forlang\bbl@tempa{%
1867 \edef\bbl@LC{\bbl@tempa\bbl@stripslash#1}%
1868 \bbl@ifunset{\bbl@LC}% eg, \germanchaptername
1869 {\bbl@exp{%
1870 \global\bbbl@add\<\bbl@G\bbl@tempa>{\bbbl@scset\#1\<\bbl@LC>}}}%
1871 }%
1872 \def\BabelString{#2}%
1873 \bbl@usehooks{stringprocess}{}%
1874 \expandafter\bbl@stringdef
1875 \csname\bbl@LC\endcsname\expandafter\expandafter\BabelString}}

```

A little auxiliary command sets the string. TODO: Formerly used with casing. Very likely no longer necessary, although it's used in `\setlocalecaption`.

```
1876 \def\bb@scset#1#2{\def#1{#2}}
```

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.

```
1877 <<(*Macros local to BabelCommands)>> ≡
1878 \def\SetStringLoop##1##2{%
1879   \def\bb@templ####1{\expandafter\noexpand\csname##1\endcsname}%
1880   \count@\z@
1881   \bb@loop\bb@tempa{##2}{% empty items and spaces are ok
1882     \advance\count@\@ne
1883     \toks@\expandafter{\bb@tempa}%
1884     \bb@exp{%
1885       \\SetString\bb@templ{\romannumeral\count@}{\the\toks@}%
1886       \count@=\the\count@\relax}}}%
1887 <</Macros local to BabelCommands>>
```

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

```
1888 \def\bb@aftercmds#1{%
1889   \toks@\expandafter{\bb@scafter#1}%
1890   \xdef\bb@scafter{\the\toks@}}
```

Case mapping The command `\SetCase` is deprecated. Currently it consists in a definition with a hack just for backward compatibility in the macro mapping.

```
1891 <<(*Macros local to BabelCommands)>> ≡
1892 \newcommand\SetCase[3][]{%
1893   \def\bb@tempa####1####2{%
1894     \ifx####1\@empty\else
1895       \bb@carg\bb@add{extras\CurrentOption}{%
1896         \bb@carg\babel@save{c__text_uppercase_\string####1_tl}%
1897         \bb@carg\def{c__text_uppercase_\string####1_tl}{####2}%
1898         \bb@carg\babel@save{c__text_lowercase_\string####2_tl}%
1899         \bb@carg\def{c__text_lowercase_\string####2_tl}{####1}}%
1900       \expandafter\bb@tempa
1901       \fi}%
1902   \bb@tempa##1\@empty\@empty
1903   \bb@carg\bb@tglobal{extras\CurrentOption}}%
1904 <</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.

```
1905 <<(*Macros local to BabelCommands)>> ≡
1906 \newcommand\SetHyphenMap[1]{%
1907   \bb@forlang\bb@tempa{%
1908     \expandafter\bb@stringdef
1909     \csname\bb@tempa @bb@hyphenmap\endcsname{##1}}}%
1910 <</Macros local to BabelCommands>>
```

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

```
1911 \newcommand\BabelLower[2]{% one to one.
1912   \ifnum\lccode#1=#2\else
1913     \babel@savevariable{\lccode#1}%
1914     \lccode#1=#2\relax
1915   \fi}
1916 \newcommand\BabelLowerMM[4]{% many-to-many
1917   \@tempcnta=#1\relax
1918   \@tempcntb=#4\relax
1919   \def\bb@tempa{%
1920     \ifnum\@tempcnta>#2\else
1921       \@expandtwoargs\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
1922       \advance\@tempcnta#3\relax
```

```

1923     \advance\@tempcntb#3\relax
1924     \expandafter\bbbl@tempa
1925     \fi}%
1926 \bbbl@tempa}
1927 \newcommand\BabelLowerM0[4]{% many-to-one
1928   \@tempcnta=#1\relax
1929   \def\bbbl@tempa{%
1930     \ifnum\@tempcnta>#2\else
1931       \@expandtwoargs\BabelLower{\the\@tempcnta}{#4}%
1932       \advance\@tempcnta#3
1933       \expandafter\bbbl@tempa
1934       \fi}%
1935   \bbbl@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

1936 <<(*More package options)>> ≡
1937 \DeclareOption{hyphenmap=off}{\chardef\bbbl@opt@hyphenmap\z@}
1938 \DeclareOption{hyphenmap=first}{\chardef\bbbl@opt@hyphenmap@ne}
1939 \DeclareOption{hyphenmap=select}{\chardef\bbbl@opt@hyphenmap\tw@}
1940 \DeclareOption{hyphenmap=other}{\chardef\bbbl@opt@hyphenmap\thr@@}
1941 \DeclareOption{hyphenmap=other*}{\chardef\bbbl@opt@hyphenmap4\relax}
1942 <</More package options>>

```

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

```

1943 \AtEndOfPackage{%
1944   \ifx\bbbl@opt@hyphenmap\undefined
1945     \bbbl@xin@{,}{\bbbl@language@opts}%
1946     \chardef\bbbl@opt@hyphenmap\ifin@4\else\@ne\fi
1947   \fi}

```

This sections ends with a general tool for resetting the caption names with a unique interface. With the old way, which mixes the switcher and the string, we convert it to the new one, which separates these two steps.

```

1948 \newcommand\setlocalecaption{% TODO. Catch typos.
1949   \@ifstar\bbbl@setcaption@s\bbbl@setcaption@x}
1950 \def\bbbl@setcaption@x#1#2#3{% language caption-name string
1951   \bbbl@trim@def\bbbl@tempa{#2}%
1952   \bbbl@xin@{.template}{\bbbl@tempa}%
1953   \ifin@
1954     \bbbl@ini@captions@template{#3}{#1}%
1955   \else
1956     \edef\bbbl@tempd{%
1957       \expandafter\expandafter\expandafter
1958       \strip@prefix\expandafter\meaning\csname captions#1\endcsname}%
1959     \bbbl@xin@
1960       {\expandafter\string\csname #2name\endcsname}%
1961       {\bbbl@tempd}%
1962     \ifin@ % Renew caption
1963       \bbbl@xin@{\string\bbbl@scset}{\bbbl@tempd}%
1964       \ifin@
1965         \bbbl@exp{%
1966           \\bbbl@ifsamestring{\bbbl@tempa}{\language name}%
1967           {\bbbl@scset\<#2name>\<#1#2name>}}%
1968         {}}%
1969       \else % Old way converts to new way
1970         \bbbl@ifunset{#1#2name}%
1971         {\bbbl@exp{%
1972           \\bbbl@add\<captions#1>{\def\<#2name>{\<#1#2name>}}}%
1973           \\bbbl@ifsamestring{\bbbl@tempa}{\language name}%
1974           {\def\<#2name>{\<#1#2name>}}}%
1975         {}}}%
1976     {}%
1977   \fi
1978   \else

```



```

1979 \bbl@xin@{\string\bbl@scset}\bbl@tempd}% New
1980 \ifin@ % New way
1981 \bbl@exp{%
1982 \\bbl@add\<captions#1>{\bbl@scset\<#2name>\<#1#2name>}%
1983 \\bbl@ifsamestring{\bbl@tempa}{\languagename}%
1984 {\bbl@scset\<#2name>\<#1#2name>}%
1985 {}}%
1986 \else % Old way, but defined in the new way
1987 \bbl@exp{%
1988 \\bbl@add\<captions#1>{\def\<#2name>\<#1#2name>}}%
1989 \\bbl@ifsamestring{\bbl@tempa}{\languagename}%
1990 {\def\<#2name>\<#1#2name>}}%
1991 {}}%
1992 \fi%
1993 \fi
1994 \@namedef{#1#2name}{#3}%
1995 \toks@\expandafter{\bbl@captionslist}%
1996 \bbl@exp{\in@{\<#2name>}{\the\toks@}}%
1997 \ifin@ \else
1998 \bbl@exp{\bbl@add\bbl@captionslist{\<#2name>}}%
1999 \bbl@toglobal\bbl@captionslist
2000 \fi
2001 \fi}
2002% \def\bbl@setcaption@s#1#2#3{ % TODO. Not yet implemented (w/o 'name')

```

4.11 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.

```

2003 \bbl@trace{Macros related to glyphs}
2004 \def\set@low@box#1{\setbox\tw@\hbox{,}\setbox\z@\hbox{#1}%
2005 \dimen\z@\ht\z@ \advance\dimen\z@ -\ht\tw@%
2006 \setbox\z@\hbox{\lower\dimen\z@ \box\z@}\ht\z@\ht\tw@ \dp\z@\dp\tw@}

```

`\save@s@f@q` The macro `\save@s@f@q` is used to save and reset the current space factor.

```

2007 \def\save@s@f@q#1{\leavevmode
2008 \begingroup
2009 \edef\@SF{\spacefactor\the\spacefactor}#1\@SF
2010 \endgroup}

```

4.12 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.

4.12.1 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.

```

2011 \ProvideTextCommand{\quotedblbase}{OT1}{%
2012 \save@s@f@q{\set@low@box{\textquotedblright\}}%
2013 \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.

```

2014 \ProvideTextCommandDefault{\quotedblbase}{%
2015 \UseTextSymbol{OT1}{\quotedblbase}}

```

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

```

2016 \ProvideTextCommand{\quotesinglbase}{OT1}{%
2017 \save@s@f@q{\set@low@box{\textquoteright\}}%
2018 \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.

```
2019 \ProvideTextCommandDefault{\quotesinglbase}{%
2020 \UseTextSymbol{OT1}{\quotesinglbase}}
```

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

```
2021 \ProvideTextCommand{\guillemetleft}{OT1}{%
2022 \ifmmode
2023 \ll
2024 \else
2025 \save@sf@q{\nobreak
2026 \raise.2ex\hbox{\scriptscriptstyle\ll}\bbl@allowhyphens}%
2027 \fi}
2028 \ProvideTextCommand{\guillemetright}{OT1}{%
2029 \ifmmode
2030 \gg
2031 \else
2032 \save@sf@q{\nobreak
2033 \raise.2ex\hbox{\scriptscriptstyle\gg}\bbl@allowhyphens}%
2034 \fi}
2035 \ProvideTextCommand{\guillemotleft}{OT1}{%
2036 \ifmmode
2037 \ll
2038 \else
2039 \save@sf@q{\nobreak
2040 \raise.2ex\hbox{\scriptscriptstyle\ll}\bbl@allowhyphens}%
2041 \fi}
2042 \ProvideTextCommand{\guillemotright}{OT1}{%
2043 \ifmmode
2044 \gg
2045 \else
2046 \save@sf@q{\nobreak
2047 \raise.2ex\hbox{\scriptscriptstyle\gg}\bbl@allowhyphens}%
2048 \fi}
```

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

```
2049 \ProvideTextCommandDefault{\guillemetleft}{%
2050 \UseTextSymbol{OT1}{\guillemetleft}}
2051 \ProvideTextCommandDefault{\guillemetright}{%
2052 \UseTextSymbol{OT1}{\guillemetright}}
2053 \ProvideTextCommandDefault{\guillemotleft}{%
2054 \UseTextSymbol{OT1}{\guillemotleft}}
2055 \ProvideTextCommandDefault{\guillemotright}{%
2056 \UseTextSymbol{OT1}{\guillemotright}}
```

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

```
2057 \ProvideTextCommand{\guilsinglleft}{OT1}{%
2058 \ifmmode
2059 <%
2060 \else
2061 \save@sf@q{\nobreak
2062 \raise.2ex\hbox{\scriptscriptstyle<}\bbl@allowhyphens}%
2063 \fi}
2064 \ProvideTextCommand{\guilsinglright}{OT1}{%
2065 \ifmmode
2066 >%
2067 \else
2068 \save@sf@q{\nobreak
2069 \raise.2ex\hbox{\scriptscriptstyle>}\bbl@allowhyphens}%
2070 \fi}
```

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

```
2071 \ProvideTextCommandDefault{\guilsinglleft}{%
```

```

2072 \UseTextSymbol{OT1}{\guilsinglleft}}
2073 \ProvideTextCommandDefault{\guilsinglright}{%
2074 \UseTextSymbol{OT1}{\guilsinglright}}

```

4.12.2 Letters

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

```

2075 \DeclareTextCommand{\ij}{OT1}{%
2076 i\kern-0.02em\bbl@allowhyphens j}
2077 \DeclareTextCommand{\IJ}{OT1}{%
2078 I\kern-0.02em\bbl@allowhyphens J}
2079 \DeclareTextCommand{\ij}{T1}{\char188}
2080 \DeclareTextCommand{\IJ}{T1}{\char156}

```

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

```

2081 \ProvideTextCommandDefault{\ij}{%
2082 \UseTextSymbol{OT1}{\ij}}
2083 \ProvideTextCommandDefault{\IJ}{%
2084 \UseTextSymbol{OT1}{\IJ}}

```

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

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

```

2085 \def\crrtic@{\hrule height0.1ex width0.3em}
2086 \def\crttic@{\hrule height0.1ex width0.33em}
2087 \def\ddj@{%
2088 \setbox0\hbox{d}\dimen@=\ht0
2089 \advance\dimen@lex
2090 \dimen@.45\dimen@
2091 \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2092 \advance\dimen@ii.5ex
2093 \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
2094 \def\DDJ@{%
2095 \setbox0\hbox{D}\dimen@=.55\ht0
2096 \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2097 \advance\dimen@ii.15ex % correction for the dash position
2098 \advance\dimen@ii-.15\fontdimen7\font % correction for cmtt font
2099 \dimen@thr@\expandafter\rem@pt\the\fontdimen7\font\dimen@
2100 \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crttic@}}}}
2101 %
2102 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
2103 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}

```

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

```

2104 \ProvideTextCommandDefault{\dj}{%
2105 \UseTextSymbol{OT1}{\dj}}
2106 \ProvideTextCommandDefault{\DJ}{%
2107 \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.

```

2108 \DeclareTextCommand{\SS}{OT1}{SS}
2109 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}

```

4.12.3 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` 2110 `\ProvideTextCommandDefault{\glq}{%`
 2111 `\textormath{\quotingslbase}{\mbox{\quotingslbase}}}`
 The definition of `\grq` depends on the fontencoding. With T1 encoding no extra kerning is needed.
 2112 `\ProvideTextCommand{\grq}{T1}{%`
 2113 `\textormath{\kern\z@\textquoteleft}{\mbox{\textquoteleft}}}`
 2114 `\ProvideTextCommand{\grq}{TU}{%`
 2115 `\textormath{\textquoteleft}{\mbox{\textquoteleft}}}`
 2116 `\ProvideTextCommand{\grq}{OT1}{%`
 2117 `\save@sf@q{\kern-.0125em`
 2118 `\textormath{\textquoteleft}{\mbox{\textquoteleft}}%`
 2119 `\kern.07em\relax}}`
 2120 `\ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}`

`\glqq` The ‘german’ double quotes.
`\grqq` 2121 `\ProvideTextCommandDefault{\glqq}{%`
 2122 `\textormath{\quotedblbase}{\mbox{\quotedblbase}}}`
 The definition of `\grqq` depends on the fontencoding. With T1 encoding no extra kerning is needed.
 2123 `\ProvideTextCommand{\grqq}{T1}{%`
 2124 `\textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}`
 2125 `\ProvideTextCommand{\grqq}{TU}{%`
 2126 `\textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}`
 2127 `\ProvideTextCommand{\grqq}{OT1}{%`
 2128 `\save@sf@q{\kern-.07em`
 2129 `\textormath{\textquotedblleft}{\mbox{\textquotedblleft}}%`
 2130 `\kern.07em\relax}}`
 2131 `\ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}`

`\flq` The ‘french’ single guillemets.
`\frq` 2132 `\ProvideTextCommandDefault{\flq}{%`
 2133 `\textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}`
 2134 `\ProvideTextCommandDefault{\frq}{%`
 2135 `\textormath{\guilsinglright}{\mbox{\guilsinglright}}}`

`\flqq` The ‘french’ double guillemets.
`\frqq` 2136 `\ProvideTextCommandDefault{\flqq}{%`
 2137 `\textormath{\guillemetleft}{\mbox{\guillemetleft}}}`
 2138 `\ProvideTextCommandDefault{\frqq}{%`
 2139 `\textormath{\guillemetright}{\mbox{\guillemetright}}}`

4.12.4 Umlauts and tremas

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

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

```
2140 \def\umlauthigh{%
2141   \def\bbl@umlauta##1{\leavevmode\bgroup%
2142     \accent\csname\fontencoding dqpos\endcsname
2143     ##1\bbl@allowhyphens\egroup}%
2144   \let\bbl@umlaute\bbl@umlauta}
2145 \def\umlautlow{%
2146   \def\bbl@umlauta{\protect\lower@umlaut}}
2147 \def\umlautelow{%
2148   \def\bbl@umlaute{\protect\lower@umlaut}}
2149 \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.

```
2150 \expandafter\ifx\csname U@D\endcsname\relax
2151 \csname newdimen\endcsname\U@D
2152 \fi
```

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

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

```
2153 \def\lower@umlaut#1{%
2154 \leavevmode\bgroup
2155 \U@D 1ex%
2156 {\setbox\z@\hbox{%
2157 \char\csname\fi@encoding dqpos\endcsname}%
2158 \dimen@ -.45ex\advance\dimen@\ht\z@
2159 \ifdim 1ex<\dimen@ \fontdimen5\font\dimen@ \fi}%
2160 \accent\csname\fi@encoding dqpos\endcsname
2161 \fontdimen5\font\U@D #1%
2162 \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).

```
2163 \AtBeginDocument{%
2164 \DeclareTextCompositeCommand{\}{OT1}{a}{\bbl@umlauta{a}}%
2165 \DeclareTextCompositeCommand{\}{OT1}{e}{\bbl@umlaute{e}}%
2166 \DeclareTextCompositeCommand{\}{OT1}{i}{\bbl@umlaute{i}}%
2167 \DeclareTextCompositeCommand{\}{OT1}{\i}{\bbl@umlaute{i}}%
2168 \DeclareTextCompositeCommand{\}{OT1}{o}{\bbl@umlauta{o}}%
2169 \DeclareTextCompositeCommand{\}{OT1}{u}{\bbl@umlauta{u}}%
2170 \DeclareTextCompositeCommand{\}{OT1}{A}{\bbl@umlauta{A}}%
2171 \DeclareTextCompositeCommand{\}{OT1}{E}{\bbl@umlaute{E}}%
2172 \DeclareTextCompositeCommand{\}{OT1}{I}{\bbl@umlaute{I}}%
2173 \DeclareTextCompositeCommand{\}{OT1}{O}{\bbl@umlauta{O}}%
2174 \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.

```
2175 \ifx\l@english\@undefined
2176 \chardef\l@english\z@
2177 \fi
2178% The following is used to cancel rules in ini files (see Amharic).
2179 \ifx\l@unhyphenated\@undefined
2180 \newlanguage\l@unhyphenated
2181 \fi
```

4.13 Layout

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

```
2182 \bbl@trace{Bidi layout}
2183 \providecommand\IfBabelLayout[3]{#3}%
2184 <-core>
2185 \newcommand\BabelPatchSection[1]{%
2186 \@ifundefined{#1}{}
```

```

2187 \bbl@exp{\let\<bbl@ss@#1>\<#1>}%
2188 \@namedef{#1}{%
2189 \ifstar{\bbl@presec@#1}%
2190 {\@dblarg{\bbl@presec@x{#1}}}}%
2191 \def\bbl@presec@x#1[#2]#3{%
2192 \bbl@exp{%
2193 \\\select@language@x{\bbl@main@language}%
2194 \\\bbl@cs{sspre@#1}%
2195 \\\bbl@cs{ss@#1}%
2196 [\\foreignlanguage{\languagename}{\unexpanded{#2}}}%
2197 {\\foreignlanguage{\languagename}{\unexpanded{#3}}}%
2198 \\\select@language@x{\languagename}}%
2199 \def\bbl@presec@s#1#2{%
2200 \bbl@exp{%
2201 \\\select@language@x{\bbl@main@language}%
2202 \\\bbl@cs{sspre@#1}%
2203 \\\bbl@cs{ss@#1}*%
2204 {\\foreignlanguage{\languagename}{\unexpanded{#2}}}%
2205 \\\select@language@x{\languagename}}%
2206 \IfBabelLayout{sectioning}%
2207 {\BabelPatchSection{part}%
2208 \BabelPatchSection{chapter}%
2209 \BabelPatchSection{section}%
2210 \BabelPatchSection{subsection}%
2211 \BabelPatchSection{subsubsection}%
2212 \BabelPatchSection{paragraph}%
2213 \BabelPatchSection{subparagraph}%
2214 \def\babel@toc#1{%
2215 \select@language@x{\bbl@main@language}}{}}
2216 \IfBabelLayout{captions}%
2217 {\BabelPatchSection{caption}}{}}
2218 (+core)

```

4.14 Load engine specific macros

Some macros are not defined in all engines, so, after loading the files define them if necessary to raise an error.

```

2219 \bbl@trace{Input engine specific macros}
2220 \ifcase\bbl@engine
2221 \input txtbabel.def
2222 \or
2223 \input luababel.def
2224 \or
2225 \input xebabel.def
2226 \fi
2227 \providecommand\babelfont{\bbl@error{only-lua-xe}}{}}{}}
2228 \providecommand\babelprehyphenation{\bbl@error{only-lua}}{}}{}}
2229 \ifx\babelposthyphenation\undefined
2230 \let\babelposthyphenation\babelprehyphenation
2231 \let\babelpatterns\babelprehyphenation
2232 \let\babelcharproperty\babelprehyphenation
2233 \fi

```

4.15 Creating and modifying languages

Continue with \LaTeX only.

`\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.

```

2234 (/package | core)
2235 (*package)
2236 \bbl@trace{Creating languages and reading ini files}

```

```

2237 \let\bb@extend@ini@gobble
2238 \newcommand\babelprovide[2][]{%
2239   \let\bb@savelangname\languagename
2240   \edef\bb@savelocaleid{\the\localeid}%
2241   % Set name and locale id
2242   \edef\languagename{#2}%
2243   \bb@id@assign
2244   % Initialize keys
2245   \bb@vforeach{captions,date,import,main,script,language,%
2246     hyphenrules,linebreaking,justification,mapfont,maparabic,%
2247     mapdigits,intraspaces,intrapenalty,onchar,transforms,alph,%
2248     Alph,labels,labels*,calendar,date,casing,interchar}%
2249     {\bb@csarg\let{KVP@##1}\@nnil}%
2250   \global\let\bb@release@transforms@empty
2251   \global\let\bb@release@casing@empty
2252   \let\bb@calendars@empty
2253   \global\let\bb@inidata@empty
2254   \global\let\bb@extend@ini@gobble
2255   \global\let\bb@included@inis@empty
2256   \gdef\bb@key@list{;}%
2257   \bb@forkv{#1}{%
2258     \in@/{#1}% With /, (re)sets a value in the ini
2259     \ifin@
2260       \global\let\bb@extend@ini\bb@extend@ini@aux
2261       \bb@renewinikey##1\@{#2}%
2262     \else
2263       \bb@csarg\ifx{KVP@##1}\@nnil\else
2264         \bb@error{unknown-provide-key}{#1}{}%
2265       \fi
2266       \bb@csarg\def{KVP@##1}{##2}%
2267     \fi}%
2268   \chardef\bb@howloaded=0:none;1:ldf without ini;2:ini
2269   \bb@ifunset{date#2}\z@{\bb@ifunset{bb@llevel@#2}\ne\tw@}%
2270   % == init ==
2271   \ifx\bb@screset\@undefined
2272     \bb@ldfinit
2273   \fi
2274   % == date (as option) ==
2275   % \ifx\bb@KVP@date\@nnil\else
2276   % \fi
2277   % ==
2278   \let\bb@lbkflag\relax % \@empty = do setup linebreak, only in 3 cases:
2279   \ifcase\bb@howloaded
2280     \let\bb@lbkflag\@empty % new
2281   \else
2282     \ifx\bb@KVP@hyphenrules\@nnil\else
2283       \let\bb@lbkflag\@empty
2284     \fi
2285     \ifx\bb@KVP@import\@nnil\else
2286       \let\bb@lbkflag\@empty
2287     \fi
2288   \fi
2289   % == import, captions ==
2290   \ifx\bb@KVP@import\@nnil\else
2291     \bb@exp{\bb@ifblank{\bb@KVP@import}}%
2292     {\ifx\bb@initload\relax
2293       \begingroup
2294         \def\BabelBeforeIni##1##2{\gdef\bb@KVP@import{##1}\endinput}%
2295         \bb@input@texini{#2}%
2296       \endgroup
2297     \else
2298       \xdef\bb@KVP@import{\bb@initload}%
2299     \fi}%

```

```

2300     {}%
2301     \let\bbl@KVP@date\@empty
2302 \fi
2303 \let\bbl@KVP@captions@\bbl@KVP@captions % TODO. A dirty hack
2304 \ifx\bbl@KVP@captions\@nnil
2305     \let\bbl@KVP@captions\bbl@KVP@import
2306 \fi
2307 % ==
2308 \ifx\bbl@KVP@transforms\@nnil\else
2309     \bbl@replace\bbl@KVP@transforms{ }{,}%
2310 \fi
2311 % == Load ini ==
2312 \ifcase\bbl@howloaded
2313     \bbl@provide@new{#2}%
2314 \else
2315     \bbl@ifblank{#1}%
2316         {}% With \bbl@load@basic below
2317         {\bbl@provide@renew{#2}}%
2318 \fi
2319 % == include == TODO
2320 % \ifx\bbl@included@inis\@empty\else
2321 %     \bbl@replace\bbl@included@inis{ }{,}%
2322 %     \bbl@foreach\bbl@included@inis{%
2323 %         \openin\bbl@readstream=babel-##1.ini
2324 %         \bbl@extend@ini{#2}%
2325 %         \closein\bbl@readstream
2326 %     \fi
2327 % Post tasks
2328 % -----
2329 % == subsequent calls after the first provide for a locale ==
2330 \ifx\bbl@inidata\@empty\else
2331     \bbl@extend@ini{#2}%
2332 \fi
2333 % == ensure captions ==
2334 \ifx\bbl@KVP@captions\@nnil\else
2335     \bbl@ifunset{bbl@extracaps@#2}%
2336         {\bbl@exp{\bbl@babelensure[exclude=\\today]{#2}}}%
2337         {\bbl@exp{\bbl@babelensure[exclude=\\today,
2338             include=\[bbl@extracaps@#2]]{#2}}}%
2339     \bbl@ifunset{bbl@ensure@\languagename}%
2340         {\bbl@exp{%
2341             \\DeclareRobustCommand\<bbl@ensure@\languagename>[1]{%
2342                 \\foreignlanguage{\languagename}%
2343                 {###1}}}%
2344         }%
2345     \bbl@exp{%
2346         \\bbl@tglobal\<bbl@ensure@\languagename>%
2347         \\bbl@tglobal\<bbl@ensure@\languagename\space>}%
2348 \fi

```

At this point all parameters are defined if 'import'. Now we execute some code depending on them. But what about if nothing was imported? We just set the basic parameters, but still loading the whole ini file.

```

2349 \bbl@load@basic{#2}%
2350 % == script, language ==
2351 % Override the values from ini or defines them
2352 \ifx\bbl@KVP@script\@nnil\else
2353     \bbl@csarg\edef{sname@#2}{\bbl@KVP@script}%
2354 \fi
2355 \ifx\bbl@KVP@language\@nnil\else
2356     \bbl@csarg\edef{lname@#2}{\bbl@KVP@language}%
2357 \fi
2358 \ifcase\bbl@engine\or

```



```

2359 \bbl@ifunset{bbl@chrng@languagename}{}%
2360 {\directlua{
2361   Babel.set_chranges_b('\bbl@cl{sbcpr}', '\bbl@cl{chrng}') }}%
2362 \fi
2363 % == onchar ==
2364 \ifx\bbl@KVP@onchar\@nnil\else
2365   \bbl@luahyphenate
2366   \bbl@exp{%
2367     \\AddToHook{env/document/before}{\\select@language{#2}{}}}%
2368 \directlua{
2369   if Babel.locale_mapped == nil then
2370     Babel.locale_mapped = true
2371     Babel.linebreaking.add_before(Babel.locale_map, 1)
2372     Babel.loc_to_scr = {}
2373     Babel.chr_to_loc = Babel.chr_to_loc or {}
2374   end
2375   Babel.locale_props[\the\localeid].letters = false
2376 }%
2377 \bbl@xin@{ letters }{ \bbl@KVP@onchar\space}%
2378 \ifin@
2379   \directlua{
2380     Babel.locale_props[\the\localeid].letters = true
2381   }%
2382 \fi
2383 \bbl@xin@{ ids }{ \bbl@KVP@onchar\space}%
2384 \ifin@
2385   \ifx\bbl@starthyphens\@undefined % Needed if no explicit selection
2386     \AddBabelHook{babel-onchar}{beforestart}{\bbl@starthyphens}%
2387   \fi
2388   \bbl@exp{\\bbl@add\\bbl@starthyphens
2389     {\\bbl@patterns@lua{languagename}}}%
2390   % TODO - error/warning if no script
2391   \directlua{
2392     if Babel.script_blocks['\bbl@cl{sbcpr}'] then
2393       Babel.loc_to_scr[\the\localeid] = Babel.script_blocks['\bbl@cl{sbcpr}']
2394       Babel.locale_props[\the\localeid].lg = \the@nameuse{l@languagename}\space
2395     end
2396   }%
2397 \fi
2398 \bbl@xin@{ fonts }{ \bbl@KVP@onchar\space}%
2399 \ifin@
2400   \bbl@ifunset{bbl@lsys@languagename}{\bbl@provide@lsys{languagename}}}%
2401   \bbl@ifunset{bbl@wdir@languagename}{\bbl@provide@dirs{languagename}}}%
2402   \directlua{
2403     if Babel.script_blocks['\bbl@cl{sbcpr}'] then
2404       Babel.loc_to_scr[\the\localeid] =
2405         Babel.script_blocks['\bbl@cl{sbcpr}']
2406     end}%
2407   \ifx\bbl@mapselect\@undefined % TODO. almost the same as mapfont
2408     \AtBeginDocument{%
2409       \bbl@patchfont{\bbl@mapselect}}%
2410       {\selectfont}}%
2411     \def\bbl@mapselect{%
2412       \let\bbl@mapselect\relax
2413       \edef\bbl@prefontid{\fontid\font}}%
2414     \def\bbl@mapdir##1{%
2415       \begingroup
2416         \setbox\z@\hbox{% Force text mode
2417           \def{languagename}##1}%
2418         \let\bbl@ifrestoring\@firstoftwo % To avoid font warning
2419         \bbl@switchfont
2420         \ifnum\fontid\font>\z@ % A hack, for the pgf nullfont hack
2421           \directlua{

```

```

2422             Babel.locale_props[\the\csname bbl@id@##1\endcsname]%
2423             ['/\bbl@prefontid'] = \fontid\font\space}%
2424         \fi}%
2425     \endgroup}%
2426 \fi
2427 \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\languagename}}}%
2428 \fi
2429 % TODO - catch non-valid values
2430 \fi
2431 % == mapfont ==
2432 % For bidi texts, to switch the font based on direction
2433 \ifx\bbl@KVP@mapfont\@nnil\else
2434 \bbl@ifsamestring{\bbl@KVP@mapfont}{direction}{}%
2435 {\bbl@error{unknown-mapfont}}{}}}%
2436 \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{%
2437 \bbl@ifunset{\bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{%
2438 \ifx\bbl@mapselect\@undefined % TODO. See onchar.
2439 \AtBeginDocument{%
2440 \bbl@patchfont{\bbl@mapselect}}%
2441 {\selectfont}}%
2442 \def\bbl@mapselect{%
2443 \let\bbl@mapselect\relax
2444 \edef\bbl@prefontid{\fontid\font}}%
2445 \def\bbl@mapdir##1{%
2446 {\def\languagename{##1}%
2447 \let\bbl@ifrestoring\@firstoftwo % avoid font warning
2448 \bbl@switchfont
2449 \directlua{Babel.fontmap
2450 [\the\csname bbl@wdir@##1\endcsname]%
2451 [\bbl@prefontid]=\fontid\font}}}%
2452 \fi
2453 \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\languagename}}}%
2454 \fi
2455 % == Line breaking: intraspace, intrapenalty ==
2456 % For CJK, East Asian, Southeast Asian, if interspace in ini
2457 \ifx\bbl@KVP@intraspace\@nnil\else % We can override the ini or set
2458 \bbl@csarg\edef{intsp@#2}{\bbl@KVP@intraspace}%
2459 \fi
2460 \bbl@provide@intraspace
2461 % == Line breaking: CJK quotes == TODO -> @extras
2462 \ifcase\bbl@engine\or
2463 \bbl@xin@{/c}{/\bbl@cl{\lnbrk}}}%
2464 \ifin@
2465 \bbl@ifunset{\bbl@quote@\languagename}{}%
2466 {\directlua{
2467 Babel.locale_props[\the\localeid].cjk_quotes = {}
2468 local cs = 'op'
2469 for c in string.utfvalues(
2470 [[\csname bbl@quote@\languagename\endcsname]]) do
2471 if Babel.cjk_characters[c].c == 'qu' then
2472 Babel.locale_props[\the\localeid].cjk_quotes[c] = cs
2473 end
2474 cs = ( cs == 'op') and 'cl' or 'op'
2475 end
2476 }}}%
2477 \fi
2478 \fi
2479 % == Line breaking: justification ==
2480 \ifx\bbl@KVP@justification\@nnil\else
2481 \let\bbl@KVP@linebreaking\bbl@KVP@justification
2482 \fi
2483 \ifx\bbl@KVP@linebreaking\@nnil\else
2484 \bbl@xin@{\bbl@KVP@linebreaking,}%

```

```

2485     {,elongated,kashida,cjk,padding,unhyphenated,}%
2486     \ifin@
2487     \bbl@csarg\xdef
2488     {lnbrk@\languagename}{\expandafter\@car\bbl@KVP@linebreaking\@nil}%
2489     \fi
2490     \fi
2491     \bbl@xin@{/e}{/\bbl@c{l{lnbrk}}}%
2492     \ifin@\else\bbl@xin@{/k}{/\bbl@c{l{lnbrk}}}\fi
2493     \ifin@\bbl@arabicjust\fi
2494     \bbl@xin@{/p}{/\bbl@c{l{lnbrk}}}%
2495     \ifin@\AtBeginDocument{\@nameuse{bbl@tibetanjust}}\fi
2496     % == Line breaking: hyphenate.other.(locale|script) ==
2497     \ifx\bbl@lbfkflag\empty
2498     \bbl@ifunset{bbl@hyotl@\languagename}{}%
2499     {\bbl@csarg\bbl@replace{hyotl@\languagename}{ }{,}}%
2500     \bbl@startcommands*\languagename}{}%
2501     \bbl@csarg\bbl@foreach{hyotl@\languagename}{%
2502     \ifcase\bbl@engine
2503     \ifnum##1<257
2504     \SetHyphenMap{\BabelLower{##1}{##1}}%
2505     \fi
2506     \else
2507     \SetHyphenMap{\BabelLower{##1}{##1}}%
2508     \fi}%
2509     \bbl@endcommands}%
2510     \bbl@ifunset{bbl@hyots@\languagename}{}%
2511     {\bbl@csarg\bbl@replace{hyots@\languagename}{ }{,}}%
2512     \bbl@csarg\bbl@foreach{hyots@\languagename}{%
2513     \ifcase\bbl@engine
2514     \ifnum##1<257
2515     \global\lccode##1=##1\relax
2516     \fi
2517     \else
2518     \global\lccode##1=##1\relax
2519     \fi}}%
2520     \fi
2521     % == Counters: maparabic ==
2522     % Native digits, if provided in ini (TeX level, xe and lua)
2523     \ifcase\bbl@engine\else
2524     \bbl@ifunset{bbl@dgnat@\languagename}{}%
2525     {\expandafter\ifx\csname bbl@dgnat@\languagename\endcsname\empty\else
2526     \expandafter\expandafter\expandafter
2527     \bbl@setdigits\csname bbl@dgnat@\languagename\endcsname
2528     \ifx\bbl@KVP@maparabic\@nnil\else
2529     \ifx\bbl@latinarabic\@undefined
2530     \expandafter\let\expandafter\@arabic
2531     \csname bbl@counter@\languagename\endcsname
2532     \else % ie, if layout=counters, which redefines \@arabic
2533     \expandafter\let\expandafter\bbl@latinarabic
2534     \csname bbl@counter@\languagename\endcsname
2535     \fi
2536     \fi
2537     \fi}%
2538     \fi
2539     % == Counters: mapdigits ==
2540     % > luababel.def
2541     % == Counters: alph, Alph ==
2542     \ifx\bbl@KVP@alph\@nnil\else
2543     \bbl@exp{%
2544     \\bbl@add\<bbl@preextras@\languagename>{%
2545     \\bbl@save\\@alph
2546     \let\\@alph\<bbl@cntr@\bbl@KVP@alph @\languagename>}}%
2547     \fi

```

```

2548 \ifx\bb1@KVP@Alph@annil\else
2549 \bb1@exp{%
2550 \\\bb1@add\<bb1@preextras@\languagename>{%
2551 \\\babel@save\\\@Alph
2552 \let\\\@Alph\<bb1@cntr@\bb1@KVP@Alph @\languagename>}}%
2553 \fi
2554 % == Casing ==
2555 \bb1@release@casing
2556 \ifx\bb1@KVP@casing@annil\else
2557 \bb1@csarg\xdef{casing@\languagename}%
2558 {\@nameuse{bb1@casing@\languagename}\bb1@maybextx\bb1@KVP@casing}%
2559 \fi
2560 % == Calendars ==
2561 \ifx\bb1@KVP@calendar@annil
2562 \edef\bb1@KVP@calendar{\bb1@cl{calpr}}%
2563 \fi
2564 \def\bb1@tempe##1 ##2\@@{% Get first calendar
2565 \def\bb1@tempa{##1}}%
2566 \bb1@exp{\bb1@tempe\bb1@KVP@calendar\space\\\@@}%
2567 \def\bb1@tempe##1.##2.##3\@@{%
2568 \def\bb1@tempc{##1}%
2569 \def\bb1@tempb{##2}}%
2570 \expandafter\bb1@tempe\bb1@tempa. \@
2571 \bb1@csarg\edef{calpr@\languagename}{%
2572 \ifx\bb1@tempc@empty\else
2573 calendar=\bb1@tempc
2574 \fi
2575 \ifx\bb1@tempb@empty\else
2576 ,variant=\bb1@tempb
2577 \fi}%
2578 % == engine specific extensions ==
2579 % Defined in XXXbabel.def
2580 \bb1@provide@extra{#2}%
2581 % == require.babel in ini ==
2582 % To load or reload the babel-*.tex, if require.babel in ini
2583 \ifx\bb1@beforestart\relax\else % But not in doc aux or body
2584 \bb1@ifunset{bb1@rqtex@\languagename}{}%
2585 {\expandafter\ifx\csname bb1@rqtex@\languagename\endcsname@empty\else
2586 \let\BabelBeforeIni@gobbletwo
2587 \chardef\atcatcode=\catcode \@
2588 \catcode \@=11\relax
2589 \def\CurrentOption{#2}%
2590 \bb1@input@texini{\bb1@cs{rqtex@\languagename}}%
2591 \catcode \@=\atcatcode
2592 \let\atcatcode\relax
2593 \global\bb1@csarg\let{rqtex@\languagename}\relax
2594 \fi}%
2595 \bb1@foreach\bb1@calendars{%
2596 \bb1@ifunset{bb1@ca@##1}{%
2597 \chardef\atcatcode=\catcode \@
2598 \catcode \@=11\relax
2599 \InputIfFileExists{babel-ca-##1.tex}{}%
2600 \catcode \@=\atcatcode
2601 \let\atcatcode\relax}%
2602 {}}%
2603 \fi
2604 % == frenchspacing ==
2605 \ifcase\bb1@howloaded\in@true\else\in@false\fi
2606 \ifin@ \else\bb1@xin@{typography/frenchspacing}{\bb1@key@list}\fi
2607 \ifin@
2608 \bb1@extras@wrap{\bb1@pre@fs}%
2609 {\bb1@pre@fs}%
2610 {\bb1@post@fs}%

```

```

2611 \fi
2612 % == transforms ==
2613 % > luababel.def
2614 \def\CurrentOption{#2}%
2615 \@nameuse{bbl@icsave@#2}%
2616 % == main ==
2617 \ifx\bbl@KVP@main\@nnil % Restore only if not 'main'
2618   \let\languagename\bbl@save@langname
2619   \chardef\localeid\bbl@save@localeid\relax
2620 \fi
2621 % == hyphenrules (apply if current) ==
2622 \ifx\bbl@KVP@hyphenrules\@nnil\else
2623   \ifnum\bbl@save@localeid=\localeid
2624     \language\@nameuse{l@\languagename}%
2625   \fi
2626 \fi}

```

Depending on whether or not the language exists (based on `\date<language>`), we define two macros. Remember `\bbl@startcommands` opens a group.

```

2627 \def\bbl@provide@new#1{%
2628   \@namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
2629   \@namedef{extras#1}{}%
2630   \@namedef{noextras#1}{}%
2631   \bbl@startcommands*{#1}{captions}%
2632   \ifx\bbl@KVP@captions\@nnil % and also if import, implicit
2633     \def\bbl@tempb##1{% elt for \bbl@captionslist
2634       \if##1@empty\else
2635         \bbl@exp{%
2636           \\SetString\\##1{%
2637             \\bbl@nocaption{\bbl@stripslash##1}{#1\bbl@stripslash##1}}}%
2638         \expandafter\bbl@tempb
2639       \fi}%
2640     \expandafter\bbl@tempb\bbl@captionslist\@empty
2641   \else
2642     \ifx\bbl@initoload\relax
2643       \bbl@read@ini{\bbl@KVP@captions}2% % Here letters cat = 11
2644     \else
2645       \bbl@read@ini{\bbl@initoload}2% % Same
2646     \fi
2647   \fi
2648   \StartBabelCommands*{#1}{date}%
2649   \ifx\bbl@KVP@date\@nnil
2650     \bbl@exp{%
2651       \\SetString\\today{\bbl@nocaption{today}{#1today}}}%
2652   \else
2653     \bbl@savetoday
2654     \bbl@savedate
2655   \fi
2656   \bbl@endcommands
2657   \bbl@load@basic{#1}%
2658   % == hyphenmins == (only if new)
2659   \bbl@exp{%
2660     \gdef\<#1hyphenmins>{%
2661       {\bbl@ifunset{\bbl@lfthm@#1}{2}{\bbl@cs{lfthm@#1}}}%
2662       {\bbl@ifunset{\bbl@rgthm@#1}{3}{\bbl@cs{rgthm@#1}}}}}%
2663   % == hyphenrules (also in renew) ==
2664   \bbl@provide@hyphens{#1}%
2665   \ifx\bbl@KVP@main\@nnil\else
2666     \expandafter\main@language\expandafter{#1}%
2667   \fi}
2668 %
2669 \def\bbl@provide@renew#1{%
2670   \ifx\bbl@KVP@captions\@nnil\else

```

```

2671 \StartBabelCommands*{#1}{captions}%
2672 \bbl@read@ini{\bbl@KVP@captions}2% % Here all letters cat = 11
2673 \EndBabelCommands
2674 \fi
2675 \ifx\bbl@KVP@date\@nnil\else
2676 \StartBabelCommands*{#1}{date}%
2677 \bbl@savetoday
2678 \bbl@savedate
2679 \EndBabelCommands
2680 \fi
2681 % == hyphenrules (also in new) ==
2682 \ifx\bbl@lbfkflag\@empty
2683 \bbl@provide@hyphens{#1}%
2684 \fi}

```

Load the basic parameters (ids, typography, counters, and a few more), while captions and dates are left out. But it may happen some data has been loaded before automatically, so we first discard the saved values. (TODO. But preserving previous values would be useful.)

```

2685 \def\bbl@load@basic#1{%
2686 \ifcase\bbl@howloaded\or\or
2687 \ifcase\csname bbl@llevel@\languagename\endcsname
2688 \bbl@carg\let\lname@\languagename\relax
2689 \fi
2690 \fi
2691 \bbl@ifunset{\bbl@lname@#1}%
2692 {\def\BabelBeforeIni##1##2{%
2693 \begingroup
2694 \let\bbl@ini@captions@aux\@gobbletwo
2695 \def\bbl@inidate ###1.###2.###3.###4\relax ###5###6}%
2696 \bbl@read@ini{##1}1%
2697 \ifx\bbl@initoload\relax\endinput\fi
2698 \endgroup}%
2699 \begingroup % boxed, to avoid extra spaces:
2700 \ifx\bbl@initoload\relax
2701 \bbl@input@texini{#1}%
2702 \else
2703 \setbox\z@\hbox{\BabelBeforeIni{\bbl@initoload}}}%
2704 \fi
2705 \endgroup}%
2706 {}

```

The hyphenrules option is handled with an auxiliary macro. This macro is called in three cases: when a language is first declared with \babelprovide, with hyphenrules and with import.

```

2707 \def\bbl@provide@hyphens#1{%
2708 \@tempcnta\m@ne % a flag
2709 \ifx\bbl@KVP@hyphenrules\@nnil\else
2710 \bbl@replace\bbl@KVP@hyphenrules{ },}%
2711 \bbl@foreach\bbl@KVP@hyphenrules{%
2712 \ifnum\@tempcnta=\m@ne % if not yet found
2713 \bbl@ifsamestring{##1}{+}%
2714 {\bbl@carg\addlanguage{l@##1}}%
2715 }%
2716 \bbl@ifunset{l@##1}% After a possible +
2717 {}%
2718 {\@tempcnta\@nameuse{l@##1}}%
2719 \fi}%
2720 \ifnum\@tempcnta=\m@ne
2721 \bbl@warning{%
2722 Requested 'hyphenrules' for '\languagename' not found:\\%
2723 \bbl@KVP@hyphenrules.\\%
2724 Using the default value. Reported}%
2725 \fi
2726 \fi
2727 \ifnum\@tempcnta=\m@ne % if no opt or no language in opt found

```

```

2728 \ifx\bbk@KVP@captions@@\@nnil % TODO. Hackish. See above.
2729 \bbk@ifunset{\bbk@hyphr@#1}{}% use value in ini, if exists
2730 {\bbk@exp{\bbk@ifblank{\bbk@cs{hyphr@#1}}}%
2731 {}%
2732 {\bbk@ifunset{\l@bbk@cl{hyphr}}}%
2733 {}% if hyphenrules found:
2734 {\@tempcnta\@nameuse{\l@bbk@cl{hyphr}}}}%
2735 \fi
2736 \fi
2737 \bbk@ifunset{\l@#1}%
2738 {\ifnum\@tempcnta=\m@ne
2739 \bbk@carg\adddialect{\l@#1}\language
2740 \else
2741 \bbk@carg\adddialect{\l@#1}\@tempcnta
2742 \fi}%
2743 {\ifnum\@tempcnta=\m@ne\else
2744 \global\bbk@carg\chardef{\l@#1}\@tempcnta
2745 \fi}}

```

The reader of babel-...tex files. We reset temporarily some catcodes.

```

2746 \def\bbk@input@texini#1{%
2747 \bbk@bsphack
2748 \bbk@exp{%
2749 \catcode`\\%=14 \catcode`\\%=0
2750 \catcode`\\%=1 \catcode`\\%=2
2751 \lowercase{\InputIfFileExists{babel-#1.tex}{}}%
2752 \catcode`\\%=\the\catcode`%\relax
2753 \catcode`\\%=\the\catcode`%\relax
2754 \catcode`\\%=\the\catcode`%\relax
2755 \catcode`\\%=\the\catcode`%\relax}%
2756 \bbk@esphack}

```

The following macros read and store ini files (but don't process them). For each line, there are 3 possible actions: ignore if starts with ;, switch section if starts with [, and store otherwise. There are used in the first step of \bbk@read@ini.

```

2757 \def\bbk@iniline#1\bbk@iniline{%
2758 \ifnextchar[\bbk@inisect{\@ifnextchar;\bbk@iniskip\bbk@inistore}#1\@@% ]
2759 \def\bbk@inisect[#1]#2\@@{\def\bbk@section{#1}}
2760 \def\bbk@iniskip#1\@@{% if starts with ;
2761 \def\bbk@inistore#1=#2\@@{% full (default)
2762 \bbk@trim@def\bbk@tempa{#1}%
2763 \bbk@trim\toks@{#2}%
2764 \bbk@xin@{\bbk@section/\bbk@tempa;}{\bbk@key@list}%
2765 \ifin@else
2766 \bbk@xin@{,identification/include.}%
2767 {,\bbk@section/\bbk@tempa}%
2768 \ifin@\xdef\bbk@included@inis{\the\toks@}\fi
2769 \bbk@exp{%
2770 \\g@addto@macro\\bbk@inidata{%
2771 \\bbk@elt{\bbk@section}{\bbk@tempa}{\the\toks@}}%
2772 \fi}
2773 \def\bbk@inistore@min#1=#2\@@{% minimal (maybe set in \bbk@read@ini)
2774 \bbk@trim@def\bbk@tempa{#1}%
2775 \bbk@trim\toks@{#2}%
2776 \bbk@xin@{.identification.}{\bbk@section.}%
2777 \ifin@
2778 \bbk@exp{\\g@addto@macro\\bbk@inidata{%
2779 \\bbk@elt{identification}{\bbk@tempa}{\the\toks@}}%
2780 \fi}

```

Now, the 'main loop', which **must be executed inside a group**. At this point, \bbk@inidata may contain data declared in \babelprovide, with 'slashed' keys. There are 3 steps: first read the ini file and store it; then traverse the stored values, and process some groups if required (date, captions, labels, counters); finally, 'export' some values by defining global macros (identification, typography,

characters, numbers). The second argument is 0 when called to read the minimal data for fonts; with `\babelprovide` it's either 1 or 2.

```

2781 \def\bbl@loop@ini{%
2782   \loop
2783     \if T\ifeof\bbl@readstream F\fi T\relax % Trick, because inside \loop
2784     \endlinechar\m@ne
2785     \read\bbl@readstream to \bbl@line
2786     \endlinechar\^^M
2787     \ifx\bbl@line@empty\else
2788       \expandafter\bbl@iniline\bbl@line\bbl@iniline
2789     \fi
2790   \repeat}
2791 \ifx\bbl@readstream@undefined
2792   \csname newread\endcsname\bbl@readstream
2793 \fi
2794 \def\bbl@read@ini#1#2{%
2795   \global\let\bbl@extend@ini@gobble
2796   \openin\bbl@readstream=babel-#1.ini
2797   \ifeof\bbl@readstream
2798     \bbl@error{no-ini-file}{#1}{}%
2799   \else
2800     % == Store ini data in \bbl@inidata ==
2801     \catcode\[=12 \catcode\]=12 \catcode\==12 \catcode\&=12
2802     \catcode\;=12 \catcode\|=12 \catcode\%=14 \catcode\-=12
2803     \bbl@info{Importing
2804       \ifcase#2font and identification \or basic \fi
2805       data for \languagename\}%
2806     from babel-#1.ini. Reported}%
2807   \ifnum#2=\z@
2808     \global\let\bbl@inidata@empty
2809     \let\bbl@inistore\bbl@inistore@min % Remember it's local
2810   \fi
2811   \def\bbl@section{identification}%
2812   \bbl@exp{\bbl@inistore tag.ini=#1\@@}%
2813   \bbl@inistore load.level=#2\@@
2814   \bbl@loop@ini
2815   % == Process stored data ==
2816   \bbl@csarg\xdef{lini@languagename}{#1}%
2817   \bbl@read@ini@aux
2818   % == 'Export' data ==
2819   \bbl@ini@exports{#2}%
2820   \global\bbl@csarg\let{inidata@languagename}\bbl@inidata
2821   \global\let\bbl@inidata@empty
2822   \bbl@exp{\bbl@add@list\bbl@ini@loaded{languagename}}%
2823   \bbl@tglobal\bbl@ini@loaded
2824   \fi
2825   \closein\bbl@readstream}
2826 \def\bbl@read@ini@aux{%
2827   \let\bbl@savestrings@empty
2828   \let\bbl@savetoday@empty
2829   \let\bbl@savodate@empty
2830   \def\bbl@elt##1##2##3{%
2831     \def\bbl@section{##1}%
2832     \in{=date.}{=##1}% Find a better place
2833     \ifin@
2834       \bbl@ifunset{bbl@inikv@##1}%
2835       {\bbl@ini@calendar{##1}}%
2836     }%
2837   \fi
2838   \bbl@ifunset{bbl@inikv@##1}{%
2839     {\csname bbl@inikv@##1\endcsname{##2}{##3}}%
2840   \bbl@inidata}

```


A variant to be used when the ini file has been already loaded, because it's not the first `\babelprovide` for this language.

```

2841 \def\bb@extend@ini@aux#1{%
2842   \bb@startcommands*{#1}{captions}%
2843   % Activate captions/... and modify exports
2844   \bb@csarg\def\inikv@captions.licr###1##2{%
2845     \setlocalecaption{#1}##1{##2}}%
2846   \def\bb@inikv@captions###1##2{%
2847     \bb@ini@captions@aux{##1}{##2}}%
2848   \def\bb@stringdef###1##2{\gdef##1{##2}}%
2849   \def\bb@exportkey###1##2##3{%
2850     \bb@ifunset{bb@kv@##2}{}%
2851     {\expandafter\ifx\csname bb@kv@##2\endcsname\empty\else
2852      \bb@exp{\global\let\<bb@##1@\language\>\<bb@kv@##2>}}%
2853     \fi}%
2854   % As with \bb@read@ini, but with some changes
2855   \bb@read@ini@aux
2856   \bb@ini@exports\tw@
2857   % Update inidata@lang by pretending the ini is read.
2858   \def\bb@elt###1##2##3{%
2859     \def\bb@section{##1}%
2860     \bb@iniline##2=##3\bb@iniline}%
2861     \csname bb@inidata@#1\endcsname
2862     \global\bb@csarg\let{inidata@#1}\bb@inidata
2863   \StartBabelCommands*{#1}{date}% And from the import stuff
2864   \def\bb@stringdef###1##2{\gdef##1{##2}}%
2865   \bb@savetoday
2866   \bb@savedate
2867   \bb@endcommands}

```

A somewhat hackish tool to handle calendar sections. TODO. To be improved.

```

2868 \def\bb@ini@calendar#1{%
2869   \lowercase{\def\bb@tempa{=#1=}}%
2870   \bb@replace\bb@tempa{=date.gregorian}{}%
2871   \bb@replace\bb@tempa{=date.}{}%
2872   \in@{.licr}=#1=%
2873   \ifin@
2874     \ifcase\bb@engine
2875       \bb@replace\bb@tempa{.licr}={}%
2876     \else
2877       \let\bb@tempa\relax
2878     \fi
2879   \fi
2880   \ifx\bb@tempa\relax\else
2881     \bb@replace\bb@tempa{=}{}%
2882     \ifx\bb@tempa\empty\else
2883       \xdef\bb@calendars{\bb@calendars,\bb@tempa}%
2884     \fi
2885     \bb@exp{%
2886       \def\<bb@inikv@#1>#####1###2{%
2887         \\\bb@inidate###1...\relax{#####2}{\bb@tempa}}}%
2888     \fi}

```

A key with a slash in `\babelprovide` replaces the value in the ini file (which is ignored altogether). The mechanism is simple (but suboptimal): add the data to the ini one (at this point the ini file has not yet been read), and define a dummy macro. When the ini file is read, just skip the corresponding key and reset the macro (in `\bb@inistore` above).

```

2889 \def\bb@renewinikey#1/#2\@#3{%
2890   \edef\bb@tempa{\zap@space #1 \@empty}% section
2891   \edef\bb@tempb{\zap@space #2 \@empty}% key
2892   \bb@trim\toks@{#3}% value
2893   \bb@exp{%
2894     \edef\\bb@key@list{\bb@key@list \bb@tempa/\bb@tempb};%

```

```

2895   \\g@addto@macro\\bb@inidata{%
2896     \\bb@elt{\\bb@tempa}{\\bb@tempb}{\\the\toks@}}}%

```

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

```

2897 \def\bb@exportkey#1#2#3{%
2898   \bb@ifunset{bb@@kv@#2}%
2899     {\\bb@csarg\gdef{#1@\\languagename}{#3}}%
2900     {\\expandafter\\ifx\\csname bb@@kv@#2\\endcsname\\@empty
2901       \\bb@csarg\gdef{#1@\\languagename}{#3}%
2902       \\else
2903         \\bb@exp{\\global\\let<bb@#1@\\languagename>\\<bb@@kv@#2>}%
2904       \\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 `\\bb@ini@exports` is called always (via `\\bb@inisec`), while `\\bb@after@ini` must be called explicitly after `\\bb@read@ini` if necessary. Although BCP 47 doesn't treat '-x-' as an extension, the CLDR and many other sources do (as a *private use extension*). For consistency with other single-letter subtags or 'singletons', here is considered an extension, too.

```

2905 \def\bb@iniwarning#1{%
2906   \bb@ifunset{bb@@kv@identification.warning#1}}}%
2907   {\\bb@warning{%
2908     From babel-\\bb@cs{\\ini@\\languagename}.ini:\\%
2909     \\bb@cs{@kv@identification.warning#1}\\%
2910     Reported }}}
2911 %
2912 \\let\\bb@release@transforms\\@empty
2913 \\let\\bb@release@casing\\@empty
2914 \def\bb@ini@exports#1{%
2915   % Identification always exported
2916   \\bb@iniwarning}%
2917   \\ifcase\\bb@engine
2918     \\bb@iniwarning{.pdflatex}%
2919   \\or
2920     \\bb@iniwarning{.lualatex}%
2921   \\or
2922     \\bb@iniwarning{.xelatex}%
2923   \\fi%
2924   \\bb@exportkey{llevel}{identification.load.level}}}%
2925   \\bb@exportkey{elname}{identification.name.english}}}%
2926   \\bb@exp{\\bb@exportkey{lname}{identification.name.opentype}%
2927     {\\csname bb@elname@\\languagename\\endcsname}}}%
2928   \\bb@exportkey{tbc}{identification.tag.bcp47}}}%
2929   % Somewhat hackish. TODO:
2930   \\bb@exportkey{casing}{identification.tag.bcp47}}}%
2931   \\bb@exportkey{lbc}{identification.language.tag.bcp47}}}%
2932   \\bb@exportkey{lotf}{identification.tag.opentype}{dflt}%
2933   \\bb@exportkey{esname}{identification.script.name}}}%
2934   \\bb@exp{\\bb@exportkey{sname}{identification.script.name.opentype}%
2935     {\\csname bb@esname@\\languagename\\endcsname}}}%
2936   \\bb@exportkey{sbc}{identification.script.tag.bcp47}}}%
2937   \\bb@exportkey{sotf}{identification.script.tag.opentype}{DFLT}%
2938   \\bb@exportkey{rbcp}{identification.region.tag.bcp47}}}%
2939   \\bb@exportkey{vbcp}{identification.variant.tag.bcp47}}}%
2940   \\bb@exportkey{extt}{identification.extension.t.tag.bcp47}}}%
2941   \\bb@exportkey{extu}{identification.extension.u.tag.bcp47}}}%
2942   \\bb@exportkey{extx}{identification.extension.x.tag.bcp47}}}%
2943   % Also maps bcp47 -> languagename
2944   \\ifbb@bcptoname
2945     \\bb@csarg\xdef{bcp@map@\\bb@cl{tbc}}{\\languagename}%
2946   \\fi
2947   \\ifcase\\bb@engine\\or
2948     \\directlua{%

```

```

2949     Babel.locale_props[\the\bbbl@cs{id@\language name}].script
2950     = '\bbbl@cl{sbcpr}'%
2951 \fi
2952 % Conditional
2953 \ifnum#1>\z@           % 0 = only info, 1, 2 = basic, (re)new
2954 \bbbl@exportkey{calpr}{date.calendar.preferred}{}%
2955 \bbbl@exportkey{lnbrk}{typography.linebreaking}{h}%
2956 \bbbl@exportkey{hyphr}{typography.hyphenrules}{}%
2957 \bbbl@exportkey{lfthm}{typography.lefthyphenmin}{2}%
2958 \bbbl@exportkey{rgthm}{typography.righthyphenmin}{3}%
2959 \bbbl@exportkey{prehc}{typography.prehyphenchar}{}%
2960 \bbbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
2961 \bbbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
2962 \bbbl@exportkey{intsp}{typography.intraspaces}{}%
2963 \bbbl@exportkey{frspc}{typography.frenchspacing}{u}%
2964 \bbbl@exportkey{chrng}{characters.ranges}{}%
2965 \bbbl@exportkey{quote}{characters.delimiters.quotes}{}%
2966 \bbbl@exportkey{dgnat}{numbers.digits.native}{}%
2967 \ifnum#1=\tw@         % only (re)new
2968 \bbbl@exportkey{rqtex}{identification.require.babel}{}%
2969 \bbbl@toglobal\bbbl@savetoday
2970 \bbbl@toglobal\bbbl@savedate
2971 \bbbl@savestrings
2972 \fi
2973 \fi}

```

A shared handler for key=val lines to be stored in \bbbl@kv@<section>.<key>.

```

2974 \def\bbbl@inikv#1#2{%      key=value
2975 \toks@{#2}%                This hides #'s from ini values
2976 \bbbl@csarg\edef{kv@\bbbl@section.#1}{\the\toks@}}

```

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

```

2977 \let\bbbl@inikv@identification\bbbl@inikv
2978 \let\bbbl@inikv@date\bbbl@inikv
2979 \let\bbbl@inikv@typography\bbbl@inikv
2980 \let\bbbl@inikv@numbers\bbbl@inikv

```

The characters section also stores the values, but casing is treated in a different fashion. Much like transforms, a set of commands calling the parser are stored in \bbbl@release@casing, which is executed in \babelprovide.

```

2981 \def\bbbl@maybextx{-\bbbl@csarg\ifx{extx@\language name}\@empty x-\fi}
2982 \def\bbbl@inikv@characters#1#2{%
2983 \bbbl@ifsamestring{#1}{casing}% eg, casing = uV
2984 {\bbbl@exp{%
2985 \g@addto@macro{\bbbl@release@casing{%
2986 \bbbl@casemapping}{\language name}{\unexpanded{#2}}}}}%
2987 {\in@{casing.}{#1}% eg, casing.Uv = uV
2988 \ifin@
2989 \lowercase{\def\bbbl@tempb{#1}}%
2990 \bbbl@replace\bbbl@tempb{casing.}{}%
2991 \bbbl@exp{\g@addto@macro{\bbbl@release@casing{%
2992 \bbbl@casemapping
2993 {\bbbl@maybextx\bbbl@tempb}{\language name}{\unexpanded{#2}}}}}%
2994 \else
2995 \bbbl@inikv{#1}{#2}%
2996 \fi}}

```

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

```

2997 \def\bbbl@inikv@counters#1#2{%
2998 \bbbl@ifsamestring{#1}{digits}%
2999 {\bbbl@error{digits-is-reserved}{}}}%
3000 {}%

```

```

3001 \def\bbbl@tempc{#1}%
3002 \bbbl@trim@def{\bbbl@tempb*}{#2}%
3003 \in@{.l$}{#1$}%
3004 \ifin@
3005   \bbbl@replace\bbbl@tempc{.l}{}%
3006   \bbbl@csarg\protected@xdef{cntr@\bbbl@tempc @\languagename}{%
3007     \noexpand\bbbl@alphanumeric{\bbbl@tempc}}%
3008 \fi
3009 \in@{.F.}{#1}%
3010 \ifin@\else\in@{.S.}{#1}\fi
3011 \ifin@
3012   \bbbl@csarg\protected@xdef{cntr@#1@\languagename}{\bbbl@tempb*}%
3013 \else
3014   \toks@{ }% Required by \bbbl@builidifcase, which returns \bbbl@tempa
3015   \expandafter\bbbl@builidifcase\bbbl@tempb* \ \ % Space after \
3016   \bbbl@csarg{\global\expandafter\let}{cntr@#1@\languagename}\bbbl@tempa
3017 \fi}

```

Now captions and captions.licr, depending on the engine. And below also for dates. They rely on a few auxiliary macros. It is expected the ini file provides the complete set in Unicode and LICR, in that order.

```

3018 \ifcase\bbbl@engine
3019   \bbbl@csarg\def{inikv@captions.licr}#1#2{%
3020     \bbbl@ini@captions@aux{#1}{#2}}
3021 \else
3022   \def\bbbl@inikv@captions#1#2{%
3023     \bbbl@ini@captions@aux{#1}{#2}}
3024 \fi

```

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

```

3025 \def\bbbl@ini@captions@template#1#2{% string language tempa=capt-name
3026   \bbbl@replace\bbbl@tempa{.template}{}}%
3027 \def\bbbl@toreplace{#1}{}}%
3028 \bbbl@replace\bbbl@toreplace{[ ]}{\nobreakspace}}%
3029 \bbbl@replace\bbbl@toreplace{[ ]}{\csname}%
3030 \bbbl@replace\bbbl@toreplace{[ ]}{\csname the}%
3031 \bbbl@replace\bbbl@toreplace{[ ]}{\name\endcsname}}%
3032 \bbbl@replace\bbbl@toreplace{[ ]}{\endcsname}}%
3033 \bbbl@xin@{, \bbbl@tempa, }{, chapter, appendix, part, }%
3034 \ifin@
3035   \@nameuse{bbbl@patch\bbbl@tempa}%
3036   \global\bbbl@csarg\let{\bbbl@tempa fmt@#2}\bbbl@toreplace
3037 \fi
3038 \bbbl@xin@{, \bbbl@tempa, }{, figure, table, }%
3039 \ifin@
3040   \global\bbbl@csarg\let{\bbbl@tempa fmt@#2}\bbbl@toreplace
3041   \bbbl@exp{\gdef\<fnum@\bbbl@tempa>{%
3042     \\bbbl@ifunset{bbbl@\bbbl@tempa fmt@\\languagename}%
3043     {[fnum@\bbbl@tempa]}%
3044     {\\@nameuse{bbbl@\bbbl@tempa fmt@\\languagename}}}}%
3045 \fi}
3046 \def\bbbl@ini@captions@aux#1#2{%
3047   \bbbl@trim@def\bbbl@tempa{#1}%
3048   \bbbl@xin@{.template}{\bbbl@tempa}%
3049   \ifin@
3050     \bbbl@ini@captions@template{#2}\languagename
3051 \else
3052   \bbbl@ifblank{#2}%
3053     {\bbbl@exp{%
3054       \toks@{\\bbbl@nocaption{\bbbl@tempa}{\languagename\bbbl@tempa name}}}}%
3055     {\bbbl@trim\toks@{#2}}%
3056   \bbbl@exp{%
3057     \\bbbl@add\\bbbl@savestrings{%
3058       \\SetString\<\bbbl@tempa name>{\the\toks@}}}%

```

```

3059 \toks\expandafter{\bbl@captionslist}%
3060 \bbl@exp{\in@{\<\bbl@tempa name>}{\the\toks@}}%
3061 \ifin@ \else
3062 \bbl@exp{%
3063 \\\bbl@add\<bbl@extracaps@ \language name>{\<\bbl@tempa name>}%
3064 \\\bbl@tglobal\<bbl@extracaps@ \language name>}%
3065 \fi
3066 \fi}

```

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

```

3067 \def\bbl@list@the{%
3068 part,chapter,section,subsection,subsubsection,paragraph,%
3069 subparagraph,enumi,enumii,enumiii,enumiv,equation,figure,%
3070 table,page,footnote,mpfootnote,mpfn}
3071 \def\bbl@map@cnt#1{% #1:roman,etc, // #2:enumi,etc
3072 \bbl@ifunset{\bbl@map@#1@ \language name}%
3073 {\@nameuse{#1}}%
3074 {\@nameuse{\bbl@map@#1@ \language name}}}}
3075 \def\bbl@inikv@labels#1#2{%
3076 \in@{.map}{#1}%
3077 \ifin@
3078 \ifx\bbl@KVP@labels\@nnil\else
3079 \bbl@xin@{ map }{ \bbl@KVP@labels \space}%
3080 \ifin@
3081 \def\bbl@tempc{#1}%
3082 \bbl@replace\bbl@tempc{.map}{}%
3083 \in@{,#2,}{,arabic,roman,Roman,alph,Alph,fnsymbol,}%
3084 \bbl@exp{%
3085 \gdef\<bbl@map@ \bbl@tempc @ \language name>%
3086 {\ifin@<#2>\else\\localecounter{#2}\fi}}%
3087 \bbl@foreach\bbl@list@the{%
3088 \bbl@ifunset{the##1}{}%
3089 {\bbl@exp{\let\\bbl@tempd\<the##1>}%
3090 \bbl@exp{%
3091 \\\bbl@sreplace\<the##1>%
3092 {\<\bbl@tempc>{##1}}{\\\bbl@map@cnt{\bbl@tempc}{##1}}%
3093 \\\bbl@sreplace\<the##1>%
3094 {\<\@empty @ \bbl@tempc>\<c@##1>}{\\bbl@map@cnt{\bbl@tempc}{##1}}}%
3095 \expandafter\ifx\csname the##1\endcsname\bbl@tempd\else
3096 \toks\expandafter\expandafter\expandafter{%
3097 \csname the##1\endcsname}%
3098 \expandafter\edef\csname the##1\endcsname{\the\toks@}}%
3099 \fi}}%
3100 \fi
3101 \fi
3102 %
3103 \else
3104 %
3105 % The following code is still under study. You can test it and make
3106 % suggestions. Eg, enumerate.2 = ([enumi]).([enumii]). It's
3107 % language dependent.
3108 \in@{enumerate.}{#1}%
3109 \ifin@
3110 \def\bbl@tempa{#1}%
3111 \bbl@replace\bbl@tempa{enumerate.}{}%
3112 \def\bbl@toreplace{#2}%
3113 \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace{}}%
3114 \bbl@replace\bbl@toreplace{[ ]}{\csname the}%
3115 \bbl@replace\bbl@toreplace{ ]}{\endcsname{}}%
3116 \toks\expandafter{\bbl@toreplace}%
3117 % TODO. Execute only once:
3118 \bbl@exp{%
3119 \\\bbl@add\<extras \language name>%

```

```

3120     \\babel@save\<labelenum\romannumeral\bbl@tempa>%
3121     \def\<labelenum\romannumeral\bbl@tempa>{\the\toks@}%
3122     \\bbl@tglobal\<extras\language>%
3123     \fi
3124     \fi}

```

To show correctly some captions in a few languages, we need to patch some internal macros, because the order is hardcoded. For example, in Japanese the chapter number is surrounded by two string, while in Hungarian is placed after. These replacement works in many classes, but not all. Actually, the following lines are somewhat tentative.

```

3125 \def\bbl@chapttype{chapter}
3126 \ifx\@makechapterhead\@undefined
3127   \let\bbl@patchchapter\relax
3128 \else\ifx\thechapter\@undefined
3129   \let\bbl@patchchapter\relax
3130 \else\ifx\ps@headings\@undefined
3131   \let\bbl@patchchapter\relax
3132 \else
3133   \def\bbl@patchchapter{%
3134     \global\let\bbl@patchchapter\relax
3135     \gdef\bbl@chfmt{%
3136       \bbl@ifunset{bbl@\bbl@chapttype fmt@\language}%
3137         {\@chapapp\space\thechapter}
3138         {\@nameuse{bbl@\bbl@chapttype fmt@\language}}}
3139     \bbl@add\appendix{\def\bbl@chapttype{appendix}}% Not harmful, I hope
3140     \bbl@sreplace\ps@headings{\@chapapp\ \thechapter}{\bbl@chfmt}%
3141     \bbl@sreplace\chaptermark{\@chapapp\ \thechapter}{\bbl@chfmt}%
3142     \bbl@sreplace\@makechapterhead{\@chapapp\space\thechapter}{\bbl@chfmt}%
3143     \bbl@tglobal\appendix
3144     \bbl@tglobal\ps@headings
3145     \bbl@tglobal\chaptermark
3146     \bbl@tglobal\@makechapterhead}
3147     \let\bbl@patchappendix\bbl@patchchapter
3148   \fi\fi\fi
3149 \ifx\@part\@undefined
3150   \let\bbl@patchpart\relax
3151 \else
3152   \def\bbl@patchpart{%
3153     \global\let\bbl@patchpart\relax
3154     \gdef\bbl@partformat{%
3155       \bbl@ifunset{bbl@partfmt@\language}%
3156         {\partname\nobreakspace\thepart}
3157         {\@nameuse{bbl@partfmt@\language}}}
3158     \bbl@sreplace\@part{\partname\nobreakspace\thepart}{\bbl@partformat}%
3159     \bbl@tglobal\@part}
3160   \fi

```

Date. Arguments (year, month, day) are *not* protected, on purpose. In \today, arguments are always gregorian, and therefore always converted with other calendars. TODO. Document

```

3161 \let\bbl@calendar\@empty
3162 \DeclareRobustCommand\localdate[1][\bbl@localdate{#1}]
3163 \def\bbl@localdate#1#2#3#4{%
3164   \begingroup
3165     \edef\bbl@they{#2}%
3166     \edef\bbl@them{#3}%
3167     \edef\bbl@thed{#4}%
3168     \edef\bbl@tempe{%
3169       \bbl@ifunset{bbl@calpr@\language}{\bbl@cl{calpr}},%
3170       #1}%
3171     \bbl@replace\bbl@tempe{ }{}%
3172     \bbl@replace\bbl@tempe{CONVERT}{convert=}% Hackish
3173     \bbl@replace\bbl@tempe{convert}{convert=}%
3174     \let\bbl@ld@calendar\@empty
3175     \let\bbl@ld@variant\@empty

```

```

3176 \let\bbl@d@convert\relax
3177 \def\bbl@tempb##1=##2\@{\@namedef\bbl@d@##1}{##2}}%
3178 \bbl@foreach\bbl@tempe{\bbl@tempb##1\@}{%
3179 \bbl@replace\bbl@d@calendar{gregorian}{}}%
3180 \ifx\bbl@d@calendar\@empty\else
3181 \ifx\bbl@d@convert\relax\else
3182 \babelcalendar[\bbl@they-\bbl@them-\bbl@thed]%
3183 {\bbl@d@calendar}\bbl@they\bbl@them\bbl@thed
3184 \fi
3185 \fi
3186 \@nameuse\bbl@precalendar}% Remove, eg, +, -civil (-ca-islamic)
3187 \edef\bbl@calendar{% Used in \month..., too
3188 \bbl@d@calendar
3189 \ifx\bbl@d@variant\@empty\else
3190 .\bbl@d@variant
3191 \fi}%
3192 \bbl@cased
3193 {\@nameuse\bbl@date@\languagename @\bbl@calendar}%
3194 \bbl@they\bbl@them\bbl@thed}%
3195 \endgroup}
3196 % eg: 1=months, 2=wide, 3=1, 4=dummy, 5=value, 6=calendar
3197 \def\bbl@inidate#1.#2.#3.#4\relax#5#6{% TODO - ignore with 'captions'
3198 \bbl@trim@def\bbl@tempa{#1.#2}%
3199 \bbl@ifsamestring{\bbl@tempa}{months.wide}% to savedate
3200 {\bbl@trim@def\bbl@tempa{#3}%
3201 \bbl@trim\toks@{#5}%
3202 \@temptokena\expandafter{\bbl@savodate}%
3203 \bbl@exp{% Reverse order - in ini last wins
3204 \def\\bbl@savodate{%
3205 \\SetString<month\romannumeral\bbl@tempa#6name>{\the\toks@}%
3206 \the\@temptokena}}%
3207 {\bbl@ifsamestring{\bbl@tempa}{date.long}% defined now
3208 {\lowercase{\def\bbl@tempb{#6}}}%
3209 \bbl@trim@def\bbl@toreplace{#5}%
3210 \bbl@TG@@date
3211 \global\bbl@csarg\let{date@\languagename @\bbl@tempb}\bbl@toreplace
3212 \ifx\bbl@savetoday\@empty
3213 \bbl@exp{% TODO. Move to a better place.
3214 \\AfterBabelCommands{%
3215 \def<\languagename date>{\protect<\languagename date >}%
3216 \\newcommand<\languagename date >[4][{%
3217 \\bbl@usedategrouprue
3218 <\bbl@ensure@\languagename>{%
3219 \\localdate[####1]{####2}{####3}{####4}}}%
3220 \def\\bbl@savetoday{%
3221 \\SetString\\today{%
3222 <\languagename date>[convert]%
3223 {\the\year}{\the\month}{\the\day}}}%
3224 \fi}%
3225 {}}}

```

Dates will require some macros for the basic formatting. They may be redefined by language, so “semi-public” names (camel case) are used. Oddly enough, the CLDR places particles like “de” inconsistently in either in the date or in the month name. Note after `\bbl@replace\toks@` contains the resulting string, which is used by `\bbl@replace@finish@iii` (this implicit behavior doesn’t seem a good idea, but it’s efficient).

```

3226 \let\bbl@calendar\@empty
3227 \newcommand\babelcalendar[2][\the\year-\the\month-\the\day]{%
3228 \@nameuse\bbl@ca@#2}#1\@{
3229 \newcommand\BabelDateSpace{\nobreakspace}
3230 \newcommand\BabelDateDot{\. \@} % TODO. \let instead of repeating
3231 \newcommand\BabelDated[1]{\number#1}
3232 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}

```

```

3233 \newcommand\BabelDateM[1]{\number#1}
3234 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
3235 \newcommand\BabelDateMMMM[1]{%
3236   \csname month\romannumeral#1\bbbl@calendar name\endcsname}%
3237 \newcommand\BabelDatey[1]{\number#1}%
3238 \newcommand\BabelDateyy[1]{%
3239   \ifnum#1<10 0\number#1 %
3240   \else\ifnum#1<100 \number#1 %
3241   \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
3242   \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
3243   \else
3244     \bbbl@error{limit-two-digits}{\number#1}%
3245   \fi\fi\fi\fi}
3246 \newcommand\BabelDateyyyy[1]{\number#1} % TODO - add leading 0
3247 \newcommand\BabelDateU[1]{\number#1}%
3248 \def\bbbl@replace@finish@iii#1{%
3249   \bbbl@exp{\def\#1###1###2###3{\the\toks@}}
3250 \def\bbbl@TG@date{%
3251   \bbbl@replace\bbbl@toreplace{[ ]}{\BabelDateSpace{}}%
3252   \bbbl@replace\bbbl@toreplace{[.]}{\BabelDateDot{}}%
3253   \bbbl@replace\bbbl@toreplace{[d]}{\BabelDated{###3}}%
3254   \bbbl@replace\bbbl@toreplace{[dd]}{\BabelDatedd{###3}}%
3255   \bbbl@replace\bbbl@toreplace{[M]}{\BabelDateM{###2}}%
3256   \bbbl@replace\bbbl@toreplace{[MM]}{\BabelDateMM{###2}}%
3257   \bbbl@replace\bbbl@toreplace{[MMMM]}{\BabelDateMMMM{###2}}%
3258   \bbbl@replace\bbbl@toreplace{[y]}{\BabelDatey{###1}}%
3259   \bbbl@replace\bbbl@toreplace{[yy]}{\BabelDateyy{###1}}%
3260   \bbbl@replace\bbbl@toreplace{[yyyy]}{\BabelDateyyyy{###1}}%
3261   \bbbl@replace\bbbl@toreplace{[U]}{\BabelDateU{###1}}%
3262   \bbbl@replace\bbbl@toreplace{[y]}{\bbbl@datecntr[###1]}%
3263   \bbbl@replace\bbbl@toreplace{[U]}{\bbbl@datecntr[###1]}%
3264   \bbbl@replace\bbbl@toreplace{[m]}{\bbbl@datecntr[###2]}%
3265   \bbbl@replace\bbbl@toreplace{[d]}{\bbbl@datecntr[###3]}%
3266   \bbbl@replace@finish@iii\bbbl@toreplace}
3267 \def\bbbl@datecntr{\expandafter\bbbl@xdatecntr\expandafter}
3268 \def\bbbl@xdatecntr[#1|#2]{\localenumeral{#2}{#1}}

```

Transforms.

```

3269 \bbbl@csarg\let{inikv@transforms.prehyphenation}\bbbl@inikv
3270 \bbbl@csarg\let{inikv@transforms.posthyphenation}\bbbl@inikv
3271 \def\bbbl@transforms@aux#1#2#3#4,#5\relax{%
3272   #1[#2]{#3}{#4}{#5}}
3273 \begingroup % A hack. TODO. Don't require an specific order
3274   \catcode`\%=12
3275   \catcode`\&=14
3276   \gdef\bbbl@transforms#1#2#3{&%
3277     \directlua{
3278       local str = [=[#2]=]
3279       str = str:gsub('%.%d+%.%d+$', '')
3280       token.set_macro('babeltempa', str)
3281     }&%
3282     \def\babeltempc{&%
3283     \bbbl@xin@{,\babeltempa,},{,\bbbl@KVP@transforms,}&%
3284     \ifin@\\else
3285     \bbbl@xin@{:,\babeltempa,},{,\bbbl@KVP@transforms,}&%
3286     \fi
3287     \ifin@
3288     \bbbl@foreach\bbbl@KVP@transforms{&%
3289     \bbbl@xin@{:,\babeltempa,},{,##1,}&%
3290     \ifin@ &% font:font:transform syntax
3291     \directlua{
3292       local t = {}
3293       for m in string.gmatch('##1'..'.' ':', '(.-):') do

```



```

3294         table.insert(t, m)
3295     end
3296     table.remove(t)
3297     token.set_macro('babeltempc', ', fonts=' .. table.concat(t, ' '))
3298 }&%
3299 \fi}&%
3300 \in@{.0$}{#2$}&%
3301 \ifin@
3302     \directlua{&% (\attribute) syntax
3303         local str = string.match([[ \bbl@KVP@transforms]],
3304             '%(([^%(-)]^%)-\babeltempa')
3305         if str == nil then
3306             token.set_macro('babeltempb', '')
3307         else
3308             token.set_macro('babeltempb', ', attribute=' .. str)
3309         end
3310     }&%
3311 \toks@{#3}&%
3312 \bbl@exp{&%
3313     \\g@addto@macro\\bbl@release@transforms{&%
3314         \relax &% Closes previous \bbl@transforms@aux
3315         \\bbl@transforms@aux
3316         \\#1{label=\babeltempa\babeltempb\babeltempc}&%
3317         {\language\the\toks@}}&%
3318 \else
3319     \g@addto@macro\bbl@release@transforms{, {#3}}&%
3320 \fi
3321 \fi}
3322 \endgroup

```

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

```

3323 \def\bbl@provide@lsys#1{%
3324     \bbl@ifunset{bbl@lname@#1}%
3325         {\bbl@load@info{#1}}%
3326     }%
3327     \bbl@csarg\let{lsys@#1}\@empty
3328     \bbl@ifunset{bbl@sname@#1}{\bbl@csarg\gdef{sname@#1}{Default}}{%
3329     \bbl@ifunset{bbl@sotf@#1}{\bbl@csarg\gdef{sotf@#1}{DFLT}}{%
3330     \bbl@csarg\bbl@add@list{lsys@#1}{Script=\bbl@cs{sname@#1}}%
3331     \bbl@ifunset{bbl@lname@#1}{%
3332         {\bbl@csarg\bbl@add@list{lsys@#1}{Language=\bbl@cs{lname@#1}}}%
3333     \ifcase\bbl@engine\or\or
3334     \bbl@ifunset{bbl@prehc@#1}{%
3335         {\bbl@exp{\\bbl@ifblank{\bbl@cs{prehc@#1}}}%
3336         }%
3337         {\ifx\bbl@xenoxyph\undefined
3338             \global\let\bbl@xenoxyph\bbl@xenoxyph@d
3339             \ifx\AtBeginDocument\notprerr
3340                 \expandafter\@secondoftwo % to execute right now
3341             \fi
3342             \AtBeginDocument{%
3343                 \bbl@patchfont{\bbl@xenoxyph}%
3344                 {\expandafter\select@language\expandafter{\language}}}%
3345             \fi}}%
3346     \fi
3347     \bbl@csarg\bbl@toggle@lsys{#1}}
3348 \def\bbl@xenoxyph@d{%
3349     \bbl@ifset{bbl@prehc@\language}%
3350         {\ifnum\hyphenchar\font=\defaultshyphenchar
3351             \iffontchar\font\bbl@cl{prehc}\relax
3352             \hyphenchar\font\bbl@cl{prehc}\relax
3353         \else\iffontchar\font"200B

```

```

3354     \hyphenchar\font"200B
3355     \else
3356     \bbl@warning
3357         {Neither 0 nor ZERO WIDTH SPACE are available\\%
3358         in the current font, and therefore the hyphen\\%
3359         will be printed. Try changing the fontspec's\\%
3360         'HyphenChar' to another value, but be aware\\%
3361         this setting is not safe (see the manual).\\%
3362         Reported}%
3363     \hyphenchar\font\defaultshyphenchar
3364     \fi\fi
3365     \fi}%
3366     {\hyphenchar\font\defaultshyphenchar}}
3367     % \fi}

```

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

```

3368 \def\bbl@load@info#1{%
3369     \def\BabelBeforeIni##1##2{%
3370         \begingroup
3371             \bbl@read@ini{##1}0%
3372             \endinput           % babel- .tex may contain only preamble's
3373             \endgroup}%         boxed, to avoid extra spaces:
3374     {\bbl@input@texini{#1}}

```

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

```

3375 \def\bbl@setdigits#1#2#3#4#5{%
3376     \bbl@exp{%
3377         \def<\languagename digits>####1{%           ie, \langdigits
3378             <\bbl@digits@\languagename>####1\\@nil}%
3379             \let<\bbl@cntr@digits@\languagename><\languagename digits>%
3380             \def<\languagename counter>####1{%       ie, \langcounter
3381                 \\expandafter<\bbl@counter@\languagename>%
3382                 \\curname c@####1\endcsname}%
3383             \def<\bbl@counter@\languagename>####1{% ie, \bbl@counter@lang
3384                 \\expandafter<\bbl@digits@\languagename>%
3385                 \\number####1\\@nil}}}%
3386     \def\bbl@tempa##1##2##3##4##5{%
3387         \bbl@exp{%   Wow, quite a lot of hashes! :- (
3388             \def<\bbl@digits@\languagename>#####1{%
3389                 \\ifx#####1\\@nil           % ie, \bbl@digits@lang
3390                 \\else
3391                     \\ifx0#####1#1%
3392                     \\else\\ifx1#####1#2%
3393                     \\else\\ifx2#####1#3%
3394                     \\else\\ifx3#####1#4%
3395                     \\else\\ifx4#####1#5%
3396                     \\else\\ifx5#####1#1%
3397                     \\else\\ifx6#####1#2%
3398                     \\else\\ifx7#####1#3%
3399                     \\else\\ifx8#####1#4%
3400                     \\else\\ifx9#####1#5%
3401                     \\else#####1%
3402                     \\fi\\fi\\fi\\fi\\fi\\fi\\fi\\fi\\fi\\fi\\fi\\fi\\fi\\fi\\fi
3403                     \\expandafter<\bbl@digits@\languagename>%
3404                     \\fi}}}%
3405     \bbl@tempa}

```

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

```

3406 \def\bbl@buildifcase#1 {% Returns \bbl@tempa, requires \toks@=}

```

```

3407 \ifx\#1%           % \ before, in case #1 is multiletter
3408   \bbl@exp{%
3409     \def\#1\bbl@tempa###1{%
3410       \<ifcase>###1\space\the\toks@<else>\\\@ctrerr<fi>}%
3411   \else
3412     \toks@&expandafter{\the\toks@&or #1}%
3413     \expandafter\bbl@buildifcase
3414   \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).

```

3415 \newcommand\localenumerical[2]{\bbl@cs{cntr@#1@&language}{#2}}
3416 \def\bbl@localecntr#1#2{\localenumerical{#2}{#1}}
3417 \newcommand\localecounter[2]{%
3418   \expandafter\bbl@localecntr
3419   \expandafter{\number\csname c@#2\endcsname}{#1}}
3420 \def\bbl@alphanumeric#1#2{%
3421   \expandafter\bbl@alphanumeric@i\number#2 76543210\@{#1}}
3422 \def\bbl@alphanumeric@i#1#2#3#4#5#6#7#8\@#9{%
3423   \ifcase@car#8\nil\or % Currently <10000, but prepared for bigger
3424     \bbl@alphanumeric@ii{#9}00000#1\or
3425     \bbl@alphanumeric@ii{#9}00000#1#2\or
3426     \bbl@alphanumeric@ii{#9}00000#1#2#3\or
3427     \bbl@alphanumeric@ii{#9}00000#1#2#3#4\else
3428     \bbl@alphnum@invalid{>9999}%
3429   \fi}
3430 \def\bbl@alphanumeric@ii#1#2#3#4#5#6#7#8{%
3431   \bbl@ifunset{bbl@cntr@#1.F.\number#5#6#7#8@&language}%
3432     {\bbl@cs{cntr@#1.4@&language}{#5}
3433     \bbl@cs{cntr@#1.3@&language}{#6}
3434     \bbl@cs{cntr@#1.2@&language}{#7}
3435     \bbl@cs{cntr@#1.1@&language}{#8}
3436     \ifnum#6#7#8>\z@ % TODO. An ad hoc rule for Greek. Ugly.
3437     \bbl@ifunset{bbl@cntr@#1.S.321@&language}{}%
3438     {\bbl@cs{cntr@#1.S.321@&language}{}}%
3439   \fi}%
3440   {\bbl@cs{cntr@#1.F.\number#5#6#7#8@&language}}
3441 \def\bbl@alphnum@invalid#1{%
3442   \bbl@error{alphabetic-too-large}{#1}{}}

```

The information in the identification section can be useful, so the following macro just exposes it with a user command.

```

3443 \def\bbl@localeinfo#1#2{%
3444   \bbl@ifunset{bbl@info@#2}{#1}%
3445     {\bbl@ifunset{bbl@csname bbl@info@#2\endcsname @&language}{#1}%
3446     {\bbl@cs{\csname bbl@info@#2\endcsname @&language}}}
3447 \newcommand\localeinfo[1]{%
3448   \ifx*#1\@empty % TODO. A bit hackish to make it expandable.
3449     \bbl@afterelse\bbl@localeinfo{%
3450   \else
3451     \bbl@localeinfo
3452     {\bbl@error{no-ini-info}{}}}%
3453   {#1}%
3454   \fi}
3455 % \namedef{bbl@info@name.locale}{lname}
3456 \namedef{bbl@info@tag.ini}{lini}
3457 \namedef{bbl@info@name.english}{elname}
3458 \namedef{bbl@info@name.opentype}{lname}
3459 \namedef{bbl@info@tag.bcp47}{tbcp}
3460 \namedef{bbl@info@language.tag.bcp47}{lbcp}
3461 \namedef{bbl@info@tag.opentype}{lotf}

```

```

3462 \@namedef{bbl@info@script.name}{esname}
3463 \@namedef{bbl@info@script.name.opentype}{sname}
3464 \@namedef{bbl@info@script.tag.bcp47}{sbcpc}
3465 \@namedef{bbl@info@script.tag.opentype}{sotf}
3466 \@namedef{bbl@info@region.tag.bcp47}{rbcp}
3467 \@namedef{bbl@info@variant.tag.bcp47}{vbcp}
3468 \@namedef{bbl@info@extension.t.tag.bcp47}{extt}
3469 \@namedef{bbl@info@extension.u.tag.bcp47}{extu}
3470 \@namedef{bbl@info@extension.x.tag.bcp47}{extx}

```

\LaTeX needs to know the BCP 47 codes for some features. For that, it expects `\BCPdata` to be defined. While language, region, script, and variant are recognized, extension.`(s)` for singletons may change.

```

3471 \ifcase\bbl@engine % Converts utf8 to its code (expandable)
3472 \def\bbl@uftocode#1{\the\numexpr\decode@UTFviii#1\relax}
3473 \else
3474 \def\bbl@uftocode#1{\expandafter`\string#1}
3475 \fi
3476 % Still somewhat hackish. WIP. Note |\str_if_eq:nnTF| is fully
3477 % expandable (|\bbl@ifsamestring| isn't).
3478 \providecommand\BCPdata{}
3479 \ifx\renewcommand\undefined\else % For plain. TODO. It's a quick fix
3480 \renewcommand\BCPdata[1]{\bbl@bcpdata@i#1@empty}
3481 \def\bbl@bcpdata@i#1#2#3#4#5#6@empty{%
3482 \nameuse{str_if_eq:nnTF}{#1#2#3#4#5}{main.}%
3483 {\bbl@bcpdata@ii#6}\bbl@main@language}%
3484 {\bbl@bcpdata@ii#1#2#3#4#5#6}\language}%
3485 \def\bbl@bcpdata@ii#1#2{%
3486 \bbl@ifunset{bbl@info@#1.tag.bcp47}%
3487 {\bbl@error{unknown-ini-field}{#1}{}}%
3488 {\bbl@ifunset{bbl@csname bbl@info@#1.tag.bcp47\endcsname @#2}{}%
3489 {\bbl@cs{\csname bbl@info@#1.tag.bcp47\endcsname @#2}}}}
3490 \fi
3491 \@namedef{bbl@info@casing.tag.bcp47}{casing}
3492 \newcommand\BabelUppercaseMapping[3]{%
3493 \DeclareUppercaseMapping[\nameuse{bbl@casing@#1}]{#2}{#3}}
3494 \newcommand\BabelTitlecaseMapping[3]{%
3495 \DeclareTitlecaseMapping[\nameuse{bbl@casing@#1}]{#2}{#3}}
3496 \newcommand\BabelLowercaseMapping[3]{%
3497 \DeclareLowercaseMapping[\nameuse{bbl@casing@#1}]{#2}{#3}}

```

The parser for casing and casing.`(variant)`.

```

3498 \def\bbl@casemapping#1#2#3{% 1:variant
3499 \def\bbl@tempa##1 ##2{% Loop
3500 \bbl@casemapping@i{##1}%
3501 \ifx\@empty##2\else\bbl@afterfi\bbl@tempa##2\fi}%
3502 \edef\bbl@templ{\nameuse{bbl@casing@#2}#1}% Language code
3503 \def\bbl@tempe{0}% Mode (upper/lower...)
3504 \def\bbl@tempc{#3}% Casing list
3505 \expandafter\bbl@tempa\bbl@tempc\@empty}
3506 \def\bbl@casemapping@i#1{%
3507 \def\bbl@tempb{#1}%
3508 \ifcase\bbl@engine % Handle utf8 in pdftex, by surrounding chars with {}
3509 \nameuse{regex_replace_all:nnN}%
3510 {[\\x{c0}-\\x{ff}][\\x{80}-\\x{bf}]*}{\0}}\bbl@tempb
3511 \else
3512 \nameuse{regex_replace_all:nnN}{.}{\0}}\bbl@tempb % TODO. needed?
3513 \fi
3514 \expandafter\bbl@casemapping@ii\bbl@tempb\@}
3515 \def\bbl@casemapping@ii#1#2#3\@{%
3516 \in@{#1#3}{<>}% ie, if <u>, <l>, <t>
3517 \ifin@
3518 \edef\bbl@tempe{%
3519 \if#2u1 \else\if#2l2 \else\if#2t3 \fi\fi\fi}%

```

```

3520 \else
3521   \ifcase\bb@tempe\relax
3522     \DeclareUppercaseMapping[\bb@templ]{\bb@utfcode{#1}}{#2}%
3523     \DeclareLowercaseMapping[\bb@templ]{\bb@utfcode{#2}}{#1}%
3524   \or
3525     \DeclareUppercaseMapping[\bb@templ]{\bb@utfcode{#1}}{#2}%
3526   \or
3527     \DeclareLowercaseMapping[\bb@templ]{\bb@utfcode{#1}}{#2}%
3528   \or
3529     \DeclareTitlecaseMapping[\bb@templ]{\bb@utfcode{#1}}{#2}%
3530   \fi
3531 \fi}

```

With version 3.75 `\BabelEnsureInfo` is executed always, but there is an option to disable it.

```

3532 <<(*More package options)>> ≡
3533 \DeclareOption{ensureinfo=off}{}
3534 <</More package options>>
3535 \let\bb@ensureinfo@gobble
3536 \newcommand\BabelEnsureInfo{%
3537   \ifx\InputIfFileExists\@undefined\else
3538     \def\bb@ensureinfo##1{%
3539       \bb@ifunset{bb@lname@##1}{\bb@load@info{##1}}{}}%
3540   \fi
3541   \bb@foreach\bb@loaded{%
3542     \let\bb@ensuring\@empty % Flag used in a couple of babel-*.tex files
3543     \def\languagename{##1}%
3544     \bb@ensureinfo{##1}}}%
3545 \@ifpackagewith{babel}{ensureinfo=off}{}%
3546 {\AtEndOfPackage{% Test for plain.
3547   \ifx\@undefined\bb@loaded\else\BabelEnsureInfo\fi}}

```

More general, but non-expandable, is `\getlocaleproperty`. To inspect every possible loaded ini, we define `\LocaleForEach`, where `\bb@ini@loaded` is a comma-separated list of locales, built by `\bb@read@ini`.

```

3548 \newcommand\getlocaleproperty{%
3549   \ifstar\bb@getproperty@s\bb@getproperty@x}
3550 \def\bb@getproperty@s#1#2#3{%
3551   \let#1\relax
3552   \def\bb@elt##1##2##3{%
3553     \bb@ifsamestring{##1/##2}{#3}%
3554     {\providecommand#1{##3}%
3555     \def\bb@elt####1####2####3{}}}%
3556   {}}%
3557   \bb@cs{inidata@#2}}%
3558 \def\bb@getproperty@x#1#2#3{%
3559   \bb@getproperty@s{#1}{#2}{#3}%
3560   \ifx#1\relax
3561     \bb@error{unknown-locale-key}{#1}{#2}{#3}%
3562   \fi}
3563 \let\bb@ini@loaded\@empty
3564 \newcommand\LocaleForEach{\bb@foreach\bb@ini@loaded}
3565 \def\ShowLocaleProperties#1{%
3566   \typeout{}%
3567   \typeout{*** Properties for language '#1' ***}}
3568 \def\bb@elt##1##2##3{\typeout{##1/##2 = ##3}}%
3569 \@nameuse{bb@inidata@#1}%
3570 \typeout{*****}}

```

5 Adjusting the Babel behavior

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

```

3571 \newcommand\babeladjust[1]{% TODO. Error handling.

```

```

3572 \bbl@forkv{#1}{%
3573   \bbl@ifunset{bbl@ADJ@##1@##2}%
3574     {\bbl@cs{ADJ@##1}{##2}}%
3575     {\bbl@cs{ADJ@##1@##2}}}}
3576 %
3577 \def\bbl@adjust@lua#1#2{%
3578   \ifvmode
3579     \ifnum\currentgrouplevel=\z@
3580       \directlua{ Babe\.#2 }%
3581       \expandafter\expandafter\expandafter\@gobble
3582     \fi
3583   \fi
3584   {\bbl@error{adjust-only-vertical}{#1}{}}}% Gobbled if everything went ok.
3585 \@namedef{bbl@ADJ@bidi.mirroring@on}{%
3586   \bbl@adjust@lua{bidi}{mirroring_enabled=true}}
3587 \@namedef{bbl@ADJ@bidi.mirroring@off}{%
3588   \bbl@adjust@lua{bidi}{mirroring_enabled=false}}
3589 \@namedef{bbl@ADJ@bidi.text@on}{%
3590   \bbl@adjust@lua{bidi}{bidi_enabled=true}}
3591 \@namedef{bbl@ADJ@bidi.text@off}{%
3592   \bbl@adjust@lua{bidi}{bidi_enabled=false}}
3593 \@namedef{bbl@ADJ@bidi.math@on}{%
3594   \let\bbl@noamsmath\@empty}
3595 \@namedef{bbl@ADJ@bidi.math@off}{%
3596   \let\bbl@noamsmath\relax}
3597 \@namedef{bbl@ADJ@bidi.mapdigits@on}{%
3598   \bbl@adjust@lua{bidi}{digits_mapped=true}}
3599 \@namedef{bbl@ADJ@bidi.mapdigits@off}{%
3600   \bbl@adjust@lua{bidi}{digits_mapped=false}}
3601 %
3602 \@namedef{bbl@ADJ@linebreak.sea@on}{%
3603   \bbl@adjust@lua{linebreak}{sea_enabled=true}}
3604 \@namedef{bbl@ADJ@linebreak.sea@off}{%
3605   \bbl@adjust@lua{linebreak}{sea_enabled=false}}
3606 \@namedef{bbl@ADJ@linebreak.cjk@on}{%
3607   \bbl@adjust@lua{linebreak}{cjk_enabled=true}}
3608 \@namedef{bbl@ADJ@linebreak.cjk@off}{%
3609   \bbl@adjust@lua{linebreak}{cjk_enabled=false}}
3610 \@namedef{bbl@ADJ@justify.arabic@on}{%
3611   \bbl@adjust@lua{linebreak}{arabic.justify_enabled=true}}
3612 \@namedef{bbl@ADJ@justify.arabic@off}{%
3613   \bbl@adjust@lua{linebreak}{arabic.justify_enabled=false}}
3614 %
3615 \def\bbl@adjust@layout#1{%
3616   \ifvmode
3617     #1%
3618     \expandafter\@gobble
3619   \fi
3620   {\bbl@error{layout-only-vertical}{}}}% Gobbled if everything went ok.
3621 \@namedef{bbl@ADJ@layout.tabular@on}{%
3622   \ifnum\bbl@tabular@mode=\tw@
3623     \bbl@adjust@layout{\let\@tabular\bbl@NL@tabular}%
3624   \else
3625     \chardef\bbl@tabular@mode\@ne
3626   \fi}
3627 \@namedef{bbl@ADJ@layout.tabular@off}{%
3628   \ifnum\bbl@tabular@mode=\tw@
3629     \bbl@adjust@layout{\let\@tabular\bbl@OL@tabular}%
3630   \else
3631     \chardef\bbl@tabular@mode\z@
3632   \fi}
3633 \@namedef{bbl@ADJ@layout.lists@on}{%
3634   \bbl@adjust@layout{\let\list\bbl@NL@list}}

```

```

3635 \@namedef{bbl@ADJ@layout.lists@off}{%
3636   \bbl@adjust@layout{\let\list\bbl@OL@list}}
3637 %
3638 \@namedef{bbl@ADJ@autoload.bcp47@on}{%
3639   \bbl@bcppallowedtrue}
3640 \@namedef{bbl@ADJ@autoload.bcp47@off}{%
3641   \bbl@bcppallowedfalse}
3642 \@namedef{bbl@ADJ@autoload.bcp47.prefix}#1{%
3643   \def\bbl@bcp@prefix{#1}}
3644 \def\bbl@bcp@prefix{bcp47-}
3645 \@namedef{bbl@ADJ@autoload.options}#1{%
3646   \def\bbl@autoload@options{#1}}
3647 \let\bbl@autoload@bcppoptions\@empty
3648 \@namedef{bbl@ADJ@autoload.bcp47.options}#1{%
3649   \def\bbl@autoload@bcppoptions{#1}}
3650 \newif\ifbbl@bcptoname
3651 \@namedef{bbl@ADJ@bcp47.toname@on}{%
3652   \bbl@bcptonametrue}
3653 \BabelEnsureInfo}
3654 \@namedef{bbl@ADJ@bcp47.toname@off}{%
3655   \bbl@bcptonamefalse}
3656 \@namedef{bbl@ADJ@prehyphenation.disable@nohyphenation}{%
3657   \directlua{ Babel.ignore_pre_char = function(node)
3658     return (node.lang == \the\csname l@nohyphenation\endcsname)
3659   end }}
3660 \@namedef{bbl@ADJ@prehyphenation.disable@off}{%
3661   \directlua{ Babel.ignore_pre_char = function(node)
3662     return false
3663   end }}
3664 \@namedef{bbl@ADJ@interchar.disable@nohyphenation}{%
3665   \def\bbl@ignoreinterchar{%
3666     \ifnum\language=\l@nohyphenation
3667       \expandafter\@gobble
3668     \else
3669       \expandafter\@firstofone
3670     \fi}}
3671 \@namedef{bbl@ADJ@interchar.disable@off}{%
3672   \let\bbl@ignoreinterchar\@firstofone}
3673 \@namedef{bbl@ADJ@select.write@shift}{%
3674   \let\bbl@restorelastskip\relax
3675   \def\bbl@savelastskip{%
3676     \let\bbl@restorelastskip\relax
3677     \ifvmode
3678       \ifdim\lastskip=\z@
3679         \let\bbl@restorelastskip\nobreak
3680       \else
3681         \bbl@exp{%
3682           \def\\bbl@restorelastskip{%
3683             \skip@=\the\lastskip
3684             \\nobreak \vskip-\skip@ \vskip\skip@}}%
3685         \fi
3686       \fi}}
3687 \@namedef{bbl@ADJ@select.write@keep}{%
3688   \let\bbl@restorelastskip\relax
3689   \let\bbl@savelastskip\relax}
3690 \@namedef{bbl@ADJ@select.write@omit}{%
3691   \AddBabelHook{babel-select}{beforestart}{%
3692     \expandafter\babel@aux\expandafter{\bbl@main@language}}}%
3693   \let\bbl@restorelastskip\relax
3694   \def\bbl@savelastskip##1\bbl@restorelastskip{}}
3695 \@namedef{bbl@ADJ@select.encoding@off}{%
3696   \let\bbl@encoding@select@off\@empty}

```

5.1 Cross referencing macros

The \LaTeX book states:

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

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

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

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

```
3697 <<{*More package options}>> ≡
3698 \DeclareOption{safe=none}{\let\bbl@opt@safe\empty}
3699 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
3700 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
3701 \DeclareOption{safe=refbib}{\def\bbl@opt@safe{BR}}
3702 \DeclareOption{safe=bibref}{\def\bbl@opt@safe{BR}}
3703 <</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.

```
3704 \bbl@trace{Cross referencing macros}
3705 \ifx\bbl@opt@safe\empty\else % ie, if 'ref' and/or 'bib'
3706   \def\@newl@bel#1#2#3{%
3707     {\@safe@activestrue
3708       \bbl@ifunset{#1#2}%
3709         \relax
3710         {\gdef\@multiplelabels{%
3711           \@latex@warning@no@line{There were multiply-defined labels}}%
3712           \@latex@warning@no@line{Label `#2' multiply defined}}%
3713         \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.

```
3714 \CheckCommand*\@testdef[3]{%
3715   \def\reserved@a{#3}%
3716   \expandafter\ifx\csname#1#2\endcsname\reserved@a
3717   \else
3718     \@tempwattrue
3719   \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.

```
3720 \def\@testdef#1#2#3{% TODO. With @samestring?
3721   \@safe@activestrue
3722   \expandafter\let\expandafter\bbl@tempa\csname #1#2\endcsname
3723   \def\bbl@tempb{#3}%
3724   \@safe@activesfalse
3725   \ifx\bbl@tempa\relax
3726   \else
3727     \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
3728   \fi
3729   \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
3730   \ifx\bbl@tempa\bbl@tempb
3731   \else
3732     \@tempwattrue
3733   \fi}
3734 \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.

```

3735 \bbl@xin@{R}\bbl@opt@safe
3736 \ifin@
3737 \edef\bbl@tempc{\expandafter\string\csname ref code\endcsname}%
3738 \bbl@xin@{\expandafter\strip@prefix\meaning\bbl@tempc}%
3739 {\expandafter\strip@prefix\meaning\ref}%
3740 \ifin@
3741 \bbl@redefine\@kernel@ref#1{%
3742   \@safe@activetrue\org@@kernel@ref{#1}\@safe@activfalse}
3743 \bbl@redefine\@kernel@pageref#1{%
3744   \@safe@activetrue\org@@kernel@pageref{#1}\@safe@activfalse}
3745 \bbl@redefine\@kernel@sref#1{%
3746   \@safe@activetrue\org@@kernel@sref{#1}\@safe@activfalse}
3747 \bbl@redefine\@kernel@spageref#1{%
3748   \@safe@activetrue\org@@kernel@spageref{#1}\@safe@activfalse}
3749 \else
3750 \bbl@redefinero bust\ref#1{%
3751   \@safe@activetrue\org@ref{#1}\@safe@activfalse}
3752 \bbl@redefinero bust\pageref#1{%
3753   \@safe@activetrue\org@pageref{#1}\@safe@activfalse}
3754 \fi
3755 \else
3756 \let\org@ref\ref
3757 \let\org@pageref\pageref
3758 \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.

```

3759 \bbl@xin@{B}\bbl@opt@safe
3760 \ifin@
3761 \bbl@redefine\@citex[#1]#2{%
3762   \@safe@activetrue\edef\bbl@tempa{#2}\@safe@activfalse
3763   \org@@citex[#1]{\bbl@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.

```

3764 \AtBeginDocument{%
3765   \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.)

```

3766   \def\@citex[#1][#2]#3{%
3767     \@safe@activetrue\edef\bbl@tempa{#3}\@safe@activfalse
3768     \org@@citex[#1][#2]{\bbl@tempa}}%
3769   }{}

```

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

```

3770 \AtBeginDocument{%
3771   \ifpackageloaded{cite}{%
3772     \def\@citex[#1]#2{%
3773       \@safe@activetrue\org@@citex[#1][#2]\@safe@activfalse}%
3774     }{}

```

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

```
3775 \bbl@redefine\nocite#1{%
3776   \@safe@activestruer\org@nocite{#1}\@safe@activesfalse}
```

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

```
3777 \bbl@redefine\bibcite{%
3778   \bbl@cite@choice
3779   \bibcite}
```

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

```
3780 \def\bbl@bibcite#1#2{%
3781   \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.

```
3782 \def\bbl@cite@choice{%
3783   \global\let\bibcite\bbl@bibcite
3784   \ifpackageloaded{natbib}\global\let\bibcite\org@bibcite}{}%
3785   \ifpackageloaded{cite}\global\let\bibcite\org@bibcite}{}%
3786   \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.

```
3787 \AtBeginDocument{\bbl@cite@choice}
```

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

```
3788 \bbl@redefine\@bibitem#1{%
3789   \@safe@activestruer\org@bibitem{#1}\@safe@activesfalse}
3790 \else
3791   \let\org@nocite\nocite
3792   \let\org@citex\@citex
3793   \let\org@bibcite\bibcite
3794   \let\org@bibitem\@bibitem
3795 \fi
```

5.2 Marks

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

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

```
3796 \bbl@trace{Marks}
3797 \IfBabelLayout{sectioning}
3798   {\ifx\bbl@opt@headfoot\@nnil
3799     \g@addto@macro\@resetactivechars{%
3800       \set@typeset@protect
3801       \expandafter\select@language\x\expandafter{\bbl@main@language}%
3802       \let\protect\noexpand
3803       \ifcase\bbl@bidimode\else % Only with bidi. See also above
3804         \edef\thepage{%
3805           \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}%
3806       \fi}%
```

```

3807 \fi}
3808 {\ifbbl@single\else
3809 \bbl@ifunset{markright }\bbl@redefine\bbl@redefineroobust
3810 \markright#1{%
3811 \bbl@ifblank{#1}%
3812 {\org@markright{}}%
3813 {\toks@{#1}%
3814 \bbl@exp{%
3815 \\org@markright{\\protect\\foreignlanguage{\language}%
3816 {\\protect\\bbl@restore@actives\the\toks@}}}%

```

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

```

3817 \ifx\@mkboth\markboth
3818 \def\bbl@tempc{\let\@mkboth\markboth}%
3819 \else
3820 \def\bbl@tempc{%
3821 \fi
3822 \bbl@ifunset{markboth }\bbl@redefine\bbl@redefineroobust
3823 \markboth#1#2{%
3824 \protected@edef\bbl@tempb##1{%
3825 \protect\foreignlanguage
3826 {\language}{\protect\bbl@restore@actives##1}}%
3827 \bbl@ifblank{#1}%
3828 {\toks@{}}%
3829 {\toks@\expandafter{\bbl@tempb{#1}}}%
3830 \bbl@ifblank{#2}%
3831 {\@temptokena{}}%
3832 {\@temptokena\expandafter{\bbl@tempb{#2}}}%
3833 \bbl@exp{\\org@markboth{\the\toks@}{\the\@temptokena}}}%
3834 \bbl@tempc
3835 \fi} % end ifbbl@single, end \IfBabelLayout

```

5.3 Preventing clashes with other packages

5.3.1 `ifthen`

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

```

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

```

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

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

Then we can set the `\@safe@actives` switch and call the original `\ifthenelse`. In order to be able to use shorthands in the second and third arguments of `\ifthenelse` the resetting of the switch *and* the definition of `\pageref` happens inside those arguments.

```

3836 \bbl@trace{Preventing clashes with other packages}
3837 \ifx\org@ref\undefined\else
3838 \bbl@xin@{R}\bbl@opt@safe
3839 \ifin@
3840 \AtBeginDocument{%
3841 \@ifpackageloaded{ifthen}{%

```

```

3842     \bbl@redefine@long\ifthenelse#1#2#3{%
3843     \let\bbl@temp@pref\pageref
3844     \let\pageref\org@pageref
3845     \let\bbl@temp@ref\ref
3846     \let\ref\org@ref
3847     \@safe@activestru
3848     \org@ifthenelse{#1}%
3849     {\let\pageref\bbl@temp@pref
3850     \let\ref\bbl@temp@ref
3851     \@safe@activesfalse
3852     #2}%
3853     {\let\pageref\bbl@temp@pref
3854     \let\ref\bbl@temp@ref
3855     \@safe@activesfalse
3856     #3}%
3857     }%
3858     }{}%
3859     }
3860 \fi

```

5.3.2 varioref

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

```

3861 \AtBeginDocument{%
3862   \ifpackageloaded{varioref}{%
3863     \bbl@redefine\@@vpageref#1[#2]#3{%
3864       \@safe@activestru
3865       \org@@@vpageref{#1}[#2]{#3}%
3866       \@safe@activesfalse}%
3867     \bbl@redefine\vrefpagemum#1#2{%
3868       \@safe@activestru
3869       \org@vrefpagemum{#1}{#2}%
3870       \@safe@activesfalse}%

```

The package `varioref` defines `\Ref` to be a robust command wich uppercases the first character of the reference text. In order to be able to do that it needs to access the expandable form of `\ref`. So we employ a little trick here. We redefine the (internal) command `\Ref_` to call `\org@ref` instead of `\ref`. The disadvantage of this solution is that whenever the definition of `\Ref` changes, this definition needs to be updated as well.

```

3871   \expandafter\def\csname Ref \endcsname#1{%
3872     \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
3873   }{}%
3874   }
3875 \fi

```

5.3.3 hhlne

`\hhlne` Delaying the activation of the shorthand characters has introduced a problem with the `hhlne` 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.

```

3876 \AtEndOfPackage{%
3877   \AtBeginDocument{%
3878     \ifpackageloaded{hhlne}%
3879     {\expandafter\ifx\csname normal@char\string:\endcsname\relax
3880     \else
3881       \makeatletter
3882       \def\@currname{hhlne}\input{hhlne.sty}\makeatother
3883       \fi}%
3884     {}}}

```

`\substitutefontfamily` *Deprecated*. Use the tools provides by \TeX . 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.

```

3885 \def\substitutefontfamily#1#2#3{%
3886   \lowercase{\immediate\openout15=#1#2.fd\relax}%
3887   \immediate\write15{%
3888     \string\ProvidesFile{#1#2.fd}%
3889     [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
3890     \space generated font description file]^J
3891     \string\DeclareFontFamily{#1}{#2}{}^^J
3892     \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{}^^J
3893     \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{}^^J
3894     \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{}^^J
3895     \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{}^^J
3896     \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{}^^J
3897     \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{}^^J
3898     \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{}^^J
3899     \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{}^^J
3900   }%
3901   \closeout15
3902 }
3903 \@onlypreamble\substitutefontfamily

```

5.4 Encoding and fonts

Because documents may use non-ASCII font encodings, we make sure that the logos of \TeX and \LaTeX always come out in the right encoding. There is a list of non-ASCII encodings. Requested encodings are currently stored in `\@fontenc@load@list`. If a non-ASCII has been loaded, we define versions of `\TeX` and `\LaTeX` for them using `\ensureascii`. The default ASCII encoding is set, too (in reverse order): the “main” encoding (when the document begins), the last loaded, or OT1.

`\ensureascii`

```

3904 \bbl@trace{Encoding and fonts}
3905 \newcommand\BabelNonASCII{LGR,LGI,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU}
3906 \newcommand\BabelNonText{TS1,T3,TS3}
3907 \let\org@TeX\TeX
3908 \let\org@LaTeX\LaTeX
3909 \let\ensureascii\@firstofone
3910 \let\asciencoding\@empty
3911 \AtBeginDocument{%
3912   \def\@elt#1{,#1,}%
3913   \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
3914   \let\@elt\relax
3915   \let\bbl@tempb\@empty
3916   \def\bbl@tempc{OT1}%
3917   \bbl@foreach\BabelNonASCII{% LGR loaded in a non-standard way
3918     \bbl@ifunset{T@#1}{\def\bbl@tempb{#1}}}%
3919   \bbl@foreach\bbl@tempa{%
3920     \bbl@xin@{,#1,}{,\BabelNonASCII,}%
3921     \ifin@
3922       \def\bbl@tempb{#1}% Store last non-ascii
3923     \else\bbl@xin@{,#1,}{,\BabelNonText,}% Pass
3924     \ifin@\else
3925       \def\bbl@tempc{#1}% Store last ascii
3926     \fi
3927   \fi}%
3928   \ifx\bbl@tempb\@empty\else
3929     \bbl@xin@{\cf@encoding,}{,\BabelNonASCII,\BabelNonText,}%
3930     \ifin@\else
3931       \edef\bbl@tempc{\cf@encoding}% The default if ascii wins
3932     \fi
3933   \let\asciencoding\bbl@tempc
3934   \renewcommand\ensureascii[1]{%

```

```

3935     {\fontencoding{\asciientcoding}\selectfont#1}}%
3936     \DeclareTextCommandDefault{\TeX}{\ensureascii{\org@TeX}}%
3937     \DeclareTextCommandDefault{\LaTeX}{\ensureascii{\org@LaTeX}}%
3938     \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.

```

3939 \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.

```

3940 \AtBeginDocument{%
3941   \@ifpackageloaded{fontspec}%
3942     {\xdef\latinencoding{%
3943       \ifx\UTFencname\undefined
3944         EU\ifcase\bb@engine\or2\or1\fi
3945       \else
3946         \UTFencname
3947       \fi}}%
3948     {\gdef\latinencoding{OT1}}%
3949     \ifx\cf@encoding\bb@t@one
3950       \xdef\latinencoding{\bb@t@one}%
3951     \else
3952       \def\@elt#1{,#1,}%
3953       \edef\bb@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
3954       \let\@elt\relax
3955       \bb@xin@{,T1,}\bb@tempa
3956       \ifin@
3957         \xdef\latinencoding{\bb@t@one}%
3958       \fi
3959     \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.

```

3960 \DeclareRobustCommand{\latintext}{%
3961   \fontencoding{\latinencoding}\selectfont
3962   \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.

```

3963 \ifx\@undefined\DeclareTextFontCommand
3964   \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}
3965 \else
3966   \DeclareTextFontCommand{\textlatin}{\latintext}
3967 \fi

```

For several functions, we need to execute some code with `\selectfont`. With \LaTeX 2021-06-01, there is a hook for this purpose.

```

3968 \def\bb@patchfont#1{\AddToHook{selectfont}{#1}}

```

5.5 Basic bidi support

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

It is loosely based on `rlbabel.def`, but most of it has been developed from scratch. This babel module (by Johannes Braams and Boris Lavva) has served the purpose of typesetting R documents for two decades, and despite its flaws I think it is still a good starting point (some parts have been

copied here almost verbatim), partly thanks to its simplicity. I've also looked at ARABI (by Youssef Jabri), which is compatible with babel.

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

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

```

3969 \bbl@trace{Loading basic (internal) bidi support}
3970 \ifodd\bbl@engine
3971 \else % TODO. Move to txtbabel
3972   \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200 % Any xe+lua bidi=
3973     \bbl@error{bidi-only-lua}{\}\}\}%
3974     \let\bbl@beforeforeign\leavevmode
3975     \AtEndOfPackage{%
3976       \EnableBabelHook{babel-bidi}%
3977       \bbl@xebidipar}
3978   \fi\fi
3979   \def\bbl@loadxebidi#1{%
3980     \ifx\RTLfootnotetext\@undefined
3981       \AtEndOfPackage{%
3982         \EnableBabelHook{babel-bidi}%
3983         \bbl@loadfontspec % bidi needs fontspec
3984         \usepackage#1{bidi}%
3985         \let\bbl@digitsdotdash\DigitsDotDashInterCharToks
3986         \def\DigitsDotDashInterCharToks{% See the 'bidi' package
3987           \ifnum\@nameuse{bbl@wdir@\languagename}=\tw@ % 'AL' bidi
3988             \bbl@digitsdotdash % So ignore in 'R' bidi
3989           \fi}}%
3990     \fi}
3991 \ifnum\bbl@bidimode>200 % Any xe bidi=
3992   \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
3993     \bbl@tentative{bidi=bidi}
3994     \bbl@loadxebidi{}
3995   \or
3996     \bbl@loadxebidi{[rldocument]}
3997   \or
3998     \bbl@loadxebidi{}
3999   \fi
4000 \fi
4001 \fi
4002 % TODO? Separate:
4003 \ifnum\bbl@bidimode=\@ne % Any bidi= except default=1
4004   \let\bbl@beforeforeign\leavevmode
4005   \ifodd\bbl@engine
4006     \newattribute\bbl@attr@dir
4007     \directlua{ Babel.attr_dir = luatexbase.registernumber'bbl@attr@dir' }
4008     \bbl@exp{\output{\bodydir\pagedir\the\output}}
4009   \fi
4010   \AtEndOfPackage{%
4011     \EnableBabelHook{babel-bidi}%
4012     \ifodd\bbl@engine\else
4013       \bbl@xebidipar
4014     \fi}
4015 \fi

```

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

```

4016 \bbl@trace{Macros to switch the text direction}
4017 \def\bbl@alscripts{,Arabic,Syriac,Thaana,}
4018 \def\bbl@rscripts{% TODO. Base on codes ??
4019   ,Imperial Aramaic,Avestan,Cypriot,Hatran,Hebrew,%
4020   Old Hungarian,Lydian,Mandaean,Manichaeen,%
4021   Meroitic Cursive,Meroitic,Old North Arabian,%
4022   Nabataean,N'Ko,Orkhon,Palmyrene,Inscriptional Pahlavi,%
4023   Psalter Pahlavi,Phoenician,Inscriptional Parthian,Samaritan,%
4024   Old South Arabian,}%
4025 \def\bbl@provide@dirs#1{%
4026   \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts\bbl@rscripts}%
4027   \ifin@
4028     \global\bbl@csarg\chardef{wdir@#1}\@ne
4029     \bbl@xin@{\csname bbl@sname@#1\endcsname}{\bbl@alscripts}%
4030     \ifin@
4031     \global\bbl@csarg\chardef{wdir@#1}\tw@
4032     \fi
4033   \else
4034     \global\bbl@csarg\chardef{wdir@#1}\z@
4035     \fi
4036   \ifodd\bbl@engine
4037     \bbl@csarg\ifcase{wdir@#1}%
4038       \directlua{ Babel.locale_props[\the\localeid].textdir = 'l' }%
4039     \or
4040       \directlua{ Babel.locale_props[\the\localeid].textdir = 'r' }%
4041     \or
4042       \directlua{ Babel.locale_props[\the\localeid].textdir = 'al' }%
4043     \fi
4044   \fi}
4045 \def\bbl@switchdir{%
4046   \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
4047   \bbl@ifunset{\bbl@wdir@\languagename}{\bbl@provide@dirs{\languagename}}{}%
4048   \bbl@exp{\bbl@setdirs\bbl@cl{wdir}}%
4049 \def\bbl@setdirs#1{% TODO - math
4050   \ifcase\bbl@select@type % TODO - strictly, not the right test
4051     \bbl@bodydir{#1}%
4052     \bbl@pdir{#1}% <- Must precede \bbl@textdir
4053   \fi
4054   \bbl@textdir{#1}}
4055 % TODO. Only if \bbl@bidimode > 0?:
4056 \AddBabelHook{babel-bidi}{afterextras}{\bbl@switchdir}
4057 \DisableBabelHook{babel-bidi}

```

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

```

4058 \ifodd\bbl@engine % luatex=1
4059 \else % pdftex=0, xetex=2
4060   \newcount\bbl@dirlevel
4061   \chardef\bbl@thetextdir\z@
4062   \chardef\bbl@thepardir\z@
4063   \def\bbl@textdir#1{%
4064     \ifcase#1\relax
4065       \chardef\bbl@thetextdir\z@
4066       \@nameuse{setlatin}%
4067       \bbl@textdir@i\beginL\endL
4068     \else
4069       \chardef\bbl@thetextdir\@ne
4070       \@nameuse{setnonlatin}%
4071       \bbl@textdir@i\beginR\endR
4072     \fi}
4073   \def\bbl@textdir@i#1#2{%
4074     \ifhmode

```



```

4075 \ifnum\currentgrouplevel>\z@
4076 \ifnum\currentgrouplevel=\bbl@dirlevel
4077 \bbl@error{multiple-bidi}{\}{\}%
4078 \bgroup\aftergroup#2\aftergroup\egroup
4079 \else
4080 \ifcase\currentgroup\or % 0 bottom
4081 \aftergroup#2% 1 simple {}
4082 \or
4083 \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
4084 \or
4085 \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
4086 \or\or\or % vbox vtop align
4087 \or
4088 \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
4089 \or\or\or\or\or\or % output math disc insert vcent mathchoice
4090 \or
4091 \aftergroup#2% 14 \begin\group
4092 \else
4093 \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
4094 \fi
4095 \fi
4096 \bbl@dirlevel\currentgrouplevel
4097 \fi
4098 #1%
4099 \fi}
4100 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
4101 \let\bbl@bodydir\@gobble
4102 \let\bbl@pagedir\@gobble
4103 \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).

```

4104 \def\bbl@xebidipar{%
4105 \let\bbl@xebidipar\relax
4106 \TeXeTstate\@ne
4107 \def\bbl@xeverypar{%
4108 \ifcase\bbl@thepardir
4109 \ifcase\bbl@thetextdir\else\beginR\fi
4110 \else
4111 {\setbox\z@\lastbox\beginR\box\z@}%
4112 \fi}%
4113 \let\bbl@severypar\everypar
4114 \newtoks\everypar
4115 \everypar=\bbl@severypar
4116 \bbl@severypar{\bbl@xeverypar\the\everypar}}
4117 \ifnum\bbl@bidimode>200 % Any xe bidi=
4118 \let\bbl@textdir@i\@gobbletwo
4119 \let\bbl@xebidipar\@empty
4120 \AddBabelHook{bidi}{foreign}{%
4121 \def\bbl@tempa{\def\BabelText###1}%
4122 \ifcase\bbl@thetextdir
4123 \expandafter\bbl@tempa\expandafter{\BabelText{\LR{##1}}}%
4124 \else
4125 \expandafter\bbl@tempa\expandafter{\BabelText{\RL{##1}}}%
4126 \fi}
4127 \def\bbl@pardir#1{\ifcase#1\relax\setLR\else\setRL\fi}
4128 \fi
4129 \fi

```

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

```

4130 \DeclareRobustCommand\babelsublrl[1]{\leavevmode{\bbl@textdir\z@#1}}
4131 \AtBeginDocument{%
4132 \ifx\pdfstringdefDisableCommands\@undefined\else

```

```

4133 \ifx\pdfstringdefDisableCommands\relax\else
4134 \pdfstringdefDisableCommands{\let\babelsublr\@firstofone}%
4135 \fi
4136 \fi}

```

5.6 Local Language Configuration

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

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

```

4137 \bbl@trace{Local Language Configuration}
4138 \ifx\loadlocalcfg\undefined
4139 \@ifpackagewith{babel}{noconfigs}%
4140 {\let\loadlocalcfg@gobble}%
4141 {\def\loadlocalcfg#1{%
4142 \InputIfFileExists{#1.cfg}%
4143 {\typeout{*****^J%
4144 * Local config file #1.cfg used^^J%
4145 *}}}%
4146 \@empty}}
4147 \fi

```

5.7 Language options

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

```

4148 \bbl@trace{Language options}
4149 \let\bbl@afterlang\relax
4150 \let\BabelModifiers\relax
4151 \let\bbl@loaded\@empty
4152 \def\bbl@load@language#1{%
4153 \InputIfFileExists{#1.ldf}%
4154 {\edef\bbl@loaded{\CurrentOption
4155 \ifx\bbl@loaded\@empty\else,\bbl@loaded\fi}%
4156 \expandafter\let\expandafter\bbl@afterlang
4157 \csname\CurrentOption.ldf-h@k\endcsname
4158 \expandafter\let\expandafter\BabelModifiers
4159 \csname bbl@mod@\CurrentOption\endcsname
4160 \bbl@exp{\AtBeginDocument{%
4161 \\\bbl@usehooks@lang{\CurrentOption}{begindocument}{\CurrentOption}}}}%
4162 {\IfFileExists{babel-#1.tex}%
4163 {\def\bbl@tempa{%
4164 .\There is a locale ini file for this language.\%
4165 If it's the main language, try adding `provide='\%
4166 to the babel package options}}%
4167 {\let\bbl@tempa\empty}%
4168 \bbl@error{unknown-package-option}{\CurrentOption}}}}

```

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.

```

4169 \def\bbl@try@load@lang#1#2#3{%
4170 \IfFileExists{\CurrentOption.ldf}%
4171 {\bbl@load@language{\CurrentOption}}%
4172 {#1\bbl@load@language{#2#3}}
4173 %
4174 \DeclareOption{hebrew}{%
4175 \ifcase\bbl@engine\or
4176 \bbl@error{only-pdftex-lang}{hebrew}{\luatex}}%

```

```

4177 \fi
4178 \input{rlbabel.def}%
4179 \bbl@load@language{hebrew}}
4180 \DeclareOption{hungarian}{\bbl@try@load@lang{magyar}}
4181 \DeclareOption{lowersorbian}{\bbl@try@load@lang{lsorbian}}
4182 \DeclareOption{polutonikogreek}{%
4183 \bbl@try@load@lang{greek}{\languageattribute{greek}{polutoniko}}
4184 \DeclareOption{russian}{\bbl@try@load@lang{russianb}}
4185 \DeclareOption{ukrainian}{\bbl@try@load@lang{ukraineb}}
4186 \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.

```

4187 \ifx\bbl@opt@config@nnil
4188 \ifpackagewith{babel}{noconfigs}}%
4189   {\InputIfFileExists{bblopts.cfg}%
4190     {\typeout{*****^J%
4191               * Local config file bblopts.cfg used^^J%
4192               *}}}%
4193   {}}%
4194 \else
4195 \InputIfFileExists{\bbl@opt@config.cfg}%
4196   {\typeout{*****^J%
4197               * Local config file \bbl@opt@config.cfg used^^J%
4198               *}}}%
4199   {\bbl@error{config-not-found}{}}}%
4200 \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 `bbbl@language@opts` are assumed to be languages. If not declared above, the names of the option and the file are the same. We first pre-process the class and package options to determine the main language, which is processed in the third ‘main’ pass, *except* if all files are `ldf` *and* there is no main key. In the latter case (`\bbl@opt@main` is still `\@nnil`), the traditional way to set the main language is kept — the last loaded is the main language.

```

4201 \ifx\bbl@opt@main@nnil
4202 \ifnum\bbl@iniflag>\z@ % if all ldf's: set implicitly, no main pass
4203 \let\bbl@tempb@empty
4204 \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}%
4205 \bbl@foreach\bbl@tempa{\edef\bbl@tempb{#1,\bbl@tempb}}%
4206 \bbl@foreach\bbl@tempb{% \bbl@tempb is a reversed list
4207 \ifx\bbl@opt@main@nnil % ie, if not yet assigned
4208 \ifodd\bbl@iniflag % = *=
4209 \IfFileExists{babel-#1.tex}{\def\bbl@opt@main{#1}}}%
4210 \else % n +=
4211 \IfFileExists{#1.ldf}{\def\bbl@opt@main{#1}}}%
4212 \fi
4213 \fi}%
4214 \fi
4215 \else
4216 \bbl@info{Main language set with 'main='. Except if you have\\%
4217         problems, prefer the default mechanism for setting\\%
4218         the main language, ie, as the last declared.\\%
4219         Reported}
4220 \fi

```

A few languages are still defined explicitly. They are stored in case they are needed in the ‘main’ pass (the value can be `\relax`).

```

4221 \ifx\bbl@opt@main@nnil\else
4222 \bbl@ncarg\let\bbl@loadmain{ds@\bbl@opt@main}%
4223 \expandafter\let\csname ds@\bbl@opt@main\endcsname\relax
4224 \fi

```

Now define the corresponding loaders. With package options, assume the language exists. With class options, check if the option is a language by checking if the corresponding file exists.

```

4225 \bbl@foreach\bbl@language@opts{%
4226   \def\bbl@tempa{#1}%
4227   \ifx\bbl@tempa\bbl@opt@main\else
4228     \ifnum\bbl@iniflag<\tw@    % 0 0 (other = ldf)
4229     \bbl@ifunset{ds@#1}%
4230     {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4231     {}%
4232   \else                          % + * (other = ini)
4233     \DeclareOption{#1}{%
4234       \bbl@ldfinit
4235       \babelprovide[import]{#1}%
4236       \bbl@afterldf{}}%
4237   \fi
4238 \fi}
4239 \bbl@foreach\@classoptionslist{%
4240   \def\bbl@tempa{#1}%
4241   \ifx\bbl@tempa\bbl@opt@main\else
4242     \ifnum\bbl@iniflag<\tw@    % 0 0 (other = ldf)
4243     \bbl@ifunset{ds@#1}%
4244     {\IfFileExists{#1.ldf}%
4245      {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4246      {}}%
4247     {}%
4248   \else                          % + * (other = ini)
4249     \IfFileExists{babel-#1.tex}%
4250     {\DeclareOption{#1}{%
4251       \bbl@ldfinit
4252       \babelprovide[import]{#1}%
4253       \bbl@afterldf{}}}%
4254     {}%
4255   \fi
4256 \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 (but remember class options are processed before):

```

4257 \def\AfterBabelLanguage#1{%
4258   \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang{}}
4259 \DeclareOption*{}
4260 \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. With some options in provide, the package luatexbase is loaded (and immediately used), and therefore \babelprovide can't go inside a \DeclareOption; this explains why it's executed directly, with a dummy declaration. Then all languages have been loaded, so we deactivate \AfterBabelLanguage.

```

4261 \bbl@trace{Option 'main'}
4262 \ifx\bbl@opt@main\@nnil
4263   \edef\bbl@tempa{\@classoptionslist,\bbl@language@opts}
4264   \let\bbl@tempc\@empty
4265   \edef\bbl@templ{\bbl@loaded,}
4266   \edef\bbl@templ{\expandafter\strip@prefix\meaning\bbl@templ}
4267   \bbl@for\bbl@temp\bbl@tempa{%
4268     \edef\bbl@tempd{\bbl@tempb,}%
4269     \edef\bbl@tempd{\expandafter\strip@prefix\meaning\bbl@tempd}%
4270     \bbl@xin@{\bbl@tempd}{\bbl@templ}%
4271     \fin@\edef\bbl@tempc{\bbl@tempb}\fi}
4272   \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
4273   \expandafter\bbl@tempa\bbl@loaded,\@nnil

```

```

4274 \ifx\bbbl@tempb\bbbl@tempc\else
4275   \bbbl@warning{%
4276     Last declared language option is '\bbbl@tempc',\%
4277     but the last processed one was '\bbbl@tempb'.\%
4278     The main language can't be set as both a global\%
4279     and a package option. Use 'main=\bbbl@tempc' as\%
4280     option. Reported}
4281 \fi
4282 \else
4283 \ifodd\bbbl@iniflag % case 1,3 (main is ini)
4284   \bbbl@ldfinit
4285   \let\CurrentOption\bbbl@opt@main
4286   \bbbl@exp{% \bbbl@opt@provide = empty if *
4287     \\babelprovide[\bbbl@opt@provide,import,main]{\bbbl@opt@main}}%
4288   \bbbl@afterldf{}
4289   \DeclareOption{\bbbl@opt@main}{}
4290 \else % case 0,2 (main is ldf)
4291   \ifx\bbbl@loadmain\relax
4292     \DeclareOption{\bbbl@opt@main}{\bbbl@load@language{\bbbl@opt@main}}
4293   \else
4294     \DeclareOption{\bbbl@opt@main}{\bbbl@loadmain}
4295   \fi
4296   \ExecuteOptions{\bbbl@opt@main}
4297   \@namedef{ds@\bbbl@opt@main}{}%
4298 \fi
4299 \DeclareOption*{}
4300 \ProcessOptions*
4301 \fi
4302 \bbbl@exp{%
4303   \\AtBeginDocument{\\bbbl@usehooks@lang{/}{\beginDocument}{}}}%
4304 \def\AfterBabelLanguage{\bbbl@error{late-after-babel}{}}{}

```

In order to catch the case where the user didn't specify a language we check whether `\bbbl@main@language`, has become defined. If not, the `nil` language is loaded.

```

4305 \ifx\bbbl@main@language\undefined
4306   \bbbl@info{%
4307     You haven't specified a language as a class or package\%
4308     option. I'll load 'nil'. Reported}
4309   \bbbl@load@language{nil}
4310 \fi
4311 \</package>

```

6 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 \TeX users might want to use some of the features of the babel system too, care has to be taken that plain \TeX can process the files. For this reason the current format will have to be checked in a number of places. Some of the code below is common to plain \TeX and \LaTeX , some of it is for the \LaTeX case only.

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

A proxy file for `switch.def`

```

4312 \*kernel)
4313 \let\bbbl@onlyswitch\@empty
4314 \input babel.def
4315 \let\bbbl@onlyswitch\@undefined
4316 \</kernel)
4317 %
4318 \section{Error messages}

```

```

4319%
4320% They are loaded when |\bbl@error| is first called. To save space, the
4321% main code just identifies them with a tag, and messages are stored in
4322% a separate file. Since it can be loaded anywhere, you make sure some
4323% catcodes have the right value, although those for |\, |`, |^M|,
4324% |%| and |=| are reset before loading the file.
4325%
4326 (*errors)
4327 \catcode`\{=1 \catcode`\}=2 \catcode`\#=6
4328 \catcode`\:=12 \catcode`\,=12 \catcode`\.=12 \catcode`\--=12
4329 \catcode`\'=12 \catcode`\(=12 \catcode`\)=12
4330 \catcode`\@=11 \catcode`\^=7
4331%
4332 \ifx\MessageBreak\undefined
4333 \gdef\bbl@error@i#1#2{%
4334 \begingroup
4335 \newlinechar=\^^J
4336 \def\{\^^J(babel) }%
4337 \errhelp{#2}\errmessage{\#1}%
4338 \endgroup}
4339 \else
4340 \gdef\bbl@error@i#1#2{%
4341 \begingroup
4342 \def\{\MessageBreak}%
4343 \PackageError{babel}{#1}{#2}%
4344 \endgroup}
4345 \fi
4346 \def\bbl@errmessage#1#2#3{%
4347 \expandafter\gdef\csname bbl@err@#1\endcsname##1##2##3{%
4348 \bbl@error@i{#2}{#3}}
4349 % Implicit #2#3#4:
4350 \gdef\bbl@error#1{\csname bbl@err@#1\endcsname}
4351%
4352 \bbl@errmessage{not-yet-available}
4353 {Not yet available}%
4354 {Find an armchair, sit down and wait}
4355 \bbl@errmessage{bad-package-option}%
4356 {Bad option '#1=#2'. Either you have misspelled the\\%
4357 key or there is a previous setting of '#1'. Valid\\%
4358 keys are, among others, 'shorthands', 'main', 'bidi',\\%
4359 'strings', 'config', 'headfoot', 'safe', 'math'.}%
4360 {See the manual for further details.}
4361 \bbl@errmessage{base-on-the-fly}
4362 {For a language to be defined on the fly 'base'\\%
4363 is not enough, and the whole package must be\\%
4364 loaded. Either delete the 'base' option or\\%
4365 request the languages explicitly}%
4366 {See the manual for further details.}
4367 \bbl@errmessage{undefined-language}
4368 {You haven't defined the language '#1' yet.\\%
4369 Perhaps you misspelled it or your installation\\%
4370 is not complete}%
4371 {Your command will be ignored, type <return> to proceed}
4372 \bbl@errmessage{shorthand-is-off}
4373 {I can't declare a shorthand turned off (\string#2)}
4374 {Sorry, but you can't use shorthands which have been\\%
4375 turned off in the package options}
4376 \bbl@errmessage{not-a-shorthand}
4377 {The character '\string #1' should be made a shorthand character;\\%
4378 add the command \string\usesshorthands\string{#1\string} to
4379 the preamble.\\%
4380 I will ignore your instruction}%
4381 {You may proceed, but expect unexpected results}

```

```

4382 \bbl@errmessage{not-a-shorthand-b}
4383 {I can't switch '\string#2' on or off--not a shorthand}%
4384 {This character is not a shorthand. Maybe you made\\%
4385 a typing mistake? I will ignore your instruction.}
4386 \bbl@errmessage{unknown-attribute}
4387 {The attribute #2 is unknown for language #1.}%
4388 {Your command will be ignored, type <return> to proceed}
4389 \bbl@errmessage{missing-group}
4390 {Missing group for string \string#1}%
4391 {You must assign strings to some category, typically\\%
4392 captions or extras, but you set none}
4393 \bbl@errmessage{only-lua-xe}
4394 {This macro is available only in LuaLaTeX and XeLaTeX.}%
4395 {Consider switching to these engines.}
4396 \bbl@errmessage{only-lua}
4397 {This macro is available only in LuaLaTeX.}%
4398 {Consider switching to that engine.}
4399 \bbl@errmessage{unknown-provide-key}
4400 {Unknown key '#1' in \string\babelprovide}%
4401 {See the manual for valid keys}%
4402 \bbl@errmessage{unknown-mapfont}
4403 {Option '\bbl@KVP@mapfont' unknown for\\%
4404 mapfont. Use 'direction'.}%
4405 {See the manual for details.}
4406 \bbl@errmessage{no-ini-file}
4407 {There is no ini file for the requested language\\%
4408 (#1: \languagename). Perhaps you misspelled it or your\\%
4409 installation is not complete.}%
4410 {Fix the name or reinstall babel.}
4411 \bbl@errmessage{digits-is-reserved}
4412 {The counter name 'digits' is reserved for mapping\\%
4413 decimal digits}%
4414 {Use another name.}
4415 \bbl@errmessage{limit-two-digits}
4416 {Currently two-digit years are restricted to the\\%
4417 range 0-9999.}%
4418 {There is little you can do. Sorry.}
4419 \bbl@errmessage{alphabetic-too-large}
4420 {Alphabetic numeral too large (#1)}%
4421 {Currently this is the limit.}
4422 \bbl@errmessage{no-ini-info}
4423 {I've found no info for the current locale.\\%
4424 The corresponding ini file has not been loaded\\%
4425 Perhaps it doesn't exist}%
4426 {See the manual for details.}
4427 \bbl@errmessage{unknown-ini-field}
4428 {Unknown field '#1' in \string\BCPdata.\\%
4429 Perhaps you misspelled it.}%
4430 {See the manual for details.}
4431 \bbl@errmessage{unknown-locale-key}
4432 {Unknown key for locale '#2':\\%
4433 #3\\%
4434 \string#1 will be set to \relax}%
4435 {Perhaps you misspelled it.}%
4436 \bbl@errmessage{adjust-only-vertical}
4437 {Currently, #1 related features can be adjusted only\\%
4438 in the main vertical list.}%
4439 {Maybe things change in the future, but this is what it is.}
4440 \bbl@errmessage{layout-only-vertical}
4441 {Currently, layout related features can be adjusted only\\%
4442 in vertical mode.}%
4443 {Maybe things change in the future, but this is what it is.}
4444 \bbl@errmessage{bidi-only-lua}

```

4445 {The bidi method 'basic' is available only in\\%
4446 luatex. I'll continue with 'bidi=default', so\\%
4447 expect wrong results}%
4448 {See the manual for further details.}
4449 \bbl@errmessage{multiple-bidi}
4450 {Multiple bidi settings inside a group}%
4451 {I'll insert a new group, but expect wrong results.}
4452 \bbl@errmessage{unknown-package-option}
4453 {Unknown option '\CurrentOption'. Either you misspelled it\\%
4454 or the language definition file \CurrentOption.ldf\\%
4455 was not found%
4456 \bbl@tempa}
4457 {Valid options are, among others: shorthands=, KeepShorthandsActive,\\%
4458 activeacute, activegrave, noconfigs, safe=, main=, math=\\%
4459 headfoot=, strings=, config=, hyphenmap=, or a language name.}
4460 \bbl@errmessage{config-not-found}
4461 {Local config file '\bbl@opt@config.cfg' not found}%
4462 {Perhaps you misspelled it.}
4463 \bbl@errmessage{late-after-babel}
4464 {Too late for \string\AfterBabelLanguage}%
4465 {Languages have been loaded, so I can do nothing}
4466 \bbl@errmessage{double-hyphens-class}
4467 {Double hyphens aren't allowed in \string\babelcharclass\\%
4468 because it's potentially ambiguous}%
4469 {See the manual for further info}
4470 \bbl@errmessage{unknown-interchar}
4471 {'#1' for '\languagename' cannot be enabled.\\%
4472 Maybe there is a typo.}%
4473 {See the manual for further details.}
4474 \bbl@errmessage{unknown-interchar-b}
4475 {'#1' for '\languagename' cannot be disabled.\\%
4476 Maybe there is a typo.}%
4477 {See the manual for further details.}
4478 \bbl@errmessage{charproperty-only-vertical}
4479 {\string\babelcharproperty\space can be used only in\\%
4480 vertical mode (preamble or between paragraphs)}%
4481 {See the manual for further info}
4482 \bbl@errmessage{unknown-char-property}
4483 {No property named '#2'. Allowed values are\\%
4484 direction (bc), mirror (bmg), and linebreak (lb)}%
4485 {See the manual for further info}
4486 \bbl@errmessage{bad-transform-option}
4487 {Bad option '#1' in a transform.\\%
4488 I'll ignore it but expect more errors}%
4489 {See the manual for further info.}
4490 \bbl@errmessage{font-conflict-transforms}
4491 {Transforms cannot be re-assigned to different\\%
4492 fonts. The conflict is in '\bbl@kv@label'.\\%
4493 Apply the same fonts or use a different label}%
4494 {See the manual for further details.}
4495 \bbl@errmessage{transform-not-available}
4496 {'#1' for '\languagename' cannot be enabled.\\%
4497 Maybe there is a typo or it's a font-dependent transform}%
4498 {See the manual for further details.}
4499 \bbl@errmessage{transform-not-available-b}
4500 {'#1' for '\languagename' cannot be disabled.\\%
4501 Maybe there is a typo or it's a font-dependent transform}%
4502 {See the manual for further details.}
4503 \bbl@errmessage{year-out-range}
4504 {Year out of range.\\%
4505 The allowed range is #1}%
4506 {See the manual for further details.}
4507 \bbl@errmessage{only-pdftex-lang}


```

4508 {The '#1' ldf style doesn't work with #2,\\%
4509 but you can use the ini locale instead.\\%
4510 Try adding 'provide=*' to the option list. You may\\%
4511 also want to set 'bidi=' to some value.}%
4512 {See the manual for further details.}
4513 </errors>
4514 <*patterns>

```

7 Loading hyphenation patterns

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

```

4515 <<Make sure ProvidesFile is defined>>
4516 \ProvidesFile{hyphen.cfg}[<<date>> v<<version>> Babel hyphens]
4517 \xdef\bbbl@format{\jobname}
4518 \def\bbbl@version{<<version>>}
4519 \def\bbbl@date{<<date>>}
4520 \ifx\AtBeginDocument\undefined
4521 \def\@empty{}
4522 \fi
4523 <<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.

```

4524 \def\process@line#1#2 #3 #4 {%
4525 \ifx=#1%
4526 \process@synonym{#2}%
4527 \else
4528 \process@language{#1#2}{#3}{#4}%
4529 \fi
4530 \ignorespaces}

```

`\process@synonym` This macro takes care of the lines which start with an `=`. It needs an empty token register to begin with. `\bbbl@languages` is also set to empty.

```

4531 \toks@{}
4532 \def\bbbl@languages{}

```

When no languages have been loaded yet, the name following the `=` will be a synonym for hyphenation register 0. So, it is stored in a token register and executed when the first pattern file has been processed. (The `\relax` just helps to the `\if` below catching synonyms without a language.) Otherwise the name will be a synonym for the language loaded last. We also need to copy the `hyphenmin` parameters for the synonym.

```

4533 \def\process@synonym#1{%
4534 \ifnum\last@language=\m@ne
4535 \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
4536 \else
4537 \expandafter\chardef\csname l@#1\endcsname\last@language
4538 \wlog{\string\l@#1=\string\language\the\last@language}%
4539 \expandafter\let\csname #1hyphenmins\expandafter\endcsname
4540 \csname\languagenam hyphenmins\endcsname
4541 \let\bbbl@elt\relax
4542 \edef\bbbl@languages{\bbbl@languages\bbbl@elt{#1}{\the\last@language}}{}%
4543 \fi}

```

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

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

Pattern files may contain assignments to `\lefthyphenmin` and `\righthyphenmin`. \TeX does not keep track of these assignments. Therefore we try to detect such assignments and store them in the `\langle lang \rangle hyphenmins` macro. When no assignments were made we provide a default setting. Some pattern files contain changes to the `\lccode` en `\uccode` arrays. Such changes should remain local to the language; therefore we process the pattern file in a group; the `\patterns` command acts globally so its effect will be remembered.

Then we globally store the settings of `\lefthyphenmin` and `\righthyphenmin` and close the group. When the hyphenation patterns have been processed we need to see if a file with hyphenation exceptions needs to be read. This is the case when the third argument is not empty and when it does not contain a space token. (Note however there is no need to save hyphenation exceptions into the format.)

`\bbl@languages` saves a snapshot of the loaded languages in the form `\bbl@elt{<language-name>}{<number>}{<patterns-file>}{<exceptions-file>}`. Note the last 2 arguments are empty in 'dialects' defined in `language.dat` with `=`. Note also the language name can have encoding info.

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

```

4544 \def\process@language#1#2#3{%
4545   \expandafter\addlanguage\csname l@#1\endcsname
4546   \expandafter\language\csname l@#1\endcsname
4547   \edef\languagename{#1}%
4548   \bbl@hook@everylanguage{#1}%
4549   % > luatex
4550   \bbl@get@enc#1: :@@@
4551   \begingroup
4552     \lefthyphenmin\m@ne
4553     \bbl@hook@loadpatterns{#2}%
4554     % > luatex
4555     \ifnum\lefthyphenmin=\m@ne
4556     \else
4557       \expandafter\xdef\csname #1hyphenmins\endcsname{%
4558         \the\lefthyphenmin\the\righthyphenmin}%
4559     \fi
4560   \endgroup
4561   \def\bbl@tempa{#3}%
4562   \ifx\bbl@tempa\@empty\else
4563     \bbl@hook@loadexceptions{#3}%
4564     % > luatex
4565   \fi
4566   \let\bbl@elt\relax
4567   \edef\bbl@languages{%
4568     \bbl@languages\bbl@elt{#1}{\the\language}{#2}{\bbl@tempa}}%
4569   \ifnum\the\language=\z@
4570     \expandafter\ifx\csname #1hyphenmins\endcsname\relax
4571       \set@hyphenmins\tw@\thr@@\relax
4572     \else
4573       \expandafter\expandafter\expandafter\set@hyphenmins
4574       \csname #1hyphenmins\endcsname
4575     \fi
4576     \the\toks@
4577     \toks@{ }%
4578   \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.

```

4579 \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.

```
4580 \def\bb@hook@everylanguage#1{}
4581 \def\bb@hook@loadpatterns#1{\input #1\relax}
4582 \let\bb@hook@loadexceptions\bb@hook@loadpatterns
4583 \def\bb@hook@loadkernel#1{%
4584   \def\addlanguage{\csname newlanguage\endcsname}%
4585   \def\adddialect##1##2{%
4586     \global\chardef##1##2\relax
4587     \wlog{\string##1 = a dialect from \string\language##2}}%
4588   \def\iflanguage##1{%
4589     \expandafter\ifx\csname l@##1\endcsname\relax
4590       \@noLanerr{##1}%
4591     \else
4592       \ifnum\csname l@##1\endcsname=\language
4593         \expandafter\expandafter\expandafter\@firstoftwo
4594       \else
4595         \expandafter\expandafter\expandafter\@secondoftwo
4596       \fi
4597     \fi}%
4598   \def\providehyphenmins##1##2{%
4599     \expandafter\ifx\csname ##1hyphenmins\endcsname\relax
4600       \namedef{##1hyphenmins}{##2}%
4601     \fi}%
4602   \def\set@hyphenmins##1##2{%
4603     \lefthyphenmin##1\relax
4604     \righthyphenmin##2\relax}%
4605   \def\selectlanguage{%
4606     \errhelp{Selecting a language requires a package supporting it}%
4607     \errmessage{Not loaded}}%
4608   \let\foreignlanguage\selectlanguage
4609   \let\otherlanguage\selectlanguage
4610   \expandafter\let\csname otherlanguage*\endcsname\selectlanguage
4611   \def\bb@usehooks##1##2{% TODO. Temporary!!
4612     \def\setlocale{%
4613       \errhelp{Find an armchair, sit down and wait}%
4614       \errmessage{(babel) Not yet available}}%
4615     \let\uselocale\setlocale
4616     \let\locale\setlocale
4617     \let\selectlocale\setlocale
4618     \let\localename\setlocale
4619     \let\textlocale\setlocale
4620     \let\textlanguage\setlocale
4621     \let\languagetext\setlocale}
4622   \begingroup
4623   \def\AddBabelHook#1#2{%
4624     \expandafter\ifx\csname bb@hook@#2\endcsname\relax
4625       \def\next{\toks1}%
4626     \else
4627       \def\next{\expandafter\gdef\csname bb@hook@#2\endcsname###1}%
4628     \fi
4629     \next}
4630   \ifx\directlua\undefined
4631     \ifx\XeTeXinputencoding\undefined\else
4632       \input xebabel.def
4633     \fi
4634   \else
4635     \input luababel.def
4636   \fi
4637   \openin1 = babel-\bb@format.cfg
4638   \ifeof1
4639   \else
4640     \input babel-\bb@format.cfg\relax
4641   \fi
```

```

4642 \closein1
4643 \endgroup
4644 \bbl@hook@loadkernel{switch.def}

```

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

```

4645 \openin1 = language.dat

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

4646 \def\languagename{english}%
4647 \ifeof1
4648 \message{I couldn't find the file language.dat,\space
4649           I will try the file hyphen.tex}
4650 \input hyphen.tex\relax
4651 \chardef\l@english\z@
4652 \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`.

```

4653 \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.

```

4654 \loop
4655   \endlinechar@m@ne
4656   \read1 to \bbl@line
4657   \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.

```

4658   \if T\ifeof1F\fi T\relax
4659   \ifx\bbl@line@empty\else
4660     \edef\bbl@line{\bbl@line\space\space\space}%
4661     \expandafter\process@line\bbl@line\relax
4662   \fi
4663 \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.

```

4664 \begingroup
4665   \def\bbl@elt#1#2#3#4{%
4666     \global\language=#2\relax
4667     \gdef\languagename{#1}%
4668     \def\bbl@elt##1##2##3##4{}}%
4669   \bbl@languages
4670 \endgroup
4671 \fi
4672 \closein1

```

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

```

4673 \if/\the\toks@/\else
4674   \errhelp{language.dat loads no language, only synonyms}
4675   \errmessage{Orphan language synonym}
4676 \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.

```

4677 \let\bbl@line@undefined
4678 \let\process@line@undefined

```

```

4679 \let\process@synonym\@undefined
4680 \let\process@language\@undefined
4681 \let\bbl@get@enc\@undefined
4682 \let\bbl@hyph@enc\@undefined
4683 \let\bbl@tempa\@undefined
4684 \let\bbl@hook@loadkernel\@undefined
4685 \let\bbl@hook@everylanguage\@undefined
4686 \let\bbl@hook@loadpatterns\@undefined
4687 \let\bbl@hook@loadexceptions\@undefined
4688 \/\patterns)

```

Here the code for iniTeX ends.

8 Font handling with fontspec

Add the bidi handler just before luaoffload, 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].

```

4689 <<{*More package options}>> ≡
4690 \chardef\bbl@bidimode\z@
4691 \DeclareOption{bidi=default}{\chardef\bbl@bidimode=\@ne}
4692 \DeclareOption{bidi=basic}{\chardef\bbl@bidimode=101 }
4693 \DeclareOption{bidi=basic-r}{\chardef\bbl@bidimode=102 }
4694 \DeclareOption{bidi=bidi}{\chardef\bbl@bidimode=201 }
4695 \DeclareOption{bidi=bidi-r}{\chardef\bbl@bidimode=202 }
4696 \DeclareOption{bidi=bidi-l}{\chardef\bbl@bidimode=203 }
4697 <</More package options>>

```

With explicit languages, we could define the font at once, but we don't. Just wait and see if the language is actually activated. `bbl@font` replaces hardcoded font names inside `\. . family` by the corresponding macro `\. . default`.

At the time of this writing, fontspec shows a warning about there are languages not available, which some people think refers to babel, even if there is nothing wrong. Here is hack to patch fontspec to avoid the misleading (and mostly unuseful) message.

```

4698 <<{*Font selection}>> ≡
4699 \bbl@trace{Font handling with fontspec}
4700 \ifx\ExplSyntax0n\@undefined\else
4701   \def\bbl@fs@warn@nx#1#2{% \bbl@tempfs is the original macro
4702     \in{,#1,}{,no-script,language-not-exist,}%
4703     \ifin\else\bbl@tempfs@nx{#1}{#2}\fi}
4704   \def\bbl@fs@warn@nxx#1#2#3{%
4705     \in{,#1,}{,no-script,language-not-exist,}%
4706     \ifin\else\bbl@tempfs@nxx{#1}{#2}{#3}\fi}
4707   \def\bbl@loadfontspec{%
4708     \let\bbl@loadfontspec\relax
4709     \ifx\fontspec\@undefined
4710       \usepackage{fontspec}%
4711     \fi}%
4712 \fi
4713 \@onlypreamble\babelfont
4714 \newcommand\babelfont[2][]{% 1=langs/scripts 2=fam
4715   \bbl@foreach{#1}{%
4716     \expandafter\ifx\csname date##1\endcsname\relax
4717     \IfFileExists{babel-##1.tex}%
4718     {\babelprovide{##1}}%
4719     }%
4720   \fi}%
4721 \edef\bbl@tempa{#1}%
4722 \def\bbl@tempb{#2}% Used by \bbl@bblfont
4723 \bbl@loadfontspec
4724 \EnableBabelHook{babel-fontspec}% Just calls \bbl@switchfont
4725 \bbl@bblfont}
4726 \newcommand\bbl@bblfont[2][]{% 1=features 2=fontname, @font=rm|sf|tt
4727   \bbl@ifunset{\bbl@tempb family}%

```

```

4728   {\bbl@providefam{\bbl@tempb}}%
4729   }%
4730   % For the default font, just in case:
4731   \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
4732   \expandafter\bbl@ifblank\expandafter{\bbl@tempa}%
4733   {\bbl@csarg\edef{\bbl@tempb dflt@}{<{#1}{#2}}% save bbl@rmdflt@
4734   \bbl@exp{%
4735     \let<\bbl@\bbl@tempb dflt@\languagename>\<bbl@\bbl@tempb dflt@>%
4736     \\bbl@font@set<\bbl@\bbl@tempb dflt@\languagename>%
4737     \<\bbl@tempb default>\<\bbl@tempb family>}}%
4738   {\bbl@foreach\bbl@tempa{% ie bbl@rmdflt@lang / *scrt
4739     \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:

```

4740 \def\bbl@providefam#1{%
4741   \bbl@exp{%
4742     \\newcommand<#1default>{}% Just define it
4743     \\bbl@add@list\\bbl@font@fams{#1}%
4744     \\DeclareRobustCommand<#1family>{%
4745       \\not@math@alphabet<#1family>\relax
4746       % \\prepare@family@series@update{#1}<#1default>% TODO. Fails
4747       \\fontfamily<#1default>%
4748       <ifx>\\UseHooks\\<undefined><else>\\UseHook{#1family}\<fi>%
4749       \\selectfont}%
4750     \\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.

```

4751 \def\bbl@nostdfont#1{%
4752   \bbl@ifunset{\bbl@WFF@f@family}%
4753   {\bbl@csarg\gdef{WFF@f@family}}% Flag, to avoid dupl warns
4754   \bbl@infowarn{The current font is not a babel standard family:\\%
4755     #1%
4756     \fontname\font\\%
4757     There is nothing intrinsically wrong with this warning, and\\%
4758     you can ignore it altogether if you do not need these\\%
4759     families. But if they are used in the document, you should be\\%
4760     aware 'babel' will not set Script and Language for them, so\\%
4761     you may consider defining a new family with \string\babelfont.\\%
4762     See the manual for further details about \string\babelfont.\\%
4763     Reported}}
4764   }%
4765 \gdef\bbl@switchfont{%
4766   \bbl@ifunset{\bbl@lsys@\languagename}{\bbl@provide@lsys{\languagename}}{}%
4767   \bbl@exp{% eg Arabic -> arabic
4768     \lowercase{\edef\\bbl@tempa{\bbl@cl{sname}}}}%
4769   \bbl@foreach\bbl@font@fams{%
4770     \bbl@ifunset{\bbl@##1dflt@\languagename}% (1) language?
4771     {\bbl@ifunset{\bbl@##1dflt@*\bbl@tempa}% (2) from script?
4772     {\bbl@ifunset{\bbl@##1dflt@}% 2=F - (3) from generic?
4773     }% 123=F - nothing!
4774     {\bbl@exp{% 3=T - from generic
4775       \global\let<\bbl@##1dflt@\languagename>%
4776       \<bbl@##1dflt@>}}}%
4777     {\bbl@exp{% 2=T - from script
4778       \global\let<\bbl@##1dflt@\languagename>%
4779       \<bbl@##1dflt@*\bbl@tempa>}}}%
4780     }% 1=T - language, already defined
4781   \def\bbl@tempa{\bbl@nostdfont}}% TODO. Don't use \bbl@tempa
4782   \bbl@foreach\bbl@font@fams{% don't gather with prev for
4783     \bbl@ifunset{\bbl@##1dflt@\languagename}%
4784     {\bbl@cs{famrst@##1}%
4785     \global\bbl@csarg\let{famrst@##1}\relax}%
4786     {\bbl@exp{% order is relevant. TODO: but sometimes wrong!

```

```

4787     \\bbl@add\\originalTeX{%
4788     \\bbl@font@rst{\\bbl@cl{##1dflt}}%
4789         \\<##1default>\\<##1family>{##1}}%
4790     \\bbl@font@set<bbl@##1dflt@languagename>% the main part!
4791         \\<##1default>\\<##1family>}}}%
4792     \\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`.

```

4793 \\ifx\\f@family\\undefined\\else % if latex
4794 \\ifcase\\bbl@engine % if pdftex
4795     \\let\\bbl@cckckstdfonts\\relax
4796 \\else
4797     \\def\\bbl@cckckstdfonts{%
4798         \\begingroup
4799         \\global\\let\\bbl@cckckstdfonts\\relax
4800         \\let\\bbl@tempa\\empty
4801         \\bbl@foreach\\bbl@font@fams{%
4802             \\bbl@ifunset{bbl@##1dflt@}%
4803             {\\@nameuse{##1family}}%
4804             \\bbl@csarg\\gdef{WFF@\\f@family}}% Flag
4805             \\bbl@exp{\\bbl@add\\bbl@tempa{* \\<##1family>= \\f@family\\}%
4806                 \\space\\space\\fontname\\font\\}}%
4807             \\bbl@csarg\\xdef{##1dflt@}{\\f@family}%
4808             \\expandafter\\xdef\\csname ##1default\\endcsname{\\f@family}}%
4809             {}}%
4810         \\ifx\\bbl@tempa\\empty\\else
4811             \\bbl@infowarn{The following font families will use the default\\%
4812                 settings for all or some languages:\\%
4813                 \\bbl@tempa
4814                 There is nothing intrinsically wrong with it, but\\%
4815                 'babel' will no set Script and Language, which could\\%
4816                 be relevant in some languages. If your document uses\\%
4817                 these families, consider redefining them with \\string\\babelfont.\\%
4818                 Reported}%
4819         \\fi
4820     \\endgroup}
4821 \\fi
4822 \\fi

```

Now the macros defining the font with `fontspec`.

When there are repeated keys in `fontspec`, the last value wins. So, we just place the ini settings at the beginning, and user settings will take precedence. We must deactivate temporarily `\bbl@mapselect` because `\selectfont` is called internally when a font is defined.

For historical reasons, \TeX can select two different series (bx and b), for what is conceptually a single one. This can lead to problems when a single family requires several fonts, depending on the language, mainly because ‘substitutions’ with some combinations are not done consistently – sometimes `bx/sc` is the correct font, but sometimes points to `b/n`, even if `b/sc` exists. So, some substitutions are redefined (in a somewhat hackish way, by inspecting if the variant declaration contains `>ssub*`).

```

4823 \\def\\bbl@font@set#1#2#3{% eg \\bbl@rmdflt@lang \\rmdefault \\rmfamily
4824     \\bbl@xin@{<>}{#1}%
4825     \\ifin@
4826         \\bbl@exp{\\bbl@fontspec@set\\#1\\expandafter\\@gobbletwo#1\\#3}%
4827     \\fi
4828     \\bbl@exp{%
4829         'Unprotected' macros return prev values
4830         \\def\\#2{#1}% eg, \\rmdefault{\\bbl@rmdflt@lang}
4831         \\bbl@ifsamestring{#2}{\\f@family}%
4832         {\\#3%
4833             \\bbl@ifsamestring{\\f@series}{\\bfdefault}{\\bfsseries}}}%
4834     \\let\\bbl@tempa\\relax}%
4835     {}}
4836     TODO - next should be global?, but even local does its job. I'm
4837     still not sure -- must investigate:

```

```

4837 \def\bbf@fontspec@set#1#2#3#4{% eg \bbf@rmdflt@lang fnt-opt fnt-nme \xxfamily
4838 \let\bbf@tempe\bbf@mapselect
4839 \edef\bbf@tempb{\bbf@stripslash#4/}% Catcodes hack (better pass it).
4840 \bbf@exp{\bbf@replace\bbf@tempb{\bbf@stripslash\family/}}}%
4841 \let\bbf@mapselect\relax
4842 \let\bbf@tempfam#4% eg, '\rmfamily', to be restored below
4843 \let#4@empty % Make sure \renewfontfamily is valid
4844 \bbf@exp{%
4845 \let\bbf@temp@pfam<\bbf@stripslash#4\space>% eg, '\rmfamily '
4846 \<keys_if_exist:nnF>{fontspec-opentype}{Script/\bbf@cl{sname}}}%
4847 {\bbf@newfontscript{\bbf@cl{sname}}{\bbf@cl{sotf}}}%
4848 \<keys_if_exist:nnF>{fontspec-opentype}{Language/\bbf@cl{lname}}}%
4849 {\bbf@newfontlanguage{\bbf@cl{lname}}{\bbf@cl{lotf}}}%
4850 \let\bbf@tempfs@nx<__fontspec_warning:nx>%
4851 \let<__fontspec_warning:nx>\bbf@fs@warn@nx
4852 \let\bbf@tempfs@nxx<__fontspec_warning:nxx>%
4853 \let<__fontspec_warning:nxx>\bbf@fs@warn@nxx
4854 \renewfontfamily\#4%
4855 [\bbf@cl{lsys},% xetex removes unknown features :- (
4856 \ifcase\bbf@engine\or RawFeature={family=\bbf@tempb},\fi
4857 #2]}#3}% ie \bbf@exp{.}#3}
4858 \bbf@exp{%
4859 \let<__fontspec_warning:nx>\bbf@tempfs@nx
4860 \let<__fontspec_warning:nxx>\bbf@tempfs@nxx}%
4861 \begingroup
4862 #4%
4863 \xdef#1{\f@family}% eg, \bbf@rmdflt@lang{FreeSerif(0)}
4864 \endgroup % TODO. Find better tests:
4865 \bbf@xin@{\string>\string s\string s\string u\string b\string*}%
4866 {\expandafter\meaning\csname TU/#1/bx/sc\endcsname}%
4867 \ifin@
4868 \global\bbf@ccarg\let{TU/#1/bx/sc}{TU/#1/b/sc}%
4869 \fi
4870 \bbf@xin@{\string>\string s\string s\string u\string b\string*}%
4871 {\expandafter\meaning\csname TU/#1/bx/scit\endcsname}%
4872 \ifin@
4873 \global\bbf@ccarg\let{TU/#1/bx/scit}{TU/#1/b/scit}%
4874 \fi
4875 \let#4\bbf@tempfam
4876 \bbf@exp{\let<\bbf@stripslash#4\space>\bbf@temp@pfam
4877 \let\bbf@mapselect\bbf@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.

```

4878 \def\bbf@font@rst#1#2#3#4{%
4879 \bbf@csarg\def{famrst@#4}{\bbf@font@set{#1}#2#3}}

```

The default font families. They are eurocentric, but the list can be expanded easily with \babel font.

```

4880 \def\bbf@font@fams{rm,sf,tt}
4881 <</Font selection>>

```

9 Hooks for XeTeX and LuaTeX

9.1 XeTeX

Unfortunately, the current encoding cannot be retrieved and therefore it is reset always to utf8, which seems a sensible default.

```

4882 <<{*Footnote changes}>> ≡
4883 \bbf@trace{Bidi footnotes}
4884 \ifnum\bbf@bidimode>\z@ % Any bidi=
4885 \def\bbf@footnote#1#2#3{%
4886 \@ifnextchar[%

```



```

4887     {\bbl@footnote@o{#1}{#2}{#3}}%
4888     {\bbl@footnote@x{#1}{#2}{#3}}
4889 \long\def\bbl@footnote@x#1#2#3#4{%
4890   \bgroup
4891   \select@language@x{\bbl@main@language}%
4892   \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
4893   \egroup}
4894 \long\def\bbl@footnote@o#1#2#3[#4]#5{%
4895   \bgroup
4896   \select@language@x{\bbl@main@language}%
4897   \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
4898   \egroup}
4899 \def\bbl@footnotetext#1#2#3{%
4900   \@ifnextchar[%
4901     {\bbl@footnotetext@o{#1}{#2}{#3}}%
4902     {\bbl@footnotetext@x{#1}{#2}{#3}}
4903   \long\def\bbl@footnotetext@x#1#2#3#4{%
4904     \bgroup
4905     \select@language@x{\bbl@main@language}%
4906     \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
4907     \egroup}
4908   \long\def\bbl@footnotetext@o#1#2#3[#4]#5{%
4909     \bgroup
4910     \select@language@x{\bbl@main@language}%
4911     \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
4912     \egroup}
4913   \def\BabelFootnote#1#2#3#4{%
4914     \ifx\bbl@fn@footnote\@undefined
4915       \let\bbl@fn@footnote\footnote
4916       \fi
4917     \ifx\bbl@fn@footnotetext\@undefined
4918       \let\bbl@fn@footnotetext\footnotetext
4919       \fi
4920     \bbl@ifblank{#2}%
4921     {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
4922     \@namedef{\bbl@stripslash#1text}%
4923     {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
4924     {\def#1{\bbl@exp{\bbl@footnote{\foreignlanguage{#2}}}{#3}{#4}}%
4925     \@namedef{\bbl@stripslash#1text}%
4926     {\bbl@exp{\bbl@footnotetext{\foreignlanguage{#2}}}{#3}{#4}}}}
4927 \fi
4928 <</Footnote changes>>

```

Now, the code.

```

4929 (*xetex)
4930 \def\BabelStringsDefault{unicode}
4931 \let\xebbl@stop\relax
4932 \AddBabelHook{xetex}{encodedcommands}{%
4933   \def\bbl@tempa{#1}%
4934   \ifx\bbl@tempa@empty
4935     \XeTeXinputencoding"bytes"%
4936   \else
4937     \XeTeXinputencoding"#1"%
4938   \fi
4939   \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
4940 \AddBabelHook{xetex}{stopcommands}{%
4941   \xebbl@stop
4942   \let\xebbl@stop\relax}
4943 \def\bbl@input@classes{% Used in CJK intraspaces
4944   \input{load-unicode-xetex-classes.tex}%
4945   \let\bbl@input@classes\relax}
4946 \def\bbl@intraspace#1 #2 #3\@@{%
4947   \bbl@csarg\gdef{xeisp@language#1}%

```

```

4948   {\XeTeXlinebreakskip #1em plus #2em minus #3em\relax}}
4949 \def\bbl@intrapenalty#1\@@{%
4950   \bbl@csarg\gdef{xeipn@\languagename}%
4951   {\XeTeXlinebreakpenalty #1\relax}}
4952 \def\bbl@provide@intraspace{%
4953   \bbl@xin@{/s}{/\bbl@cl{lbrk}}}%
4954   \ifin@else\bbl@xin@{/c}{/\bbl@cl{lbrk}}\fi
4955   \ifin@
4956     \bbl@ifunset{\bbl@intsp@\languagename}{}%
4957     {\expandafter\ifx\csname bbl@intsp@\languagename\endcsname\@empty\else
4958       \ifx\bbl@KVP@intraspace\@nnil
4959         \bbl@exp{%
4960           \\bbl@intraspace\bbl@cl{intsp}\\\@}%
4961         \fi
4962         \ifx\bbl@KVP@intrapenalty\@nnil
4963           \bbl@intrapenalty0\@@
4964         \fi
4965       \fi
4966       \ifx\bbl@KVP@intraspace\@nnil\else % We may override the ini
4967         \expandafter\bbl@intraspace\bbl@KVP@intraspace\@@
4968       \fi
4969       \ifx\bbl@KVP@intrapenalty\@nnil\else
4970         \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
4971       \fi
4972       \bbl@exp{%
4973         % TODO. Execute only once (but redundant):
4974         \\bbl@add\<extras\languagename>%
4975         \XeTeXlinebreaklocale "\bbl@cl{tbcpr}"%
4976         \<bbl@xeisp@\languagename>%
4977         \<bbl@xeipn@\languagename>}%
4978         \\bbl@toglobal\<extras\languagename>%
4979         \\bbl@add\<noextras\languagename>{%
4980           \XeTeXlinebreaklocale ""}%
4981         \\bbl@toglobal\<noextras\languagename>}%
4982       \ifx\bbl@ispacesize\@undefined
4983         \gdef\bbl@ispacesize{\bbl@cl{xeisp}}%
4984       \ifx\AtBeginDocument\@notprerr
4985         \expandafter\@secondoftwo % to execute right now
4986       \fi
4987       \AtBeginDocument{\bbl@patchfont{\bbl@ispacesize}}%
4988     \fi}%
4989   \fi}
4990 \ifx\DisableBabelHook\@undefined\endinput\fi %%% TODO: why
4991 \AddBabelHook{babel - fontspec}{afterextras}{\bbl@switchfont}
4992 \AddBabelHook{babel - fontspec}{beforestart}{\bbl@ckeckstdfonts}
4993 \DisableBabelHook{babel - fontspec}
4994 <<Font selection>>
4995 \def\bbl@provide@extra#1{}

```

10 Support for interchar

xetex reserves some values for CJK (although they are not set in XELATEX), so we make sure they are skipped. Define some user names for the global classes, too.

```

4996 \ifnum\Xe@alloc@intercharclass<\thr@@
4997   \Xe@alloc@intercharclass\thr@@
4998 \fi
4999 \chardef\bbl@xe@class@default@=\z@
5000 \chardef\bbl@xe@class@cjkideogram@=\@ne
5001 \chardef\bbl@xe@class@cjkleftpunctuation@=\tw@
5002 \chardef\bbl@xe@class@cjkrightpunctuation@=\thr@@
5003 \chardef\bbl@xe@class@boundary@=4095
5004 \chardef\bbl@xe@class@ignore@=4096

```

The machinery is activated with a hook (enabled only if actually used). Here `\bbl@tempc` is pre-set with `\bbl@usingxeclass`, defined below. The standard mechanism based on `\originalTeX` to save, set and restore values is used. `\count@` stores the previous char to be set, except at the beginning (0) and after `\bbl@upto`, which is the previous char negated, as a flag to mark a range.

```

5005 \AddBabelHook{babel-interchar}{beforeextras}{%
5006   \@nameuse{bbl@xechars@\languagename}}
5007 \DisableBabelHook{babel-interchar}
5008 \protected\def\bbl@charclass#1{%
5009   \ifnum\count@<\z@
5010     \count@-\count@
5011     \loop
5012       \bbl@exp{%
5013         \\babel@savevariable{\XeTeXcharclass`Uchar\count@}}%
5014         \XeTeXcharclass\count@ \bbl@tempc
5015         \ifnum\count@<`#1\relax
5016           \advance\count@\@ne
5017         \repeat
5018       \else
5019         \babel@savevariable{\XeTeXcharclass`#1}%
5020         \XeTeXcharclass`#1 \bbl@tempc
5021       \fi
5022       \count@`#1\relax}

```

Now the two user macros. Char classes are declared implicitly, and then the macro to be executed at the `babel-interchar` hook is created. The list of chars to be handled by the hook defined above has internally the form `\bbl@usingxeclass\bbl@xeclass@punct@english\bbl@charclass{.}` `\bbl@charclass{,}` (etc.), where `\bbl@usingxeclass` stores the class to be applied to the subsequent characters. The `\ifcat` part deals with the alternative way to enter characters as macros (eg, `\`). As a special case, hyphens are stored as `\bbl@upto`, to deal with ranges.

```

5023 \newcommand\bbl@ifinterchar[1]{%
5024   \let\bbl@tempa@gobble      % Assume to ignore
5025   \edef\bbl@tempb{\zap@space#1 \@empty}%
5026   \ifx\bbl@KVP@interchar\@nnil\else
5027     \bbl@replace\bbl@KVP@interchar{ }{,}%
5028     \bbl@foreach\bbl@tempb{%
5029       \bbl@xin@{,##1,}{,\bbl@KVP@interchar,}%
5030     }
5031     \let\bbl@tempa@\firstofone
5032   \fi}%
5033 \fi
5034 \bbl@tempa}
5035 \newcommand\IfBabelIntercharT[2]{%
5036   \bbl@carg\bbl@add{\bbl@icsave@\CurrentOption}{\bbl@ifinterchar{#1}{#2}}}%
5037 \newcommand\babelcharclass[3]{%
5038   \EnableBabelHook{babel-interchar}%
5039   \bbl@csarg\newXeTeXintercharclass{xeclass@#2@#1}%
5040   \def\bbl@tempb##1{%
5041     \ifx##1@empty\else
5042       \ifx##1-
5043         \bbl@upto
5044       \else
5045         \bbl@charclass{%
5046           \ifcat\noexpand##1\relax\bbl@stripslash##1\else\string##1\fi}%
5047       \fi
5048       \expandafter\bbl@tempb
5049     \fi}%
5050   \bbl@ifunset{bbl@xechars@#1}%
5051   {\toks@{%
5052     \babel@savevariable\XeTeXinterchartokenstate
5053     \XeTeXinterchartokenstate@ne
5054   }}%
5055   {\toks@\expandafter\expandafter\expandafter{%
5056     \csname bbl@xechars@#1\endcsname}}%

```

```

5057 \bbl@csarg\edef{xechars@#1}{%
5058   \the\toks@
5059   \bbl@usingxecl\csname bbl@xecl\@#2@#1\endcsname
5060   \bbl@tempb#3\@empty}}
5061 \protected\def\bbl@usingxecl\@#1{\count@ \z@ \let\bbl@tempc#1}
5062 \protected\def\bbl@upto{%
5063   \ifnum\count@>\z@
5064     \advance\count@\@ne
5065     \count@-\count@
5066   \else\ifnum\count@=\z@
5067     \bbl@charclass{-}%
5068   \else
5069     \bbl@error{double-hyphens-class}{-}{-}%
5070   \fi\fi}

```

And finally, the command with the code to be inserted. If the language doesn't define a class, then use the global one, as defined above. For the definition there is a intermediate macro, which can be 'disabled' with `\bbl@ic@<label><lang>`.

```

5071 \def\bbl@ignoreinterchar{%
5072   \ifnum\language=\l@nohyphenation
5073     \expandafter\@gobble
5074   \else
5075     \expandafter\@firstofone
5076   \fi}
5077 \newcommand\babelinterchar[5][{}]{%
5078   \let\bbl@kv@label\@empty
5079   \bbl@forkv{#1}{\bbl@csarg\edef{kv@##1}{##2}}%
5080   \namedef{\zap@space bbl@xeinter@\bbl@kv@label @#3@#4@#2 \@empty}%
5081   {\bbl@ignoreinterchar{#5}}%
5082   \bbl@csarg\let{ic@\bbl@kv@label @#2}\@firstofone
5083   \bbl@exp{\bbl@for\bbl@tempa{\zap@space#3 \@empty}}%
5084   \bbl@exp{\bbl@for\bbl@tempb{\zap@space#4 \@empty}}%
5085   \XeTeXinterchartoks
5086     \@nameuse{bbl@xecl\@#2}\@#2 %
5087     \bbl@ifunset{bbl@xecl\@#2}\@#2 %
5088     \@nameuse{bbl@xecl\@#2}\@#2 %
5089     \bbl@ifunset{bbl@xecl\@#2}\@#2 %
5090   = \expandafter{%
5091     \csname bbl@ic@\bbl@kv@label @#2\expandafter\endcsname
5092     \csname\zap@space bbl@xeinter@\bbl@kv@label
5093       @#3@#4@#2 \@empty\endcsname}}
5094 \DeclareRobustCommand\enablelocaleinterchar[1]{%
5095   \bbl@ifunset{bbl@ic@#1\@languagename}%
5096   {\bbl@error{unknown-interchar}{#1}{-}}%
5097   {\bbl@csarg\let{ic@#1\@languagename}\@firstofone}}
5098 \DeclareRobustCommand\disablelocaleinterchar[1]{%
5099   \bbl@ifunset{bbl@ic@#1\@languagename}%
5100   {\bbl@error{unknown-interchar-b}{#1}{-}}%
5101   {\bbl@csarg\let{ic@#1\@languagename}\@gobble}}
5102 </xetex>

```

10.1 Layout

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

`\bbl@startskip` and `\bbl@endskip` are available to package authors. Thanks to the \TeX expansion mechanism the following constructs are valid: `\adim\bbl@startskip`, `\advance\bbl@startskip\adim`, `\bbl@startskip\adim`.

Consider `txtbabel` as a shorthand for `tex-xet babel`, which is the bidi model in both `pdftex` and `xetex`.

```

5103 (*xetex | texxet)
5104 \providecommand\bbl@provide@intraspace{}
5105 \bbl@trace{Redefinitions for bidi layout}
5106 \def\bbl@sspre@caption{%

```

```

5107 \bbl@exp{\everyhbox{\bbl@textdir\bbl@cs{wdir@\bbl@main@language}}}}
5108 \ifx\bbl@opt@layout@nnil\else % if layout=..
5109 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
5110 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}
5111 \ifx\bbl@beforeforeign\leavevmode % A poor test for bidi=
5112 \def\hangfrom#1{%
5113   \setbox\@tempboxa\hbox{#{#1}}%
5114   \hangindent\ifcase\bbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
5115   \noindent\box\@tempboxa}
5116 \def\raggedright{%
5117   \let\\\@centercr
5118   \bbl@startskip\z@skip
5119   \@rightskip\@flushglue
5120   \bbl@endskip\@rightskip
5121   \parindent\z@
5122   \parfillskip\bbl@startskip}
5123 \def\raggedleft{%
5124   \let\\\@centercr
5125   \bbl@startskip\@flushglue
5126   \bbl@endskip\z@skip
5127   \parindent\z@
5128   \parfillskip\bbl@endskip}
5129 \fi
5130 \IfBabelLayout{lists}
5131 {\bbl@sreplace\list
5132   {\@totalleftmargin\leftmargin}{\@totalleftmargin\bbl@listleftmargin}%
5133   \def\bbl@listleftmargin{%
5134     \ifcase\bbl@thepardir\leftmargin\else\rightmargin\fi}%
5135   \ifcase\bbl@engine
5136     \def\labelenumii{}\theenumii()% pdftex doesn't reverse ()
5137     \def\p@enumiii{\p@enumii}\theenumii()%
5138     \fi
5139     \bbl@sreplace\@verbatim
5140     {\leftskip\@totalleftmargin}%
5141     {\bbl@startskip\textwidth
5142       \advance\bbl@startskip-\linewidth}%
5143     \bbl@sreplace\@verbatim
5144     {\rightskip\z@skip}%
5145     {\bbl@endskip\z@skip}}%
5146 {}
5147 \IfBabelLayout{contents}
5148 {\bbl@sreplace\@dottedtocline{\leftskip}{\bbl@startskip}%
5149   \bbl@sreplace\@dottedtocline{\rightskip}{\bbl@endskip}}
5150 {}
5151 \IfBabelLayout{columns}
5152 {\bbl@sreplace\@outputdblcol{\hb@xt@\textwidth}{\bbl@outputbox}%
5153   \def\bbl@outputbox#1{%
5154     \hb@xt@\textwidth{%
5155       \hskip\columnwidth
5156       \hfil
5157       {\normalcolor\vrule \@width\columnseprule}%
5158       \hfil
5159       \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
5160       \hskip-\textwidth
5161       \hb@xt@\columnwidth{\box\@outputbox \hss}%
5162       \hskip\columnsep
5163       \hskip\columnwidth}}}%
5164 {}
5165 <<Footnote changes>>
5166 \IfBabelLayout{footnotes}%
5167 {\BabelFootnote\footnote\languagename{}}%
5168 \BabelFootnote\localfootnote\languagename{}}%
5169 \BabelFootnote\mainfootnote{}}%

```

```
5170 {}
```

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.

```
5171 \IfBabelLayout{counters*}%
5172 {\bbl@add\bbl@opt@layout{.counters.}%
5173   \AddToHook{shipout/before}{%
5174     \let\bbl@tempa\babelsublr
5175     \let\babelsublr\@firstofone
5176     \let\bbl@save@thepage\thepage
5177     \protected@edef\thepage{\thepage}%
5178     \let\babelsublr\bbl@tempa}%
5179   \AddToHook{shipout/after}{%
5180     \let\thepage\bbl@save@thepage}}{}
5181 \IfBabelLayout{counters}%
5182 {\let\bbl@latinarabic=\@arabic
5183   \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
5184   \let\bbl@asciroman=\@roman
5185   \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%
5186   \let\bbl@asciiRoman=\@Roman
5187   \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}}{}
5188 \fi % end if layout
5189 </xetex | texpet)
```

10.2 8-bit TeX

Which start just above, because some code is shared with xetex. Now, 8-bit specific stuff. If just one encoding has been declared, then assume no switching is necessary (1).

```
5190 (*texpet)
5191 \def\bbl@provide@extra#1{%
5192   % == auto-select encoding ==
5193   \ifx\bbl@encoding@select@off\@empty\else
5194     \bbl@ifunset{\bbl@encoding@#1}%
5195     {\def\@elt##1{,##1,}%
5196      \edef\bbl@tempe{\expandafter\@gobbletwo\@fontenc@load@list}%
5197      \count@\z@
5198      \bbl@foreach\bbl@tempe{%
5199        \def\bbl@tempd{##1}% Save last declared
5200        \advance\count@\@ne}%
5201      \ifnum\count@>\@ne % (1)
5202        \getlocaleproperty*\bbl@tempa{#1}{identification/encodings}%
5203        \ifx\bbl@tempa\relax \let\bbl@tempa\@empty \fi
5204        \bbl@replace\bbl@tempa{ },{,}%
5205        \global\bbl@csarg\let{encoding@#1}\@empty
5206        \bbl@xin@{,\bbl@tempd,}{,\bbl@tempa,}%
5207        \ifin@else % if main encoding included in ini, do nothing
5208          \let\bbl@tempb\relax
5209          \bbl@foreach\bbl@tempa{%
5210            \ifx\bbl@tempb\relax
5211              \bbl@xin@{,##1,}{,\bbl@tempe,}%
5212              \ifin@def\bbl@tempb{##1}\fi
5213            \fi}%
5214          \ifx\bbl@tempb\relax\else
5215            \bbl@exp{%
5216              \global\<\bbl@add>\<\bbl@preextras@#1>\<\bbl@encoding@#1>%
5217              \gdef\<\bbl@encoding@#1>{%
5218                \\babel@save\\f@encoding
5219                \\bbl@add\\originalTeX{\\selectfont}%
5220                \\fontencoding{\bbl@tempb}%
5221                \\selectfont}}%
5222            \fi
5223          \fi
5224        \fi}%
```

```

5225     {}%
5226 \fi}
5227 </texxet>

```

10.3 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 files is read at three places: (1) when plain.def, babel.sty starts, to read the list of available languages from language.dat (for the base option); (2) at hyphen.cfg, to modify some macros; (3) in the middle of plain.def and babel.sty, by babel.def, with the commands and other definitions for luatex (eg, \babelpatterns).

```

5228 (*luatex)
5229 \ifx\AddBabelHook\undefined % When plain.def, babel.sty starts
5230 \bbl@trace{Read language.dat}
5231 \ifx\bbl@readstream\undefined
5232 \csname newread\endcsname\bbl@readstream
5233 \fi
5234 \begingroup
5235 \toks@{}
5236 \count@z@ % 0=start, 1=0th, 2=normal
5237 \def\bbl@process@line#1#2 #3 #4 {%
5238 \ifx=#1%
5239 \bbl@process@synonym{#2}%
5240 \else
5241 \bbl@process@language{#1#2}{#3}{#4}%
5242 \fi
5243 \ignorespaces}
5244 \def\bbl@manylang{%
5245 \ifnum\bbl@last>\@ne
5246 \bbl@info{Non-standard hyphenation setup}%
5247 \fi
5248 \let\bbl@manylang\relax}
5249 \def\bbl@process@language#1#2#3{%
5250 \ifcase\count@
5251 \@ifundefined{zth#1}{\count@\tw@}{\count@\@ne}%
5252 \or

```

```

5253     \count@tw@
5254     \fi
5255     \ifnum\count@=\tw@
5256         \expandafter\addlanguage\csname l@#1\endcsname
5257         \language\allocationnumber
5258         \chardef\bbl@last\allocationnumber
5259         \bbl@manylang
5260         \let\bbl@elt\relax
5261         \xdef\bbl@languages{%
5262             \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
5263     \fi
5264     \the\toks@
5265     \toks@{}}
5266 \def\bbl@process@synonym@aux#1#2{%
5267     \global\expandafter\chardef\csname l@#1\endcsname#2\relax
5268     \let\bbl@elt\relax
5269     \xdef\bbl@languages{%
5270         \bbl@languages\bbl@elt{#1}{#2}{}}}%
5271 \def\bbl@process@synonym#1{%
5272     \ifcase\count@
5273         \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
5274     \or
5275         \ifundefined{zth@#1}{\bbl@process@synonym@aux{#1}{0}}}%
5276     \else
5277         \bbl@process@synonym@aux{#1}{\the\bbl@last}%
5278     \fi}
5279 \ifx\bbl@languages\undefined % Just a (sensible?) guess
5280     \chardef\l@english\z@
5281     \chardef\l@USenglish\z@
5282     \chardef\bbl@last\z@
5283     \global\@namedef{bbl@hyphendata@0}{{hyphen.tex}}
5284     \gdef\bbl@languages{%
5285         \bbl@elt{english}{0}{hyphen.tex}}%
5286         \bbl@elt{USenglish}{0}{}}
5287 \else
5288     \global\let\bbl@languages@format\bbl@languages
5289     \def\bbl@elt#1#2#3#4{% Remove all except language 0
5290         \ifnum#2>\z@\else
5291             \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
5292         \fi}%
5293     \xdef\bbl@languages{\bbl@languages}%
5294 \fi
5295 \def\bbl@elt#1#2#3#4{\@namedef{zth@#1}} % Define flags
5296 \bbl@languages
5297 \openin\bbl@readstream=language.dat
5298 \ifeof\bbl@readstream
5299     \bbl@warning{I couldn't find language.dat. No additional\\%
5300         patterns loaded. Reported}%
5301 \else
5302     \loop
5303         \endlinechar\m@ne
5304         \read\bbl@readstream to \bbl@line
5305         \endlinechar`\^^M
5306         \if T\ifeof\bbl@readstream F\fi T\relax
5307         \ifx\bbl@line\empty\else
5308             \edef\bbl@line{\bbl@line\space\space\space}%
5309             \expandafter\bbl@process@line\bbl@line\relax
5310         \fi
5311     \repeat
5312 \fi
5313 \closein\bbl@readstream
5314 \endgroup
5315 \bbl@trace{Macros for reading patterns files}

```



```

5316 \def\bbbl@get@enc#1:#2:#3@@@{\def\bbbl@hyph@enc{#2}}
5317 \ifx\babelcatcodetablenum\undefined
5318 \ifx\newcatcodetable\undefined
5319 \def\babelcatcodetablenum{5211}
5320 \def\bbbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
5321 \else
5322 \newcatcodetable\babelcatcodetablenum
5323 \newcatcodetable\bbbl@pattcodes
5324 \fi
5325 \else
5326 \def\bbbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
5327 \fi
5328 \def\bbbl@luapatterns#1#2{%
5329 \bbbl@get@enc#1:.\@@@
5330 \setbox\z@\hbox\bgroup
5331 \beginingroup
5332 \savecatcodetable\babelcatcodetablenum\relax
5333 \initcatcodetable\bbbl@pattcodes\relax
5334 \catcodetable\bbbl@pattcodes\relax
5335 \catcode\#=6 \catcode\$_=3 \catcode\&=4 \catcode\^=7
5336 \catcode\_ =8 \catcode\{=1 \catcode\}=2 \catcode\~ =13
5337 \catcode\@=11 \catcode\^^I=10 \catcode\^^J=12
5338 \catcode\<=12 \catcode\>=12 \catcode\*=12 \catcode\.=12
5339 \catcode\-=12 \catcode\/=12 \catcode\[=12 \catcode\]=12
5340 \catcode\`=12 \catcode\'=12 \catcode\"=12
5341 \input #1\relax
5342 \catcodetable\babelcatcodetablenum\relax
5343 \endgroup
5344 \def\bbbl@tempa{#2}%
5345 \ifx\bbbl@tempa\empty\else
5346 \input #2\relax
5347 \fi
5348 \egroup}%
5349 \def\bbbl@patterns@lua#1{%
5350 \language=\expandafter\ifx\csname l@#1:\f@encoding\endcsname\relax
5351 \csname l@#1\endcsname
5352 \edef\bbbl@tempa{#1}%
5353 \else
5354 \csname l@#1:\f@encoding\endcsname
5355 \edef\bbbl@tempa{#1:\f@encoding}%
5356 \fi\relax
5357 \@namedef{lu@texhyphen@loaded@the\language}{}% Temp
5358 \@ifundefined{bbbl@hyphendata@the\language}%
5359 {\def\bbbl@elt##1##2##3##4{%
5360 \ifnum##2=\csname l@bbbl@tempa\endcsname % #2=spanish, dutch:0T1...
5361 \def\bbbl@tempb{##3}%
5362 \ifx\bbbl@tempb\empty\else % if not a synonymous
5363 \def\bbbl@tempc{{##3}{##4}}%
5364 \fi
5365 \bbbl@csarg\xdef{hyphendata@##2}{\bbbl@tempc}%
5366 \fi}%
5367 \bbbl@languages
5368 \@ifundefined{bbbl@hyphendata@the\language}%
5369 {\bbbl@info{No hyphenation patterns were set for\\%
5370 language '\bbbl@tempa'. Reported}}%
5371 {\expandafter\expandafter\expandafter\bbbl@luapatterns
5372 \csname bbl@hyphendata@the\language\endcsname}}}}
5373 \endinput\fi
5374 % Here ends \ifx\AddBabelHook\undefined
5375 % A few lines are only read by hyphen.cfg
5376 \ifx\DisableBabelHook\undefined
5377 \AddBabelHook{luatex}{everylanguage}{%
5378 \def\process@language##1##2##3{%

```

```

5379     \def\process@line####1####2 ####3 ####4 {}}}
5380 \AddBabelHook{luatex}{loadpatterns}{%
5381     \input #1\relax
5382     \expandafter\gdef\csname bbl@hyphendata@the\language\endcsname
5383     {#{1}{}}}
5384 \AddBabelHook{luatex}{loadexceptions}{%
5385     \input #1\relax
5386     \def\bbl@tempb##1##2{##1}{#1}%
5387     \expandafter\xdef\csname bbl@hyphendata@the\language\endcsname
5388     {\expandafter\expandafter\expandafter\bbl@tempb
5389     \csname bbl@hyphendata@the\language\endcsname}}
5390 \endinput\fi
5391 % Here stops reading code for hyphen.cfg
5392 % The following is read the 2nd time it's loaded
5393 \begingroup % TODO - to a lua file
5394 \catcode`\%=12
5395 \catcode`\'=12
5396 \catcode`\ "=12
5397 \catcode`\:=12
5398 \directlua{
5399     Babel = Babel or {}
5400     function Babel.bytes(line)
5401         return line:gsub(".",
5402             function (chr) return unicode.utf8.char(string.byte(chr)) end)
5403     end
5404     function Babel.begin_process_input()
5405         if luatexbase and luatexbase.add_to_callback then
5406             luatexbase.add_to_callback('process_input_buffer',
5407                 Babel.bytes, 'Babel.bytes')
5408         else
5409             Babel.callback = callback.find('process_input_buffer')
5410             callback.register('process_input_buffer', Babel.bytes)
5411         end
5412     end
5413     function Babel.end_process_input ()
5414         if luatexbase and luatexbase.remove_from_callback then
5415             luatexbase.remove_from_callback('process_input_buffer', 'Babel.bytes')
5416         else
5417             callback.register('process_input_buffer', Babel.callback)
5418         end
5419     end
5420     function Babel.addpatterns(pp, lg)
5421         local lg = lang.new(lg)
5422         local pats = lang.patterns(lg) or ''
5423         lang.clear_patterns(lg)
5424         for p in pp:gmatch('[^%s]+') do
5425             ss = ''
5426             for i in string.utfcharacters(p:gsub('%d', '')) do
5427                 ss = ss .. '%d?' .. i
5428             end
5429             ss = ss:gsub('^%%d%?%', '%%.') .. '%d?'
5430             ss = ss:gsub('%.%d%?$', '%%.')
5431             pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
5432             if n == 0 then
5433                 tex.sprint(
5434                     [[\string\csname\space bbl@info\endcsname{New pattern: }]]
5435                     .. p .. [[]])
5436                 pats = pats .. ' ' .. p
5437             else
5438                 tex.sprint(
5439                     [[\string\csname\space bbl@info\endcsname{Renew pattern: }]]
5440                     .. p .. [[]])
5441             end

```

```

5442     end
5443     lang.patterns(lg, pats)
5444 end
5445 Babel.characters = Babel.characters or {}
5446 Babel.ranges = Babel.ranges or {}
5447 function Babel.hlist_has_bidi(head)
5448     local has_bidi = false
5449     local ranges = Babel.ranges
5450     for item in node.traverse(head) do
5451         if item.id == node.id'glyph' then
5452             local itemchar = item.char
5453             local chardata = Babel.characters[itemchar]
5454             local dir = chardata and chardata.d or nil
5455             if not dir then
5456                 for nn, et in ipairs(ranges) do
5457                     if itemchar < et[1] then
5458                         break
5459                     elseif itemchar <= et[2] then
5460                         dir = et[3]
5461                         break
5462                     end
5463                 end
5464             end
5465             if dir and (dir == 'al' or dir == 'r') then
5466                 has_bidi = true
5467             end
5468         end
5469     end
5470     return has_bidi
5471 end
5472 function Babel.set_chranges_b (script, chrng)
5473     if chrng == '' then return end
5474     texio.write('Replacing ' .. script .. ' script ranges')
5475     Babel.script_blocks[script] = {}
5476     for s, e in string.gmatch(chrng..' ', '(.)%.%.(.-)%s') do
5477         table.insert(
5478             Babel.script_blocks[script], {tonumber(s,16), tonumber(e,16)})
5479     end
5480 end
5481 function Babel.discard_sublr(str)
5482     if str:find( [[\string\indexentry]] ) and
5483         str:find( [[\string\babelsublr]] ) then
5484         str = str:gsub( [[\string\babelsublr%s*(%b{}]]),
5485             function(m) return m:sub(2,-2) end )
5486     end
5487     return str
5488 end
5489 }
5490 \endgroup
5491 \ifx\newattribute\@undefined\else % Test for plain
5492     \newattribute\bbl@attr@locale
5493     \directlua{ Babel.attr_locale = luatexbase.registernumber'bbl@attr@locale' }
5494     \AddBabelHook{luatex}{beforeextras}{%
5495         \setattribute\bbl@attr@locale\localeid}
5496 \fi
5497 \def\BabelStringsDefault{unicode}
5498 \let\luabbl@stop\relax
5499 \AddBabelHook{luatex}{encodedcommands}{%
5500     \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
5501     \ifx\bbl@tempa\bbl@tempb\else
5502         \directlua{Babel.begin_process_input()}%
5503     \def\luabbl@stop{%
5504         \directlua{Babel.end_process_input()}%

```

```

5505 \fi}%
5506 \AddBabelHook{luatex}{stopcommands}{%
5507 \luabbl@stop
5508 \let\luabbl@stop\relax}
5509 \AddBabelHook{luatex}{patterns}{%
5510 \@ifundefined{bbl@hyphendata@the\language}%
5511 { \def\bbl@elt##1##2##3##4{%
5512 \ifnum##2=\csname l@##2\endcsname % #2=spanish, dutch:OT1...
5513 \def\bbl@tempb{##3}%
5514 \ifx\bbl@tempb\@empty\else % if not a synonymous
5515 \def\bbl@tempc{{##3}{##4}}%
5516 \fi
5517 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
5518 \fi}%
5519 \bbl@languages
5520 \@ifundefined{bbl@hyphendata@the\language}%
5521 {\bbl@info{No hyphenation patterns were set for\\%
5522 language '#2'. Reported}}%
5523 {\expandafter\expandafter\expandafter\bbl@luapatterns
5524 \csname bbl@hyphendata@the\language\endcsname}}}%
5525 \@ifundefined{bbl@patterns@}{%
5526 \begingroup
5527 \bbl@xin@{, \number\language, }{, \bbl@pttnlist}%
5528 \ifin\@else
5529 \ifx\bbl@patterns@\@empty\else
5530 \directlua{ Babel.addpatterns(
5531 [[\bbl@patterns@]], \number\language) }%
5532 \fi
5533 \@ifundefined{bbl@patterns@#1}%
5534 \@empty
5535 {\directlua{ Babel.addpatterns(
5536 [[\space\csname bbl@patterns@#1\endcsname]],
5537 \number\language) }}%
5538 \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
5539 \fi
5540 \endgroup}%
5541 \bbl@exp{%
5542 \bbl@ifunset{bbl@prehc@\languagename}{%
5543 {\bbl@ifblank{\bbl@cs{prehc@\languagename}}{%
5544 {\prehyphenchar=\bbl@cl{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.

```

5545 \@onlypreamble\babelpatterns
5546 \AtEndOfPackage{%
5547 \newcommand\babelpatterns[2][\@empty]{%
5548 \ifx\bbl@patterns@\relax
5549 \let\bbl@patterns@\@empty
5550 \fi
5551 \ifx\bbl@pttnlist\@empty\else
5552 \bbl@warning{%
5553 You must not intermingle \string\selectlanguage\space and\\%
5554 \string\babelpatterns\space or some patterns will not\\%
5555 be taken into account. Reported}%
5556 \fi
5557 \ifx\@empty#1%
5558 \protected@edef\bbl@patterns@{\bbl@patterns@\space#2}%
5559 \else
5560 \edef\bbl@tempb{\zap@space#1 \@empty}%
5561 \bbl@for\bbl@tempa\bbl@tempb{%
5562 \bbl@fixname\bbl@tempa
5563 \bbl@iflanguage\bbl@tempa{%

```

```

5564     \bbl@csarg\protected@edef{patterns@bbl@tempa}{%
5565     \@ifundefined{bbl@patterns@bbl@tempa}%
5566     \@empty
5567     {\csname bbl@patterns@bbl@tempa\endcsname\space}%
5568     #2}}}%
5569 \fi}}

```

10.4 Southeast Asian scripts

First, some general code for line breaking, used by `\babelposthyphenation`. Replace regular (ie, implicit) discretionaries by spaceskips, based on the previous glyph (which I think makes sense, because the hyphen and the previous char go always together). Other discretionaries are not touched. See Unicode UAX 14.

```

5570% TODO - to a lua file
5571 \directlua{
5572   Babel = Babel or {}
5573   Babel.linebreaking = Babel.linebreaking or {}
5574   Babel.linebreaking.before = {}
5575   Babel.linebreaking.after = {}
5576   Babel.locale = {} % Free to use, indexed by \localeid
5577   function Babel.linebreaking.add_before(func, pos)
5578     tex.print([[ \noexpand\csname bbl@lua hyphenate\endcsname]])
5579     if pos == nil then
5580       table.insert(Babel.linebreaking.before, func)
5581     else
5582       table.insert(Babel.linebreaking.before, pos, func)
5583     end
5584   end
5585   function Babel.linebreaking.add_after(func)
5586     tex.print([[ \noexpand\csname bbl@lua hyphenate\endcsname]])
5587     table.insert(Babel.linebreaking.after, func)
5588   end
5589 }
5590 \def\bbl@intraspace#1 #2 #3\@@@{%
5591   \directlua{
5592     Babel = Babel or {}
5593     Babel.intraspaces = Babel.intraspaces or {}
5594     Babel.intraspaces['\csname bbl@sbc p@\language name\endcsname'] = %
5595     {b = #1, p = #2, m = #3}
5596     Babel.locale_props[\the\localeid].intraspace = %
5597     {b = #1, p = #2, m = #3}
5598   }}
5599 \def\bbl@intrapenalty#1\@@@{%
5600   \directlua{
5601     Babel = Babel or {}
5602     Babel.intrapenalties = Babel.intrapenalties or {}
5603     Babel.intrapenalties['\csname bbl@sbc p@\language name\endcsname'] = #1
5604     Babel.locale_props[\the\localeid].intrapenalty = #1
5605   }}
5606 \begingroup
5607 \catcode`\%=12
5608 \catcode`\^=14
5609 \catcode`\'=12
5610 \catcode`\-=12
5611 \gdef\bbl@seaintraspace{^
5612   \let\bbl@seaintraspace\relax
5613   \directlua{
5614     Babel = Babel or {}
5615     Babel.sea_enabled = true
5616     Babel.sea_ranges = Babel.sea_ranges or {}
5617     function Babel.set_chranges (script, chrng)
5618       local c = 0
5619       for s, e in string.gmatch(chrng..' ', '(.)%.%.(-)%s') do

```

```

5620     Babel.sea_ranges[script..c]={tonumber(s,16), tonumber(e,16)}
5621     c = c + 1
5622   end
5623 end
5624 function Babel.sea_disc_to_space (head)
5625   local sea_ranges = Babel.sea_ranges
5626   local last_char = nil
5627   local quad = 655360      ^% 10 pt = 655360 = 10 * 65536
5628   for item in node.traverse(head) do
5629     local i = item.id
5630     if i == node.id'glyph' then
5631       last_char = item
5632     elseif i == 7 and item.subtype == 3 and last_char
5633       and last_char.char > 0x0C99 then
5634       quad = font.getfont(last_char.font).size
5635       for lg, rg in pairs(sea_ranges) do
5636         if last_char.char > rg[1] and last_char.char < rg[2] then
5637           lg = lg:sub(1, 4) ^% Remove trailing number of, eg, Cyril1
5638           local intraspace = Babel.intraspaces[lg]
5639           local intrapenalty = Babel.intrapenalties[lg]
5640           local n
5641           if intrapenalty ~= 0 then
5642             n = node.new(14, 0)      ^% penalty
5643             n.penalty = intrapenalty
5644             node.insert_before(head, item, n)
5645           end
5646           n = node.new(12, 13)      ^% (glue, spaceskip)
5647           node.setglue(n, intraspace.b * quad,
5648             intraspace.p * quad,
5649             intraspace.m * quad)
5650           node.insert_before(head, item, n)
5651           node.remove(head, item)
5652         end
5653       end
5654     end
5655   end
5656 end
5657 }^^
5658 \bbl@luahyphenate}

```

10.5 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.

```

5659 \catcode`\%=14
5660 \gdef\bbl@cjkintraspaces{%
5661   \let\bbl@cjkintraspaces\relax
5662   \directlua{
5663     Babel = Babel or {}
5664     require('babel-data-cjk.lua')
5665     Babel.cjk_enabled = true
5666     function Babel.cjk_linebreak(head)
5667       local GLYPH = node.id'glyph'
5668       local last_char = nil
5669       local quad = 655360      % 10 pt = 655360 = 10 * 65536
5670       local last_class = nil
5671       local last_lang = nil
5672
5673       for item in node.traverse(head) do

```

```

5674     if item.id == GLYPH then
5675
5676         local lang = item.lang
5677
5678         local LOCALE = node.get_attribute(item,
5679             Babel.attr_locale)
5680         local props = Babel.locale_props[LOCALE]
5681
5682         local class = Babel.cjk_class[item.char].c
5683
5684         if props.cjk_quotes and props.cjk_quotes[item.char] then
5685             class = props.cjk_quotes[item.char]
5686         end
5687
5688         if class == 'cp' then class = 'cl' end % )) as CL
5689         if class == 'id' then class = 'I' end
5690
5691         local br = 0
5692         if class and last_class and Babel.cjk_breaks[last_class][class] then
5693             br = Babel.cjk_breaks[last_class][class]
5694         end
5695
5696         if br == 1 and props.linebreak == 'c' and
5697             lang ~= \the\l@nohyphenation\space and
5698             last_lang ~= \the\l@nohyphenation then
5699             local intrapenalty = props.intrapenalty
5700             if intrapenalty ~= 0 then
5701                 local n = node.new(14, 0)      % penalty
5702                 n.penalty = intrapenalty
5703                 node.insert_before(head, item, n)
5704             end
5705             local intraspace = props.intraspace
5706             local n = node.new(12, 13)        % (glue, spaceskip)
5707             node.setglue(n, intraspace.b * quad,
5708                 intraspace.p * quad,
5709                 intraspace.m * quad)
5710             node.insert_before(head, item, n)
5711         end
5712
5713         if font.getfont(item.font) then
5714             quad = font.getfont(item.font).size
5715         end
5716         last_class = class
5717         last_lang = lang
5718     else % if penalty, glue or anything else
5719         last_class = nil
5720     end
5721 end
5722 lang.hyphenate(head)
5723 end
5724 }%
5725 \bbl@lua hyphenate}
5726 \gdef\bbl@lua hyphenate{%
5727 \let\bbl@lua hyphenate\relax
5728 \directlua{
5729     luatexbase.add_to_callback('hyphenate',
5730     function (head, tail)
5731         if Babel.linebreaking.before then
5732             for k, func in ipairs(Babel.linebreaking.before) do
5733                 func(head)
5734             end
5735         end
5736     if Babel.cjk_enabled then

```

```

5737     Babel.cjk_linebreak(head)
5738   end
5739   lang.hyphenate(head)
5740   if Babel.linebreaking.after then
5741     for k, func in ipairs(Babel.linebreaking.after) do
5742       func(head)
5743     end
5744   end
5745   if Babel.sea_enabled then
5746     Babel.sea_disc_to_space(head)
5747   end
5748   end,
5749   'Babel.hyphenate')
5750 }
5751 }
5752 \endgroup
5753 \def\bbl@provide@intraspace{%
5754   \bbl@ifunset{\bbl@intsp@\languagename}{}%
5755   {\expandafter\ifx\cename\bbl@intsp@\languagename\endcsname\empty\else
5756     \bbl@xin{/c}{/\bbl@cl{\lnbrk}}%
5757     \ifin@           % cjk
5758     \bbl@cjk@intraspace
5759     \directlua{
5760       Babel = Babel or {}
5761       Babel.locale_props = Babel.locale_props or {}
5762       Babel.locale_props[\the\localeid].linebreak = 'c'
5763     }%
5764     \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}\@@}%
5765     \ifx\bbl@KVP@intrapenalty\@nnil
5766       \bbl@intrapenalty0\@@
5767     \fi
5768   \else           % sea
5769     \bbl@sea@intraspace
5770     \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}\@@}%
5771     \directlua{
5772       Babel = Babel or {}
5773       Babel.sea_ranges = Babel.sea_ranges or {}
5774       Babel.set_chranges('\bbl@cl{sbcp}',
5775                           '\bbl@cl{chrng}')
5776     }%
5777     \ifx\bbl@KVP@intrapenalty\@nnil
5778       \bbl@intrapenalty0\@@
5779     \fi
5780   \fi
5781 \fi
5782 \ifx\bbl@KVP@intrapenalty\@nnil\else
5783   \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
5784 \fi}}

```

10.6 Arabic justification

WIP. `\bbl@arabicjust` is executed with both elongated and kashida. This must be fine tuned. The attribute `kashida` is set by transforms with `kashida-`

```

5785 \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
5786 \def\bblar@chars{%
5787   0628,0629,062A,062B,062C,062D,062E,062F,0630,0631,0632,0633,%
5788   0634,0635,0636,0637,0638,0639,063A,063B,063C,063D,063E,063F,%
5789   0640,0641,0642,0643,0644,0645,0646,0647,0649}
5790 \def\bblar@elongated{%
5791   0626,0628,062A,062B,0633,0634,0635,0636,063B,%
5792   063C,063D,063E,063F,0641,0642,0643,0644,0646,%
5793   0649,064A}
5794 \begingroup

```



```

5795 \catcode`_ =11 \catcode`:=11
5796 \gdef\bblar@nofswarn{\gdef\msg_warning:nrx##1##2##3{}}
5797 \endgroup
5798 \gdef\bbl@arabicjust{% TODO. Allow for several locales.
5799 \let\bbl@arabicjust\relax
5800 \newattribute\bblar@kashida
5801 \directlua{ Babel.attr_kashida = luatexbase.registernumber'bblar@kashida' }%
5802 \bblar@kashida=\z@
5803 \bbl@patchfont{\bbl@parsejalt}}%
5804 \directlua{
5805   Babel.arabic.elong_map = Babel.arabic.elong_map or {}
5806   Babel.arabic.elong_map[\the\localeid] = {}
5807   luatexbase.add_to_callback('post_linebreak_filter',
5808     Babel.arabic.justify, 'Babel.arabic.justify')
5809   luatexbase.add_to_callback('hpack_filter',
5810     Babel.arabic.justify_hbox, 'Babel.arabic.justify_hbox')
5811 }}%

```

Save both node lists to make replacement. TODO. Save also widths to make computations.

```

5812 \def\bblar@fetchjalt#1#2#3#4{%
5813 \bbl@exp{\bbl@foreach{#1}}{%
5814 \bbl@ifunset\bblar@JE@##1}%
5815 {\setbox\z@\hbox{\textdir TRT ^^^^200d\char"##1#2}}%
5816 {\setbox\z@\hbox{\textdir TRT ^^^^200d\char"\@nameuse\bblar@JE@##1#2}}%
5817 \directlua{%
5818   local last = nil
5819   for item in node.traverse(tex.box[0].head) do
5820     if item.id == node.id'glyph' and item.char > 0x600 and
5821     not (item.char == 0x200D) then
5822       last = item
5823     end
5824   end
5825   Babel.arabic.#3['##1#4'] = last.char
5826 }}}

```

Elongated forms. Brute force. No rules at all, yet. The ideal: look at jalt table. And perhaps other tables (falt?, csw?). What about kaf? And diacritic positioning?

```

5827 \gdef\bbl@parsejalt{%
5828 \ifx\addfontfeature\@undefined\else
5829 \bbl@xin@{/e}{/\bbl@ccl{lbrk}}%
5830 \ifin@
5831 \directlua{%
5832   if Babel.arabic.elong_map[\the\localeid][\fontid\font] == nil then
5833     Babel.arabic.elong_map[\the\localeid][\fontid\font] = {}
5834     tex.print([\string\csname\space bbl@parsejalti\endcsname])
5835   end
5836 }%
5837 \fi
5838 \fi}
5839 \gdef\bbl@parsejalti{%
5840 \begingroup
5841 \let\bbl@parsejalt\relax % To avoid infinite loop
5842 \edef\bbl@tempb{\fontid\font}%
5843 \bblar@nofswarn
5844 \bblar@fetchjalt\bblar@elongated{}{from}}%
5845 \bblar@fetchjalt\bblar@chars{^^^064a}{from}{a}% Alef maksura
5846 \bblar@fetchjalt\bblar@chars{^^^0649}{from}{y}% Yeh
5847 \addfontfeature{RawFeature+=jalt}%
5848 % \namedef\bblar@JE@0643{06AA}% todo: catch medial kaf
5849 \bblar@fetchjalt\bblar@elongated{}{dest}}%
5850 \bblar@fetchjalt\bblar@chars{^^^064a}{dest}{a}%
5851 \bblar@fetchjalt\bblar@chars{^^^0649}{dest}{y}%
5852 \directlua{%
5853   for k, v in pairs(Babel.arabic.from) do

```

```

5854         if Babel.arabic.dest[k] and
5855             not (Babel.arabic.from[k] == Babel.arabic.dest[k]) then
5856             Babel.arabic.elong_map[\the\localeid][\bbl@tempb]
5857             [Babel.arabic.from[k]] = Babel.arabic.dest[k]
5858         end
5859     end
5860 }%
5861 \endgroup}

```

The actual justification (inspired by CHICKENIZE).

```

5862 \begingroup
5863 \catcode`#=11
5864 \catcode`~=#11
5865 \directlua{
5866
5867 Babel.arabic = Babel.arabic or {}
5868 Babel.arabic.from = {}
5869 Babel.arabic.dest = {}
5870 Babel.arabic.justify_factor = 0.95
5871 Babel.arabic.justify_enabled = true
5872 Babel.arabic.kashida_limit = -1
5873
5874 function Babel.arabic.justify(head)
5875     if not Babel.arabic.justify_enabled then return head end
5876     for line in node.traverse_id(node.id'hlist', head) do
5877         Babel.arabic.justify_hlist(head, line)
5878     end
5879     return head
5880 end
5881
5882 function Babel.arabic.justify_hbox(head, gc, size, pack)
5883     local has_inf = false
5884     if Babel.arabic.justify_enabled and pack == 'exactly' then
5885         for n in node.traverse_id(12, head) do
5886             if n.stretch_order > 0 then has_inf = true end
5887         end
5888         if not has_inf then
5889             Babel.arabic.justify_hlist(head, nil, gc, size, pack)
5890         end
5891     end
5892     return head
5893 end
5894
5895 function Babel.arabic.justify_hlist(head, line, gc, size, pack)
5896     local d, new
5897     local k_list, k_item, pos_inline
5898     local width, width_new, full, k_curr, wt_pos, goal, shift
5899     local subst_done = false
5900     local elong_map = Babel.arabic.elong_map
5901     local cnt
5902     local last_line
5903     local GLYPH = node.id'glyph'
5904     local KASHIDA = Babel.attr_kashida
5905     local LOCALE = Babel.attr_locale
5906
5907     if line == nil then
5908         line = {}
5909         line.glue_sign = 1
5910         line.glue_order = 0
5911         line.head = head
5912         line.shift = 0
5913         line.width = size
5914     end

```

```

5915
5916 % Exclude last line. todo. But-- it discards one-word lines, too!
5917 % ? Look for glue = 12:15
5918 if (line.glue_sign == 1 and line.glue_order == 0) then
5919     elongs = {}      % Stores elongated candidates of each line
5920     k_list = {}      % And all letters with kashida
5921     pos_inline = 0   % Not yet used
5922
5923     for n in node.traverse_id(GLYPH, line.head) do
5924         pos_inline = pos_inline + 1 % To find where it is. Not used.
5925
5926         % Elongated glyphs
5927         if elong_map then
5928             local locale = node.get_attribute(n, LOCALE)
5929             if elong_map[locale] and elong_map[locale][n.font] and
5930                 elong_map[locale][n.font][n.char] then
5931                 table.insert(elongs, {node = n, locale = locale} )
5932                 node.set_attribute(n.prev, KASHIDA, 0)
5933             end
5934         end
5935
5936         % Tatwil
5937         if Babel.kashida_wts then
5938             local k_wt = node.get_attribute(n, KASHIDA)
5939             if k_wt > 0 then % todo. parameter for multi inserts
5940                 table.insert(k_list, {node = n, weight = k_wt, pos = pos_inline})
5941             end
5942         end
5943
5944     end % of node.traverse_id
5945
5946     if #elongs == 0 and #k_list == 0 then goto next_line end
5947     full = line.width
5948     shift = line.shift
5949     goal = full * Babel.arabic.justify_factor % A bit crude
5950     width = node.dimensions(line.head) % The 'natural' width
5951
5952     % == Elongated ==
5953     % Original idea taken from 'chickenize'
5954     while (#elongs > 0 and width < goal) do
5955         subst_done = true
5956         local x = #elongs
5957         local curr = elongs[x].node
5958         local oldchar = curr.char
5959         curr.char = elong_map[elongs[x].locale][curr.font][curr.char]
5960         width = node.dimensions(line.head) % Check if the line is too wide
5961         % Substitute back if the line would be too wide and break:
5962         if width > goal then
5963             curr.char = oldchar
5964             break
5965         end
5966         % If continue, pop the just substituted node from the list:
5967         table.remove(elongs, x)
5968     end
5969
5970     % == Tatwil ==
5971     if #k_list == 0 then goto next_line end
5972
5973     width = node.dimensions(line.head) % The 'natural' width
5974     k_curr = #k_list % Traverse backwards, from the end
5975     wt_pos = 1
5976
5977     while width < goal do

```

```

5978     subst_done = true
5979     k_item = k_list[k_curr].node
5980     if k_list[k_curr].weight == Babel.kashida_wts[wt_pos] then
5981         d = node.copy(k_item)
5982         d.char = 0x0640
5983         d.yoffset = 0 % TODO. From the prev char. But 0 seems safe.
5984         d.xoffset = 0
5985         line.head, new = node.insert_after(line.head, k_item, d)
5986         width_new = node.dimensions(line.head)
5987         if width > goal or width == width_new then
5988             node.remove(line.head, new) % Better compute before
5989             break
5990         end
5991         if Babel.fix_diacr then
5992             Babel.fix_diacr(k_item.next)
5993         end
5994         width = width_new
5995     end
5996     if k_curr == 1 then
5997         k_curr = #k_list
5998         wt_pos = (wt_pos >= table.getn(Babel.kashida_wts)) and 1 or wt_pos+1
5999     else
6000         k_curr = k_curr - 1
6001     end
6002 end
6003
6004 % Limit the number of tatweel by removing them. Not very efficient,
6005 % but it does the job in a quite predictable way.
6006 if Babel.arabic.kashida_limit > -1 then
6007     cnt = 0
6008     for n in node.traverse_id(GLYPH, line.head) do
6009         if n.char == 0x0640 then
6010             cnt = cnt + 1
6011             if cnt > Babel.arabic.kashida_limit then
6012                 node.remove(line.head, n)
6013             end
6014         else
6015             cnt = 0
6016         end
6017     end
6018 end
6019
6020 ::next_line::
6021
6022 % Must take into account marks and ins, see luatex manual.
6023 % Have to be executed only if there are changes. Investigate
6024 % what's going on exactly.
6025 if subst_done and not gc then
6026     d = node.hpack(line.head, full, 'exactly')
6027     d.shift = shift
6028     node.insert_before(head, line, d)
6029     node.remove(head, line)
6030 end
6031 end % if process line
6032 end
6033 }
6034 \endgroup
6035 \fi\fi % ends Arabic just block: \ifnum\bbl@bidimode>100...

```

10.7 Common stuff

```

6036 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
6037 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@ckeckstdfonts}

```

```
6038 \DisableBabelHook{babel-fontspec}
6039 <<Font selection>>
```

10.8 Automatic fonts and ids switching

After defining the blocks for a number of scripts (must be extended and very likely fine tuned), we define a the function `Babel.locale_map`, which just traverse the node list to carry out the replacements. The table `loc_to_scr` stores the script range for each locale (whose id is the key), copied from this table (so that it can be modified on a locale basis); there is an intermediate table named `chr_to_loc` built on the fly for optimization, which maps a char to the locale. This locale is then used to get the `\language` 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.

```
6040 % TODO - to a lua file
6041 \directlua{
6042 Babel.script_blocks = {
6043   ['dflt'] = {},
6044   ['Arab'] = {{0x0600, 0x06FF}, {0x08A0, 0x08FF}, {0x0750, 0x077F},
6045             {0xFE70, 0xFEFF}, {0xFB50, 0xFDFF}, {0x1EE00, 0x1EEFF}},
6046   ['Armn'] = {{0x0530, 0x058F}},
6047   ['Beng'] = {{0x0980, 0x09FF}},
6048   ['Cher'] = {{0x13A0, 0x13FF}, {0xAB70, 0ABBF}},
6049   ['Copt'] = {{0x03E2, 0x03EF}, {0x2C80, 0x2CFF}, {0x102E0, 0x102FF}},
6050   ['Cyril'] = {{0x0400, 0x04FF}, {0x0500, 0x052F}, {0x1C80, 0x1C8F},
6051             {0x2DE0, 0x2DFF}, {0xA640, 0xA69F}},
6052   ['Deva'] = {{0x0900, 0x097F}, {0xA8E0, 0xA8FF}},
6053   ['Ethi'] = {{0x1200, 0x137F}, {0x1380, 0x139F}, {0x2D80, 0x2DDF},
6054             {0xAB00, 0xAB2F}},
6055   ['Geor'] = {{0x10A0, 0x10FF}, {0x2D00, 0x2D2F}},
6056   % Don't follow strictly Unicode, which places some Coptic letters in
6057   % the 'Greek and Coptic' block
6058   ['Grek'] = {{0x0370, 0x03E1}, {0x03F0, 0x03FF}, {0x1F00, 0x1FFF}},
6059   ['Hans'] = {{0x2E80, 0x2EFF}, {0x3000, 0x303F}, {0x31C0, 0x31EF},
6060             {0x3300, 0x33FF}, {0x3400, 0x4DBF}, {0x4E00, 0x9FFF},
6061             {0xF900, 0xFAFF}, {0xFE30, 0xFE4F}, {0xFF00, 0xFFEF},
6062             {0x20000, 0x2A6DF}, {0x2A700, 0x2B73F},
6063             {0x2B740, 0x2B81F}, {0x2B820, 0x2CEAF},
6064             {0x2CEB0, 0x2EBEF}, {0x2F800, 0x2FA1F}},
6065   ['Hebr'] = {{0x0590, 0x05FF}},
6066   ['Jpan'] = {{0x3000, 0x303F}, {0x3040, 0x309F}, {0x30A0, 0x30FF},
6067             {0x4E00, 0x9FAF}, {0xFF00, 0xFFEF}},
6068   ['Khmr'] = {{0x1780, 0x17FF}, {0x19E0, 0x19FF}},
6069   ['Knda'] = {{0x0C80, 0x0CFF}},
6070   ['Kore'] = {{0x1100, 0x11FF}, {0x3000, 0x303F}, {0x3130, 0x318F},
6071             {0x4E00, 0x9FAF}, {0xA960, 0xA97F}, {0xAC00, 0xD7AF},
6072             {0xD7B0, 0xD7FF}, {0xFF00, 0xFFEF}},
6073   ['Laoo'] = {{0x0E80, 0x0EFF}},
6074   ['Latn'] = {{0x0000, 0x007F}, {0x0080, 0x00FF}, {0x0100, 0x017F},
6075             {0x0180, 0x024F}, {0x1E00, 0x1EFF}, {0x2C60, 0x2C7F},
6076             {0xA720, 0xA7FF}, {0xAB30, 0xAB6F}},
6077   ['Mahj'] = {{0x11150, 0x1117F}},
6078   ['Mlym'] = {{0x0D00, 0x0D7F}},
6079   ['Mymr'] = {{0x1000, 0x109F}, {0xAA60, 0xAA7F}, {0xA9E0, 0xA9FF}},
6080   ['Orya'] = {{0x0B00, 0x0B7F}},
6081   ['Sinh'] = {{0x0D80, 0x0DFF}, {0x111E0, 0x111FF}},
6082   ['Syrc'] = {{0x0700, 0x074F}, {0x0860, 0x086F}},
6083   ['Taml'] = {{0x0B80, 0x0BFF}},
6084   ['Telu'] = {{0x0C00, 0x0C7F}},
6085   ['Tfng'] = {{0x2D30, 0x2D7F}},
6086   ['Thai'] = {{0x0E00, 0x0E7F}},
6087   ['Tibt'] = {{0x0F00, 0x0FFF}},
6088   ['Vaii'] = {{0xA500, 0xA63F}},
6089   ['Yiii'] = {{0xA000, 0xA48F}, {0xA490, 0xA4CF}}
6090 }
```

```

6091
6092 Babel.script_blocks.Cyrs = Babel.script_blocks.Cyrl
6093 Babel.script_blocks.Hant = Babel.script_blocks.Hans
6094 Babel.script_blocks.Kana = Babel.script_blocks.Jpan
6095
6096 function Babel.locale_map(head)
6097   if not Babel.locale_mapped then return head end
6098
6099   local LOCALE = Babel.attr_locale
6100   local GLYPH = node.id('glyph')
6101   local inmath = false
6102   local toloc_save
6103   for item in node.traverse(head) do
6104     local toloc
6105     if not inmath and item.id == GLYPH then
6106       % Optimization: build a table with the chars found
6107       if Babel.chr_to_loc[item.char] then
6108         toloc = Babel.chr_to_loc[item.char]
6109       else
6110         for lc, maps in pairs(Babel.loc_to_scr) do
6111           for _, rg in pairs(maps) do
6112             if item.char >= rg[1] and item.char <= rg[2] then
6113               Babel.chr_to_loc[item.char] = lc
6114               toloc = lc
6115               break
6116             end
6117           end
6118         end
6119         % Treat composite chars in a different fashion, because they
6120         % 'inherit' the previous locale.
6121         if (item.char >= 0x0300 and item.char <= 0x036F) or
6122            (item.char >= 0x1AB0 and item.char <= 0x1AFF) or
6123            (item.char >= 0x1DC0 and item.char <= 0x1DFF) then
6124           Babel.chr_to_loc[item.char] = -2000
6125           toloc = -2000
6126         end
6127         if not toloc then
6128           Babel.chr_to_loc[item.char] = -1000
6129         end
6130       end
6131       if toloc == -2000 then
6132         toloc = toloc_save
6133       elseif toloc == -1000 then
6134         toloc = nil
6135       end
6136       if toloc and Babel.locale_props[toloc] and
6137          Babel.locale_props[toloc].letters and
6138          tex.getcatcode(item.char) \string~= 11 then
6139         toloc = nil
6140       end
6141       if toloc and Babel.locale_props[toloc].script
6142          and Babel.locale_props[node.get_attribute(item, LOCALE)].script
6143          and Babel.locale_props[toloc].script ==
6144          Babel.locale_props[node.get_attribute(item, LOCALE)].script then
6145         toloc = nil
6146       end
6147       if toloc then
6148         if Babel.locale_props[toloc].lg then
6149           item.lang = Babel.locale_props[toloc].lg
6150           node.set_attribute(item, LOCALE, toloc)
6151         end
6152         if Babel.locale_props[toloc]['/'..item.font] then
6153           item.font = Babel.locale_props[toloc]['/'..item.font]

```

```

6154     end
6155     end
6156     toloc_save = toloc
6157     elseif not inmath and item.id == 7 then % Apply recursively
6158         item.replace = item.replace and Babel.locale_map(item.replace)
6159         item.pre      = item.pre and Babel.locale_map(item.pre)
6160         item.post     = item.post and Babel.locale_map(item.post)
6161     elseif item.id == node.id'math' then
6162         inmath = (item.subtype == 0)
6163     end
6164 end
6165 return head
6166 end
6167 }

```

The code for `\babelcharproperty` is straightforward. Just note the modified lua table can be different.

```

6168 \newcommand\babelcharproperty[1]{%
6169   \count@=#1\relax
6170   \ifvmode
6171     \expandafter\bbl@chprop
6172   \else
6173     \bbl@error{charproperty-only-vertical}{}{}%
6174   \fi}
6175 \newcommand\bbl@chprop[3][\the\count@]{%
6176   \@tempcnta=#1\relax
6177   \bbl@ifunset{bbl@chprop@#2}% {unknown-char-property}
6178   {\bbl@error{unknown-char-property}{}{#2}}%
6179   {}%
6180   \loop
6181     \bbl@cs{chprop@#2}{#3}%
6182     \ifnum\count@<\@tempcnta
6183       \advance\count@\@ne
6184     \repeat}
6185 \def\bbl@chprop@direction#1{%
6186   \directlua{
6187     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
6188     Babel.characters[\the\count@]['d'] = '#1'
6189   }}
6190 \let\bbl@chprop@bc\bbl@chprop@direction
6191 \def\bbl@chprop@mirror#1{%
6192   \directlua{
6193     Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
6194     Babel.characters[\the\count@]['m'] = '\number#1'
6195   }}
6196 \let\bbl@chprop@bmg\bbl@chprop@mirror
6197 \def\bbl@chprop@linebreak#1{%
6198   \directlua{
6199     Babel.cjk_characters[\the\count@] = Babel.cjk_characters[\the\count@] or {}
6200     Babel.cjk_characters[\the\count@]['c'] = '#1'
6201   }}
6202 \let\bbl@chprop@lb\bbl@chprop@linebreak
6203 \def\bbl@chprop@locale#1{%
6204   \directlua{
6205     Babel.chr_to_loc = Babel.chr_to_loc or {}
6206     Babel.chr_to_loc[\the\count@] =
6207     \bbl@ifblank{#1}{-1000}{\the\bbl@cs{id@#1}}\space
6208   }}

```

Post-handling hyphenation patterns for non-standard rules, like `ff` to `ff-f`. There are still some issues with speed (not very slow, but still slow). The Lua code is below.

```

6209 \directlua{
6210   Babel.nohyphenation = \the\@nohyphenation
6211 }

```

Now the \TeX high level interface, which requires the function defined above for converting strings to functions returning a string. These functions handle the $\{n\}$ syntax. For example, `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 in 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).

```

6212 \begingroup
6213 \catcode`\~ =12
6214 \catcode`\% =12
6215 \catcode`\& =14
6216 \catcode`\| =12
6217 \gdef\babelprehyphenation{%&
6218   \@ifnextchar[{\bbl@settransform{0}}{\bbl@settransform{0}[]}]
6219 \gdef\babelposthyphenation{%&
6220   \@ifnextchar[{\bbl@settransform{1}}{\bbl@settransform{1}[]}]
6221 \gdef\bbl@settransform#1[#2]#3#4#5{%&
6222   \ifcase#1
6223     \bbl@activateprehyphen
6224   \or
6225     \bbl@activateposthyphen
6226   \fi
6227 \begingroup
6228   \def\babeltempa{\bbl@add@list\babeltempb}&%
6229   \let\babeltempb@empty
6230   \def\bbl@tempa{#5}&%
6231   \bbl@replace\bbl@tempa{,}{,}&% TODO. Ugly trick to preserve {}
6232   \expandafter\bbl@foreach\expandafter{\bbl@tempa}{&%
6233     \bbl@ifsamestring{##1}{remove}&%
6234     {\bbl@add@list\babeltempb{nil}}&%
6235     {\directlua{
6236       local rep = [=##1]=
6237       rep = rep:gsub('^%s*(remove)%s*$', 'remove = true')
6238       rep = rep:gsub('^%s*(insert)%s*', 'insert = true, ')
6239       rep = rep:gsub('(string)%s*=%s*([%s,]*)', Babel.capture_func)
6240       if #1 == 0 or #1 == 2 then
6241         rep = rep:gsub('(space)%s*=%s*([%d%.]+)%s+([%d%.]+)%s+([%d%.]+)',
6242           'space = { ' .. '%2, %3, %4' .. ' }')
6243         rep = rep:gsub('(spacefactor)%s*=%s*([%d%.]+)%s+([%d%.]+)%s+([%d%.]+)',
6244           'spacefactor = { ' .. '%2, %3, %4' .. ' }')
6245         rep = rep:gsub('(kashida)%s*=%s*([%s,]*)', Babel.capture_kashida)
6246       else
6247         rep = rep:gsub( '(no)%s*=%s*([%s,]*)', Babel.capture_func)
6248         rep = rep:gsub( '(pre)%s*=%s*([%s,]*)', Babel.capture_func)
6249         rep = rep:gsub( '(post)%s*=%s*([%s,]*)', Babel.capture_func)
6250       end
6251       tex.print([[string\babeltempa{[]] .. rep .. [{}]])
6252     }]}&%
6253   \bbl@foreach\babeltempb{%&
6254     \bbl@forkv{##1}{&%
6255       \in@{,###1,},{,nil,step,data,remove,insert,string,no,pre,&%
6256         no,post,penalty,kashida,space,spacefactor,}&%
6257     \ifin@else
6258       \bbl@error{bad-transform-option}{###1}{,}{,}&%
6259     \fi}&%
6260   \let\bbl@kv@attribute\relax
6261   \let\bbl@kv@label\relax
6262   \let\bbl@kv@fonts@empty
6263   \bbl@forkv{#2}{\bbl@csarg\edef{kv@##1}{##2}}&%
6264   \ifx\bbl@kv@fonts@empty\else\bbl@settransform\fi
6265   \ifx\bbl@kv@attribute\relax

```



```

6266 \ifx\bbk@kv@label\relax\else
6267 \bbk@exp{\bbk@trim@def\bbk@kv@font{\bbk@kv@font}}&%
6268 \bbk@replace\bbk@kv@font{ }{,}&%
6269 \edef\bbk@kv@attribute{\bbk@ATR@\bbk@kv@label @#3@\bbk@kv@font}&%
6270 \count@\z@
6271 \def\bbk@elt##1##2##3{&%
6272 \bbk@ifsamestring{#3,\bbk@kv@label}{##1,##2}&%
6273 {\bbk@ifsamestring{\bbk@kv@font}{##3}&%
6274 {\count@\@ne}&%
6275 {\bbk@error{font-conflict-transforms}{}}&%
6276 {}}&%
6277 \bbk@transfont@list
6278 \ifnum\count@=\z@
6279 \bbk@exp{\global\bbk@add\bbk@transfont@list
6280 {\bbk@elt{#3}{\bbk@kv@label}{\bbk@kv@font}}}&%
6281 \fi
6282 \bbk@ifunset{\bbk@kv@attribute}&%
6283 {\global\bbk@carg\newattribute{\bbk@kv@attribute}}&%
6284 {}&%
6285 \global\bbk@carg\setattribute{\bbk@kv@attribute}\@ne
6286 \fi
6287 \else
6288 \edef\bbk@kv@attribute{\expandafter\bbk@stripslash\bbk@kv@attribute}&%
6289 \fi
6290 \directlua{
6291 local lbkr = Babel.linebreaking.replacements[#1]
6292 local u = unicode.utf8
6293 local id, attr, label
6294 if #1 == 0 then
6295 id = \the\csname \bbk@id@#3\endcsname\space
6296 else
6297 id = \the\csname l@#3\endcsname\space
6298 end
6299 \ifx\bbk@kv@attribute\relax
6300 attr = -1
6301 \else
6302 attr = luatexbase.registernumber'\bbk@kv@attribute'
6303 \fi
6304 \ifx\bbk@kv@label\relax\else &% Same refs:
6305 label = [==[\bbk@kv@label]==]
6306 \fi
6307 &% Convert pattern:
6308 local patt = string.gsub([==[#4]==], '%s', '')
6309 if #1 == 0 then
6310 patt = string.gsub(patt, '|', ' ')
6311 end
6312 if not u.find(patt, '()', nil, true) then
6313 patt = '()' .. patt .. '()'
6314 end
6315 if #1 == 1 then
6316 patt = string.gsub(patt, '%(%)%^', '^()')
6317 patt = string.gsub(patt, '%$(%)', '()$')
6318 end
6319 patt = u.gsub(patt, '{(.)}',
6320 function (n)
6321 return '%' .. (tonumber(n) and (tonumber(n)+1) or n)
6322 end)
6323 patt = u.gsub(patt, '{(%x%x%x%x+)}',
6324 function (n)
6325 return u.gsub(u.char(tonumber(n, 16)), '(%)', '%%1')
6326 end)
6327 lbkr[id] = lbkr[id] or {}
6328 table.insert(lbkr[id],

```

```

6329     { label=label, attr=attr, pattern=patt, replace={\babeltempb} })
6330   }&%
6331 \endgroup}
6332 \endgroup
6333 \let\bb@transfont@list\@empty
6334 \def\bb@settransfont{%
6335   \global\let\bb@settransfont\relax % Execute only once
6336   \gdef\bb@transfont{%
6337     \def\bb@elt####1####2####3{%
6338       \bb@ifblank{####3}%
6339       {\count@tw@}% Do nothing if no fonts
6340       {\count@z@
6341         \bb@vforeach{####3}{%
6342           \def\bb@tempd{#####1}%
6343           \edef\bb@tempe{\bb@transfam/\f@series/\f@shape}%
6344           \ifx\bb@tempd\bb@tempe
6345             \count@\@ne
6346           \else\ifx\bb@tempd\bb@transfam
6347             \count@\@ne
6348           \fi\fi}%
6349           \ifcase\count@
6350             \bb@csarg\unsetattribute{ATR@####2@####1@####3}%
6351           \or
6352             \bb@csarg\setattribute{ATR@####2@####1@####3}\@ne
6353           \fi}}%
6354     \bb@transfont@list}%
6355 \AddToHook{selectfont}{\bb@transfont}% Hooks are global.
6356 \gdef\bb@transfam{- unknown -}%
6357 \bb@foreach\bb@font@fams{%
6358   \AddToHook{##1family}{\def\bb@transfam{##1}}%
6359   \bb@ifsamestring{\@nameuse{##1default}}\familydefault
6360   {\xdef\bb@transfam{##1}}%
6361   {}}}
6362 \DeclareRobustCommand\enablelocaletransform[1]{%
6363   \bb@ifunset{\bb@ATR@#1@languagename @}%
6364   {\bb@error{transform-not-available}{#1}{}}}%
6365   {\bb@csarg\setattribute{ATR@#1@languagename @}\@ne}}
6366 \DeclareRobustCommand\disablelocaletransform[1]{%
6367   \bb@ifunset{\bb@ATR@#1@languagename @}%
6368   {\bb@error{transform-not-available-b}{#1}{}}}%
6369   {\bb@csarg\unsetattribute{ATR@#1@languagename @}}}
6370 \def\bb@activateposthyphen{%
6371   \let\bb@activateposthyphen\relax
6372   \directlua{
6373     require('babel-transforms.lua')
6374     Babel.linebreaking.add_after(Babel.post_hyphenate_replace)
6375   }}
6376 \def\bb@activateprehyphen{%
6377   \let\bb@activateprehyphen\relax
6378   \directlua{
6379     require('babel-transforms.lua')
6380     Babel.linebreaking.add_before(Babel.pre_hyphenate_replace)
6381   }}

```

The following experimental (and unfinished) macro applies the prehyphenation transforms for the current locale to a string (characters and spaces) and processes it in a fully expandable way (among other limitations, the string can't contain]=]). The way it operates is admittedly rather cumbersome: it converts the string to a node list, processes it, and converts it back to a string. The lua code is in the lua file below.

```

6382 \newcommand\localeprehyphenation[1]{%
6383   \directlua{ Babel.string_prehyphenation([=#1]=), \the\localeid) }}

```

10.9 Bidi

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

```
6384 \def\bbl@activate@preotf{%
6385   \let\bbl@activate@preotf\relax % only once
6386   \directlua{
6387     Babel = Babel or {}
6388     %
6389     function Babel.pre_otfload_v(head)
6390       if Babel.numbers and Babel.digits_mapped then
6391         head = Babel.numbers(head)
6392       end
6393       if Babel.bidi_enabled then
6394         head = Babel.bidi(head, false, dir)
6395       end
6396       return head
6397     end
6398     %
6399     function Babel.pre_otfload_h(head, gc, sz, pt, dir)
6400       if Babel.numbers and Babel.digits_mapped then
6401         head = Babel.numbers(head)
6402       end
6403       if Babel.bidi_enabled then
6404         head = Babel.bidi(head, false, dir)
6405       end
6406       return head
6407     end
6408     %
6409     luatexbase.add_to_callback('pre_linebreak_filter',
6410       Babel.pre_otfload_v,
6411       'Babel.pre_otfload_v',
6412     luatexbase.priority_in_callback('pre_linebreak_filter',
6413       'luaotfload.node_processor') or nil)
6414     %
6415     luatexbase.add_to_callback('hpack_filter',
6416       Babel.pre_otfload_h,
6417       'Babel.pre_otfload_h',
6418     luatexbase.priority_in_callback('hpack_filter',
6419       'luaotfload.node_processor') or nil)
6420   }}
```

The basic setup. The output is modified at a very low level to set the `\bodydir` to the `\pagedir`. Sadly, we have to deal with boxes in math with basic, so the `\bbl@mathboxdir` hack is activated every math with the package option `bidi=`.

```
6421 \breakafterdirmode=1
6422 \ifnum\bbl@bidimode>\@ne % Any bidi= except default=1
6423   \let\bbl@beforeforeign\leavevmode
6424   \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
6425   \RequirePackage{luatexbase}
6426   \bbl@activate@preotf
6427   \directlua{
6428     require('babel-data-bidi.lua')
6429     \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
6430       require('babel-bidi-basic.lua')
6431     \or
6432       require('babel-bidi-basic-r.lua')
6433     \fi}
6434   \newattribute\bbl@attr@dir
6435   \directlua{ Babel.attr_dir = luatexbase.registernumber'bbl@attr@dir' }
6436   \bbl@exp{\output{\bodydir\pagedir\the\output}}
6437 \fi
```

```

6438 \chardef\bbl@thetextdir\z@
6439 \chardef\bbl@thepardir\z@
6440 \def\bbl@getluadir#1{%
6441   \directlua{
6442     if tex.#lmdir == 'TLT' then
6443       tex.sprint('0')
6444     elseif tex.#lmdir == 'TRT' then
6445       tex.sprint('1')
6446     end}}
6447 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\textdir.. 3=0 lr/1 rl
6448   \ifcase#3\relax
6449     \ifcase\bbl@getluadir{#1}\relax\else
6450       #2 TLT\relax
6451     \fi
6452   \else
6453     \ifcase\bbl@getluadir{#1}\relax
6454       #2 TRT\relax
6455     \fi
6456   \fi}
6457 % ..00PPTT, with masks 0xC (par dir) and 0x3 (text dir)
6458 \def\bbl@thedir{0}
6459 \def\bbl@textdir#1{%
6460   \bbl@setluadir{text}\textdir{#1}%
6461   \chardef\bbl@thetextdir#1\relax
6462   \edef\bbl@thedir{\the\numexpr\bbl@thepardir*4+#1}%
6463   \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*4+#1}}
6464 \def\bbl@pardir#1{% Used twice
6465   \bbl@setluadir{par}\pardir{#1}%
6466   \chardef\bbl@thepardir#1\relax}
6467 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}% Used once
6468 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}% Unused
6469 \def\bbl@dirparastext{\pardir\the\textdir\relax}% Used once

```

RTL text inside math needs special attention. It affects not only to actual math stuff, but also to ‘tabular’, which is based on a fake math.

```

6470 \ifnum\bbl@bidimode>\z@ % Any bidi=
6471   \def\bbl@insidemath{0}%
6472   \def\bbl@everymath{\def\bbl@insidemath{1}}
6473   \def\bbl@everydisplay{\def\bbl@insidemath{2}}
6474   \frozen@everymath\expandafter{%
6475     \expandafter\bbl@everymath\the\frozen@everymath}
6476   \frozen@everydisplay\expandafter{%
6477     \expandafter\bbl@everydisplay\the\frozen@everydisplay}
6478   \AtBeginDocument{
6479     \directlua{
6480       function Babel.math_box_dir(head)
6481         if not (token.get_macro('bbl@insidemath') == '0') then
6482           if Babel.hlist_has_bidi(head) then
6483             local d = node.new(node.id'dir')
6484             d.dir = '+TRT'
6485             node.insert_before(head, node.has_glyph(head), d)
6486             local inmath = false
6487             for item in node.traverse(head) do
6488               if item.id == 11 then
6489                 inmath = (item.subtype == 0)
6490               elseif not inmath then
6491                 node.set_attribute(item,
6492                   Babel.attr_dir, token.get_macro('bbl@thedir'))
6493               end
6494             end
6495           end
6496         end
6497       return head

```

```

6498     end
6499     luatexbase.add_to_callback("hpack_filter", Babel.math_box_dir,
6500         "Babel.math_box_dir", 0)
6501   }}%
6502 \fi

```

Experimental. Tentative name.

```

6503 \DeclareRobustCommand\localebox[1]{%
6504   {\def\bbl@insidemath{0}%
6505     \mbox{\foreignlanguage{\languagename}{#1}}}}

```

10.10 Layout

Unlike xetex, luatex requires only minimal changes for right-to-left layouts, particularly in monolingual documents (the engine itself reverses boxes – including column order or headings –, margins, etc.) with `bidi=basic`, without having to patch almost any macro where text direction is relevant.

Still, there are three areas deserving special attention, namely, tabular, math, and graphics, text and intrinsically left-to-right elements are intermingled. I've made some progress in graphics, but they're essentially hacks; I've also made some progress in 'tabular', but when I decided to tackle math (both standard math and 'amsmath') the nightmare began. I'm still not sure how 'amsmath' should be modified, but the main problem is that, boxes are "generic" containers that can hold text, math, and graphics (even at the same time; remember that inline math is included in the list of text nodes marked with 'math' (11) nodes too).

`\@hangfrom` is useful in many contexts and it is redefined always with the `layout` option.

There are, however, a number of issues when the text direction is not the same as the box direction (as set by `\bodydir`), and when `\parbox` and `\hangindent` are involved. Fortunately, latest releases of luatex simplify a lot the solution with `\shapemode`.

With the issue #15 I realized commands are best patched, instead of redefined. With a few lines, a modification could be applied to several classes and packages. Now, `tabular` seems to work (at least in simple cases) with `array`, `tabularx`, `hhline`, `colortbl`, `longtable`, `booktabs`, etc. However, `dcolumn` still fails.

```

6506 \bbl@trace{Redefinitions for bidi layout}
6507 %
6508 <<(*More package options)>> ≡
6509 \chardef\bbl@eqnpos\z@
6510 \DeclareOption{leqno}{\chardef\bbl@eqnpos\@ne}
6511 \DeclareOption{fleqno}{\chardef\bbl@eqnpos\tw@}
6512 <</More package options>>
6513 %
6514 \ifnum\bbl@bidimode>\z@ % Any bidi=
6515   \matheqdirmode\@ne % A luatex primitive
6516   \let\bbl@eqnodir\relax
6517   \def\bbl@eqdel{()}
6518   \def\bbl@eqnum{%
6519     {\normalfont\normalcolor
6520       \expandafter\@firstoftwo\bbl@eqdel
6521       \theequation
6522       \expandafter\@secondoftwo\bbl@eqdel}}
6523   \def\bbl@puteqno#1{\eqno\hbox{#1}}
6524   \def\bbl@putleqno#1{\leqno\hbox{#1}}
6525   \def\bbl@eqno@flip#1{%
6526     \ifdim\predisplaysize=-\maxdimen
6527       \eqno
6528       \hb@xt@.01pt{%
6529         \hb@xt@\displaywidth{\hss{#1}\glet\bbl@upset\@currentlabel}}\hss}%
6530     \else
6531       \leqno\hbox{#1}\glet\bbl@upset\@currentlabel}%
6532     \fi
6533     \bbl@exp{\def\@currentlabel{\[bbl@upset]}}
6534   \def\bbl@leqno@flip#1{%
6535     \ifdim\predisplaysize=-\maxdimen
6536       \leqno

```

```

6537     \hb@xt@.01pt{%
6538     \hss\hb@xt@\displaywidth{#1\glet\bb@upset\@currentlabel}\hss}}%
6539 \else
6540     \eqno\hbox{#1\glet\bb@upset\@currentlabel}%
6541 \fi
6542 \bb@exp{\def\\\@currentlabel{\[bb@upset]}}%
6543 \AtBeginDocument{%
6544     \ifx\bb@noamsmath\relax\else
6545     \ifx\maketag@@@\undefined % Normal equation, eqnarray
6546     \AddToHook{env/equation/begin}{%
6547     \ifnum\bb@thetextdir>\z@
6548     \def\bb@mathboxdir{\def\bb@insidemath{1}}%
6549     \let\@eqnnum\bb@eqnum
6550     \edef\bb@eqnodir{\noexpand\bb@textdir\the\bb@thetextdir}}%
6551     \chardef\bb@thetextdir\z@
6552     \bb@add\normalfont{\bb@eqnodir}%
6553     \ifcase\bb@eqnpos
6554     \let\bb@puteqno\bb@eqno@flip
6555     \or
6556     \let\bb@puteqno\bb@leqno@flip
6557     \fi
6558     \fi}%
6559 \ifnum\bb@eqnpos=\tw@\else
6560 \def\endequation{\bb@puteqno{\@eqnnum}$\@ignoretrue}%
6561 \fi
6562 \AddToHook{env/eqnarray/begin}{%
6563 \ifnum\bb@thetextdir>\z@
6564 \def\bb@mathboxdir{\def\bb@insidemath{1}}%
6565 \edef\bb@eqnodir{\noexpand\bb@textdir\the\bb@thetextdir}}%
6566 \chardef\bb@thetextdir\z@
6567 \bb@add\normalfont{\bb@eqnodir}%
6568 \ifnum\bb@eqnpos=\@ne
6569 \def\@eqnnum{%
6570 \setbox\z@\hbox{\bb@eqnum}%
6571 \hbox to0.01pt{\hss\hbox to\displaywidth{\box\z@\hss}}}%
6572 \else
6573 \let\@eqnnum\bb@eqnum
6574 \fi
6575 \fi}
6576 % Hack. YA luatex bug?:
6577 \expandafter\bb@sreplace\csname \endcsname{${}\@eqno\kern.001pt${}}%
6578 \else % amstex
6579 \bb@exp{% Hack to hide maybe undefined conditionals:
6580 \chardef\bb@eqnpos=0%
6581 \<iftagsleft@>1\<else>\<ifflqn>2\<fi>\<fi>\relax}%
6582 \ifnum\bb@eqnpos=\@ne
6583 \let\bb@ams@lap\hbox
6584 \else
6585 \let\bb@ams@lap\llap
6586 \fi
6587 \ExplSyntaxOn % Required by \bb@sreplace with \intertext@
6588 \bb@sreplace\intertext@\normalbaselines}%
6589 {\normalbaselines
6590 \ifx\bb@eqnodir\relax\else\bb@pardir\@ne\bb@eqnodir\fi}%
6591 \ExplSyntaxOff
6592 \def\bb@ams@tagbox#1#2{#1{\bb@eqnodir#2}}% #1=hbox|lap|flip
6593 \ifx\bb@ams@lap\hbox % leqno
6594 \def\bb@ams@flip#1{%
6595 \hbox to 0.01pt{\hss\hbox to\displaywidth{#1}\hss}}%
6596 \else % eqno
6597 \def\bb@ams@flip#1{%
6598 \hbox to 0.01pt{\hbox to\displaywidth{\hss{#1}}\hss}}%
6599 \fi

```

```

6600 \def\bb@ams@preset#1{%
6601   \def\bb@mathboxdir{\def\bb@insidemath{1}}%
6602   \ifnum\bb@thetextdir>\z@
6603     \edef\bb@eqnodir{\noexpand\bb@textdir{\the\bb@thetextdir}}%
6604     \bb@sreplace\textdef@{\hbox}{\bb@ams@tagbox\hbox}%
6605     \bb@sreplace\maketag@@@{\hbox}{\bb@ams@tagbox#1}%
6606     \fi}%
6607 \ifnum\bb@eqnpos=\tw@\else
6608   \def\bb@ams@equation{%
6609     \def\bb@mathboxdir{\def\bb@insidemath{1}}%
6610     \ifnum\bb@thetextdir>\z@
6611       \edef\bb@eqnodir{\noexpand\bb@textdir{\the\bb@thetextdir}}%
6612       \chardef\bb@thetextdir\z@
6613       \bb@add\normalfont{\bb@eqnodir}%
6614       \ifcase\bb@eqnpos
6615         \def\veqno##1##2{\bb@eqno@flip{##1##2}}%
6616         \or
6617         \def\veqno##1##2{\bb@leqno@flip{##1##2}}%
6618         \fi
6619       \fi}%
6620   \AddToHook{env/equation/begin}{\bb@ams@equation}%
6621   \AddToHook{env/equation*/begin}{\bb@ams@equation}%
6622   \fi
6623   \AddToHook{env/cases/begin}{\bb@ams@preset\bb@ams@lap}%
6624   \AddToHook{env/multline/begin}{\bb@ams@preset\hbox}%
6625   \AddToHook{env/gather/begin}{\bb@ams@preset\bb@ams@lap}%
6626   \AddToHook{env/gather*/begin}{\bb@ams@preset\bb@ams@lap}%
6627   \AddToHook{env/align/begin}{\bb@ams@preset\bb@ams@lap}%
6628   \AddToHook{env/align*/begin}{\bb@ams@preset\bb@ams@lap}%
6629   \AddToHook{env/alignat/begin}{\bb@ams@preset\bb@ams@lap}%
6630   \AddToHook{env/alignat*/begin}{\bb@ams@preset\bb@ams@lap}%
6631   \AddToHook{env/eqnalign/begin}{\bb@ams@preset\hbox}%
6632   % Hackish, for proper alignment. Don't ask me why it works!:
6633   \bb@exp{% Avoid a 'visible' conditional
6634     \\\AddToHook{env/align*/end}{\<iftag@>\<else>\\tag*{\<fi>}}%
6635     \\\AddToHook{env/alignat*/end}{\<iftag@>\<else>\\tag*{\<fi>}}}%
6636   \AddToHook{env/flalign/begin}{\bb@ams@preset\hbox}%
6637   \AddToHook{env/split/before}{%
6638     \def\bb@mathboxdir{\def\bb@insidemath{1}}%
6639     \ifnum\bb@thetextdir>\z@
6640       \bb@ifsamestring@currentvir{equation}%
6641       {\ifx\bb@ams@lap\hbox % leqno
6642         \def\bb@ams@flip#1{%
6643           \hbox to 0.01pt{\hbox to\displaywidth{#1}\hss}\hss}}%
6644         \else
6645           \def\bb@ams@flip#1{%
6646             \hbox to 0.01pt{\hss\hbox to\displaywidth{\hss{#1}}}}%
6647           \fi}%
6648       }%
6649     \fi}%
6650   \fi\fi}
6651 \fi
6652 \def\bb@provide@extra#1{%
6653   % == Counters: mapdigits ==
6654   % Native digits
6655   \ifx\bb@KVP@mapdigits@nnil\else
6656     \bb@ifunset{bb@dgnat@languagename}{%
6657       {\RequirePackage{luatexbase}}%
6658       \bb@activate@preotf
6659       \directlua{
6660         Babel = Babel or {} %% -> presets in luababel
6661         Babel.digits_mapped = true
6662         Babel.digits = Babel.digits or {}

```

```

6663     Babel.digits[\the\localeid] =
6664     table.pack(string.utfvalue('\bbl@cl{dgnat}'))
6665     if not Babel.numbers then
6666     function Babel.numbers(head)
6667         local LOCALE = Babel.attr_locale
6668         local GLYPH = node.id'glyph'
6669         local inmath = false
6670         for item in node.traverse(head) do
6671             if not inmath and item.id == GLYPH then
6672                 local temp = node.get_attribute(item, LOCALE)
6673                 if Babel.digits[temp] then
6674                     local chr = item.char
6675                     if chr > 47 and chr < 58 then
6676                         item.char = Babel.digits[temp][chr-47]
6677                     end
6678                 end
6679             elseif item.id == node.id'math' then
6680                 inmath = (item.subtype == 0)
6681             end
6682         end
6683         return head
6684     end
6685 end
6686 }}%
6687 \fi
6688 % == transforms ==
6689 \ifx\bbl@KVP@transforms@nnil\else
6690     \def\bbl@elt##1##2##3{%
6691         \in@{${transforms.}}{##1}%
6692         \ifin@
6693             \def\bbl@tempa{##1}%
6694             \bbl@replace\bbl@tempa{transforms.}{}%
6695             \bbl@carg\bbl@transforms{babel\bbl@tempa}{##2}{##3}%
6696         \fi}%
6697     \csname bbl@inidata@\languagename\endcsname
6698     \bbl@release@transforms\relax % \relax closes the last item.
6699 \fi}
6700 % Start tabular here:
6701 \def\localerestoredirs{%
6702     \ifcase\bbl@thetextdir
6703         \ifnum\textdirection=\z@\else\textdir TLT\fi
6704     \else
6705         \ifnum\textdirection=\@ne\else\textdir TRT\fi
6706     \fi
6707     \ifcase\bbl@thepardir
6708         \ifnum\pardirection=\z@\else\pardir TLT\bodydir TLT\fi
6709     \else
6710         \ifnum\pardirection=\@ne\else\pardir TRT\bodydir TRT\fi
6711     \fi}
6712 \IfBabelLayout{tabular}%
6713     {\chardef\bbl@tabular@mode\tw@}% All RTL
6714     {\IfBabelLayout{notabular}%
6715         {\chardef\bbl@tabular@mode\z@}%
6716         {\chardef\bbl@tabular@mode\@ne}}% Mixed, with LTR cols
6717 \ifnum\bbl@bidimode>\@ne % Any lua bidi= except default=1
6718     \ifcase\bbl@tabular@mode\or % 1
6719         \let\bbl@parabefore\relax
6720         \AddToHook{para/before}{\bbl@parabefore}
6721         \AtBeginDocument{%
6722             \bbl@replace@\tabular{${}%
6723             \def\bbl@insidemath{0}%
6724             \def\bbl@parabefore{\localerestoredirs}}%
6725         \ifnum\bbl@tabular@mode=\@ne

```



```

6726 \bbl@ifunset{@tabclassz}{}%
6727 \bbl@exp{% Hide conditionals
6728 \\\bbl@sreplace\\\@tabclassz
6729 {\<ifcase>\\\@chnum}%
6730 {\\\localerestoredirs\<ifcase>\\\@chnum}}}%
6731 \@ifpackageloaded{colortbl}%
6732 {\bbl@sreplace\@classz
6733 {\hbox\bgroup\bgroup}{\hbox\bgroup\bgroup\localerestoredirs}}}%
6734 {\@ifpackageloaded{array}%
6735 {\bbl@exp{% Hide conditionals
6736 \\\bbl@sreplace\\\@classz
6737 {\<ifcase>\\\@chnum}%
6738 {\bgroup\\\localerestoredirs\<ifcase>\\\@chnum}%
6739 \\\bbl@sreplace\\\@classz
6740 {\\\do@row@strut\<fi>}{\\do@row@strut\<fi>\egroup}}}%
6741 {}}%
6742 \fi}%
6743 \or % 2
6744 \let\bbl@parabefore\relax
6745 \AddToHook{para/before}{\bbl@parabefore}%
6746 \AtBeginDocument{%
6747 \@ifpackageloaded{colortbl}%
6748 {\bbl@replace\@tabular{${}$}%
6749 \def\bbl@insidemath{0}%
6750 \def\bbl@parabefore{\localerestoredirs}}}%
6751 \bbl@sreplace\@classz
6752 {\hbox\bgroup\bgroup}{\hbox\bgroup\bgroup\localerestoredirs}}}%
6753 {}}%
6754 \fi

```

Very likely the `\output` routine must be patched in a quite general way to make sure the `\bodydir` is set to `\pagedir`. Note outside `\output` they can be different (and often are). For the moment, two *ad hoc* changes.

```

6755 \AtBeginDocument{%
6756 \@ifpackageloaded{multicol}%
6757 {\toks@\expandafter{\multi@column@out}%
6758 \edef\multi@column@out{\bodydir\pagedir\the\toks@}}}%
6759 {}}%
6760 \@ifpackageloaded{paracol}%
6761 {\edef\pcol@output{%
6762 \bodydir\pagedir\unexpanded\expandafter{\pcol@output}}}%
6763 {}}%
6764 \fi
6765 \ifx\bbl@opt@layout@annil\endinput\fi % if no layout

```

OMEGA provided a companion to `\mathdir` (`\nextfakemath`) for those cases where we did not want it to be applied, so that the writing direction of the main text was left unchanged. `\bbl@nextfake` is an attempt to emulate it, because `luatex` has removed it without an alternative. Also, `\hangindent` does not honour direction changes by default, so we need to redefine `\@hangfrom`.

```

6766 \ifnum\bbl@bidimode>\z@ % Any bidi=
6767 \def\bbl@nextfake#1{% non-local changes, use always inside a group!
6768 \bbl@exp{%
6769 \def\\\bbl@insidemath{0}%
6770 \mathdir\the\bodydir
6771 #1% Once entered in math, set boxes to restore values
6772 \<ifmmode>%
6773 \everyvbox{%
6774 \the\everyvbox
6775 \bodydir\the\bodydir
6776 \mathdir\the\mathdir
6777 \everyhbox{\the\everyhbox}%
6778 \everyvbox{\the\everyvbox}}}%
6779 \everyhbox{%
6780 \the\everyhbox

```

```

6781         \bodydir\the\bodydir
6782         \mathdir\the\mathdir
6783         \everyhbox{\the\everyhbox}%
6784         \everyvbox{\the\everyvbox}}%
6785         \<fi>}}%
6786 \def\hangfrom#1{%
6787   \setbox\@tempboxa\hbox{#{#1}}%
6788   \hangindent\wd\@tempboxa
6789   \ifnum\bb@getluadir{page}=\bb@getluadir{par}\else
6790     \shapemode\@ne
6791   \fi
6792   \noindent\box\@tempboxa}
6793 \fi
6794 \IfBabelLayout{tabular}
6795   {\let\bb@OL@@tabular\@tabular
6796   \bb@replace\@tabular{$}\{\bb@nextfake$}%
6797   \let\bb@NL@@tabular\@tabular
6798   \AtBeginDocument{%
6799     \ifx\bb@NL@@tabular\@tabular\else
6800       \bb@exp{\in@{\bb@nextfake}{\@tabular}}%
6801       \ifin\else
6802         \bb@replace\@tabular{$}\{\bb@nextfake$}%
6803       \fi
6804       \let\bb@NL@@tabular\@tabular
6805     \fi}}
6806   {}
6807 \IfBabelLayout{lists}
6808   {\let\bb@OL@list\list
6809   \bb@sreplace\list{\parshape}\{\bb@listparshape}%
6810   \let\bb@NL@list\list
6811   \def\bb@listparshape#1#2#3{%
6812     \parshape #1 #2 #3 %
6813     \ifnum\bb@getluadir{page}=\bb@getluadir{par}\else
6814       \shapemode\tw@
6815     \fi}}
6816   {}
6817 \IfBabelLayout{graphics}
6818   {\let\bb@pictresetdir\relax
6819   \def\bb@pictsetdir#1{%
6820     \ifcase\bb@thetextdir
6821       \let\bb@pictresetdir\relax
6822     \else
6823       \ifcase#1\bodydir TLT % Remember this sets the inner boxes
6824         \or\textdir TLT
6825         \else\bodydir TLT \textdir TLT
6826       \fi
6827       % \(\text|par)dir required in pgf:
6828       \def\bb@pictresetdir{\bodydir TRT\pardir TRT\textdir TRT\relax}%
6829     \fi}%
6830   \AddToHook{env/picture/begin}\{\bb@pictsetdir\tw@}%
6831   \directlua{
6832     Babel.get_picture_dir = true
6833     Babel.picture_has_bidi = 0
6834     %
6835     function Babel.picture_dir (head)
6836       if not Babel.get_picture_dir then return head end
6837       if Babel.hlist_has_bidi(head) then
6838         Babel.picture_has_bidi = 1
6839       end
6840       return head
6841     end
6842     luatexbase.add_to_callback("hpack_filter", Babel.picture_dir,
6843     "Babel.picture_dir")

```

```

6844 }%
6845 \AtBeginDocument{%
6846   \def\LS@rot{%
6847     \setbox\@outputbox\vbox{%
6848       \hbox dir TLT{\rotatebox{90}{\box\@outputbox}}}%
6849   \long\def\put(#1,#2)#3{%
6850     \@killglove
6851     % Try:
6852     \ifx\bbbl@pictresetdir\relax
6853       \def\bbbl@tempc{0}%
6854     \else
6855       \directlua{
6856         Babel.get_picture_dir = true
6857         Babel.picture_has_bidi = 0
6858       }%
6859       \setbox\z@\hb@xt@\z@{%
6860         \@defaultunitsset\@tempdimc{#1}\unitlength
6861         \kern\@tempdimc
6862         #3\hss}% TODO: #3 executed twice (below). That's bad.
6863       \edef\bbbl@tempc{\directlua{tex.print(Babel.picture_has_bidi)}}%
6864     \fi
6865     % Do:
6866     \@defaultunitsset\@tempdimc{#2}\unitlength
6867     \raise\@tempdimc\hb@xt@\z@{%
6868       \@defaultunitsset\@tempdimc{#1}\unitlength
6869       \kern\@tempdimc
6870       {\ifnum\bbbl@tempc>\z@\bbbl@pictresetdir\fi#3}\hss}%
6871     \ignorespaces}%
6872   \MakeRobust\put}%
6873 \AtBeginDocument
6874 {\AddToHook{cmd/diagbox@pict/before}{\let\bbbl@pictsetdir\@gobble}%
6875 \ifx\pgfpicture\undefined\else % TODO. Allow deactivate?
6876   \AddToHook{env/pgfpicture/begin}{\bbbl@pictsetdir\@ne}%
6877   \bbbl@add\pgfinterruptpicture{\bbbl@pictresetdir}%
6878   \bbbl@add\pgfsys@beginpicture{\bbbl@pictsetdir\z@}%
6879 \fi
6880 \ifx\tikzpicture\undefined\else
6881   \AddToHook{env/tikzpicture/begin}{\bbbl@pictsetdir\tw@}%
6882   \bbbl@add\tikz@atbegin@node{\bbbl@pictresetdir}%
6883   \bbbl@sreplace\tikz{\begingroup}{\begingroup\bbbl@pictsetdir\tw@}%
6884 \fi
6885 \ifx\tcolorbox\undefined\else
6886   \def\tcb@drawing@env@begin{%
6887     \csname tcb@before@tcb@split@state\endcsname
6888     \bbbl@pictsetdir\tw@
6889     \begin{\kvtcb@graphenv}%
6890     \tcb@bbdraw
6891     \tcb@apply@graph@patches}%
6892   \def\tcb@drawing@env@end{%
6893     \end{\kvtcb@graphenv}%
6894     \bbbl@pictresetdir
6895     \csname tcb@after@tcb@split@state\endcsname}%
6896   \fi
6897   }}
6898 {}
6899 \IfBabelLayout{counters*}%
6900   {\bbbl@add\bbbl@opt@layout{.counters.}}%
6901   \directlua{
6902     luatexbase.add_to_callback("process_output_buffer",

```

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.

```

6903     Babel.discard_sublr , "Babel.discard_sublr") }%
6904   }{}
6905 \IfBabelLayout{counters}%
6906   {\let\bbL@OL@@textsuperscript\@textsuperscript
6907    \bbL@sreplace\@textsuperscript{\m@th}{\m@th\mathdir\pagedir}%
6908    \let\bbL@Latinarabic=\@arabic
6909    \let\bbL@OL@@arabic\@arabic
6910    \def\@arabic#1{\babelsublr{\bbL@Latinarabic#1}}%
6911    \@ifpackagewith{babel}{bidi=default}%
6912     {\let\bbL@asciroman=\@roman
6913     \let\bbL@OL@@roman\@roman
6914     \def\@roman#1{\babelsublr{\ensureascii{\bbL@asciroman#1}}}%
6915     \let\bbL@asciRoman=\@Roman
6916     \let\bbL@OL@@roman\@Roman
6917     \def\@Roman#1{\babelsublr{\ensureascii{\bbL@asciRoman#1}}}%
6918     \let\bbL@OL@labelenumii\labelenumii
6919     \def\labelenumii}\theenumii}%
6920     \let\bbL@OL@p@enumiii\p@enumiii
6921     \def\p@enumiii{\p@enumii}\theenumii}}{}{}
6922 <<Footnote changes>>
6923 \IfBabelLayout{footnotes}%
6924   {\let\bbL@OL@footnote\footnote
6925    \BabelFootnote\footnote\languagename{}{}}%
6926    \BabelFootnote\localfootnote\languagename{}{}}%
6927    \BabelFootnote\mainfootnote{}{}}
6928   {}

```

Some \LaTeX macros use internally the math mode for text formatting. They have very little in common and are grouped here, as a single option.

```

6929 \IfBabelLayout{extras}%
6930   {\bbL@ncarg\let\bbL@OL@underline{underline }%
6931    \bbL@carg\bbL@sreplace{underline }%
6932     {\$@@underline}{\bgroup\bbL@nextfake$@@underline}%
6933    \bbL@carg\bbL@sreplace{underline }%
6934     {\m@th$}{\m@th$\egroup}%
6935    \let\bbL@OL@LaTeXe\LaTeXe
6936    \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
6937     \if b\expandafter\@car\f@series\@nil\boldmath\fi
6938     \babelsublr}%
6939     \LaTeX\kern.15em2\bbL@nextfake$_{\textstyle\varepsilon}$}}
6940   {}
6941 </luatex>

```

10.11 Lua: transforms

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.

```

6942 <(*transforms)>
6943 Babel.linebreaking.replacements = {}
6944 Babel.linebreaking.replacements[0] = {} -- pre
6945 Babel.linebreaking.replacements[1] = {} -- post
6946
6947 -- Discretionaries contain strings as nodes
6948 function Babel.str_to_nodes(fn, matches, base)

```

```

6949 local n, head, last
6950 if fn == nil then return nil end
6951 for s in string.utfvalues(fn(matches)) do
6952   if base.id == 7 then
6953     base = base.replace
6954   end
6955   n = node.copy(base)
6956   n.char = s
6957   if not head then
6958     head = n
6959   else
6960     last.next = n
6961   end
6962   last = n
6963 end
6964 return head
6965 end
6966
6967 Babel.fetch_subtext = {}
6968
6969 Babel.ignore_pre_char = function(node)
6970   return (node.lang == Babel.nohyphenation)
6971 end
6972
6973 -- Merging both functions doesn't seem feasible, because there are too
6974 -- many differences.
6975 Babel.fetch_subtext[0] = function(head)
6976   local word_string = ''
6977   local word_nodes = {}
6978   local lang
6979   local item = head
6980   local inmath = false
6981
6982   while item do
6983
6984     if item.id == 11 then
6985       inmath = (item.subtype == 0)
6986     end
6987
6988     if inmath then
6989       -- pass
6990
6991     elseif item.id == 29 then
6992       local locale = node.get_attribute(item, Babel.attr_locale)
6993
6994       if lang == locale or lang == nil then
6995         lang = lang or locale
6996         if Babel.ignore_pre_char(item) then
6997           word_string = word_string .. Babel.us_char
6998         else
6999           word_string = word_string .. unicode.utf8.char(item.char)
7000         end
7001         word_nodes[#word_nodes+1] = item
7002       else
7003         break
7004       end
7005
7006     elseif item.id == 12 and item.subtype == 13 then
7007       word_string = word_string .. ' '
7008       word_nodes[#word_nodes+1] = item
7009
7010     -- Ignore leading unrecognized nodes, too.
7011     elseif word_string ~= '' then

```

```

7012     word_string = word_string .. Babel.us_char
7013     word_nodes[#word_nodes+1] = item -- Will be ignored
7014 end
7015
7016     item = item.next
7017 end
7018
7019 -- Here and above we remove some trailing chars but not the
7020 -- corresponding nodes. But they aren't accessed.
7021 if word_string:sub(-1) == ' ' then
7022     word_string = word_string:sub(1,-2)
7023 end
7024 word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
7025 return word_string, word_nodes, item, lang
7026 end
7027
7028 Babel.fetch_subtext[1] = function(head)
7029     local word_string = ''
7030     local word_nodes = {}
7031     local lang
7032     local item = head
7033     local inmath = false
7034
7035     while item do
7036
7037         if item.id == 11 then
7038             inmath = (item.subtype == 0)
7039         end
7040
7041         if inmath then
7042             -- pass
7043
7044         elseif item.id == 29 then
7045             if item.lang == lang or lang == nil then
7046                 if (item.char ~= 124) and (item.char ~= 61) then -- not =, not |
7047                     lang = lang or item.lang
7048                     word_string = word_string .. unicode.utf8.char(item.char)
7049                     word_nodes[#word_nodes+1] = item
7050                 end
7051             else
7052                 break
7053             end
7054
7055         elseif item.id == 7 and item.subtype == 2 then
7056             word_string = word_string .. '='
7057             word_nodes[#word_nodes+1] = item
7058
7059         elseif item.id == 7 and item.subtype == 3 then
7060             word_string = word_string .. '|'
7061             word_nodes[#word_nodes+1] = item
7062
7063         -- (1) Go to next word if nothing was found, and (2) implicitly
7064         -- remove leading USs.
7065         elseif word_string == '' then
7066             -- pass
7067
7068         -- This is the responsible for splitting by words.
7069         elseif (item.id == 12 and item.subtype == 13) then
7070             break
7071
7072         else
7073             word_string = word_string .. Babel.us_char
7074             word_nodes[#word_nodes+1] = item -- Will be ignored

```

```

7075     end
7076
7077     item = item.next
7078 end
7079
7080 word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
7081 return word_string, word_nodes, item, lang
7082 end
7083
7084 function Babel.pre_hyphenate_replace(head)
7085     Babel.hyphenate_replace(head, 0)
7086 end
7087
7088 function Babel.post_hyphenate_replace(head)
7089     Babel.hyphenate_replace(head, 1)
7090 end
7091
7092 Babel.us_char = string.char(31)
7093
7094 function Babel.hyphenate_replace(head, mode)
7095     local u = unicode.utf8
7096     local lbrk = Babel.linebreaking.replacements[mode]
7097
7098     local word_head = head
7099
7100     while true do -- for each subtext block
7101
7102         local w, w_nodes, nw, lang = Babel.fetch_subtext[mode](word_head)
7103
7104         if Babel.debug then
7105             print()
7106             print((mode == 0) and '@@@@<' or '@@@@>', w)
7107         end
7108
7109         if nw == nil and w == '' then break end
7110
7111         if not lang then goto next end
7112         if not lbrk[lang] then goto next end
7113
7114         -- For each saved (pre|post)hyphenation. TODO. Reconsider how
7115         -- loops are nested.
7116         for k=1, #lbrk[lang] do
7117             local p = lbrk[lang][k].pattern
7118             local r = lbrk[lang][k].replace
7119             local attr = lbrk[lang][k].attr or -1
7120
7121             if Babel.debug then
7122                 print('*****', p, mode)
7123             end
7124
7125             -- This variable is set in some cases below to the first *byte*
7126             -- after the match, either as found by u.match (faster) or the
7127             -- computed position based on sc if w has changed.
7128             local last_match = 0
7129             local step = 0
7130
7131             -- For every match.
7132             while true do
7133                 if Babel.debug then
7134                     print('=====' )
7135                 end
7136                 local new -- used when inserting and removing nodes
7137

```

```

7138     local matches = { u.match(w, p, last_match) }
7139
7140     if #matches < 2 then break end
7141
7142     -- Get and remove empty captures (with ())'s, which return a
7143     -- number with the position), and keep actual captures
7144     -- (from (...)), if any, in matches.
7145     local first = table.remove(matches, 1)
7146     local last = table.remove(matches, #matches)
7147     -- Non re-fetched substrings may contain \31, which separates
7148     -- subsubstrings.
7149     if string.find(w:sub(first, last-1), Babel.us_char) then break end
7150
7151     local save_last = last -- with A()BC()D, points to D
7152
7153     -- Fix offsets, from bytes to unicode. Explained above.
7154     first = u.len(w:sub(1, first-1)) + 1
7155     last = u.len(w:sub(1, last-1)) -- now last points to C
7156
7157     -- This loop stores in a small table the nodes
7158     -- corresponding to the pattern. Used by 'data' to provide a
7159     -- predictable behavior with 'insert' (w_nodes is modified on
7160     -- the fly), and also access to 'remove'd nodes.
7161     local sc = first-1 -- Used below, too
7162     local data_nodes = {}
7163
7164     local enabled = true
7165     for q = 1, last-first+1 do
7166         data_nodes[q] = w_nodes[sc+q]
7167         if enabled
7168             and attr > -1
7169             and not node.has_attribute(data_nodes[q], attr)
7170         then
7171             enabled = false
7172         end
7173     end
7174
7175     -- This loop traverses the matched substring and takes the
7176     -- corresponding action stored in the replacement list.
7177     -- sc = the position in substr nodes / string
7178     -- rc = the replacement table index
7179     local rc = 0
7180
7181     while rc < last-first+1 do -- for each replacement
7182         if Babel.debug then
7183             print('.....', rc + 1)
7184         end
7185         sc = sc + 1
7186         rc = rc + 1
7187
7188         if Babel.debug then
7189             Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
7190             local ss = ''
7191             for itt in node.traverse(head) do
7192                 if itt.id == 29 then
7193                     ss = ss .. unicode.utf8.char(itt.char)
7194                 else
7195                     ss = ss .. '{' .. itt.id .. '}'
7196                 end
7197             end
7198             print('*****', ss)
7199         end
7200     end

```



```

7201
7202     local crep = r[rc]
7203     local item = w_nodes[sc]
7204     local item_base = item
7205     local placeholder = Babel.us_char
7206     local d
7207
7208     if crep and crep.data then
7209         item_base = data_nodes[crep.data]
7210     end
7211
7212     if crep then
7213         step = crep.step or 0
7214     end
7215
7216     if (not enabled) or (crep and next(crep) == nil) then -- = {}
7217         last_match = save_last    -- Optimization
7218         goto next
7219
7220     elseif crep == nil or crep.remove then
7221         node.remove(head, item)
7222         table.remove(w_nodes, sc)
7223         w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
7224         sc = sc - 1 -- Nothing has been inserted.
7225         last_match = utf8.offset(w, sc+1+step)
7226         goto next
7227
7228     elseif crep and crep.kashida then -- Experimental
7229         node.set_attribute(item,
7230             Babel.attr_kashida,
7231             crep.kashida)
7232         last_match = utf8.offset(w, sc+1+step)
7233         goto next
7234
7235     elseif crep and crep.string then
7236         local str = crep.string(matches)
7237         if str == '' then -- Gather with nil
7238             node.remove(head, item)
7239             table.remove(w_nodes, sc)
7240             w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
7241             sc = sc - 1 -- Nothing has been inserted.
7242         else
7243             local loop_first = true
7244             for s in string.utfvalues(str) do
7245                 d = node.copy(item_base)
7246                 d.char = s
7247                 if loop_first then
7248                     loop_first = false
7249                     head, new = node.insert_before(head, item, d)
7250                     if sc == 1 then
7251                         word_head = head
7252                     end
7253                     w_nodes[sc] = d
7254                     w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc+1)
7255                 else
7256                     sc = sc + 1
7257                     head, new = node.insert_before(head, item, d)
7258                     table.insert(w_nodes, sc, new)
7259                     w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc)
7260                 end
7261                 if Babel.debug then
7262                     print('.....', 'str')
7263                     Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)

```

```

7264         end
7265     end -- for
7266     node.remove(head, item)
7267 end -- if ''
7268 last_match = utf8.offset(w, sc+1+step)
7269 goto next
7270
7271 elseif mode == 1 and crep and (crep.pre or crep.no or crep.post) then
7272     d = node.new(7, 3) -- (disc, regular)
7273     d.pre = Babel.str_to_nodes(crep.pre, matches, item_base)
7274     d.post = Babel.str_to_nodes(crep.post, matches, item_base)
7275     d.replace = Babel.str_to_nodes(crep.no, matches, item_base)
7276     d.attr = item_base.attr
7277     if crep.pre == nil then -- TeXbook p96
7278         d.penalty = crep.penalty or tex.hyphenpenalty
7279     else
7280         d.penalty = crep.penalty or tex.exhyphenpenalty
7281     end
7282     placeholder = '|'
7283     head, new = node.insert_before(head, item, d)
7284
7285 elseif mode == 0 and crep and (crep.pre or crep.no or crep.post) then
7286     -- ERROR
7287
7288 elseif crep and crep.penalty then
7289     d = node.new(14, 0) -- (penalty, userpenalty)
7290     d.attr = item_base.attr
7291     d.penalty = crep.penalty
7292     head, new = node.insert_before(head, item, d)
7293
7294 elseif crep and crep.space then
7295     -- 655360 = 10 pt = 10 * 65536 sp
7296     d = node.new(12, 13) -- (glue, spaceskip)
7297     local quad = font.getfont(item_base.font).size or 655360
7298     node.setglue(d, crep.space[1] * quad,
7299                 crep.space[2] * quad,
7300                 crep.space[3] * quad)
7301     if mode == 0 then
7302         placeholder = ' '
7303     end
7304     head, new = node.insert_before(head, item, d)
7305
7306 elseif crep and crep.spacefactor then
7307     d = node.new(12, 13) -- (glue, spaceskip)
7308     local base_font = font.getfont(item_base.font)
7309     node.setglue(d,
7310                 crep.spacefactor[1] * base_font.parameters['space'],
7311                 crep.spacefactor[2] * base_font.parameters['space_stretch'],
7312                 crep.spacefactor[3] * base_font.parameters['space_shrink'])
7313     if mode == 0 then
7314         placeholder = ' '
7315     end
7316     head, new = node.insert_before(head, item, d)
7317
7318 elseif mode == 0 and crep and crep.space then
7319     -- ERROR
7320
7321 end -- ie replacement cases
7322
7323 -- Shared by disc, space and penalty.
7324 if sc == 1 then
7325     word_head = head
7326 end

```

```

7327         if crep.insert then
7328             w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc)
7329             table.insert(w_nodes, sc, new)
7330             last = last + 1
7331         else
7332             w_nodes[sc] = d
7333             node.remove(head, item)
7334             w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc+1)
7335         end
7336
7337         last_match = utf8.offset(w, sc+1+step)
7338
7339         ::next::
7340
7341     end -- for each replacement
7342
7343     if Babel.debug then
7344         print('.....', '/')
7345         Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
7346     end
7347
7348     end -- for match
7349
7350 end -- for patterns
7351
7352 ::next::
7353 word_head = nw
7354 end -- for substring
7355 return head
7356 end
7357
7358 -- This table stores capture maps, numbered consecutively
7359 Babel.capture_maps = {}
7360
7361 -- The following functions belong to the next macro
7362 function Babel.capture_func(key, cap)
7363     local ret = "[[" .. cap:gsub('{{([0-9])}}', ")]..m[%1]..[[") .. "]"
7364     local cnt
7365     local u = unicode.utf8
7366     ret, cnt = ret:gsub('{{([0-9])|([^\^]+)|(.-)}}', Babel.capture_func_map)
7367     if cnt == 0 then
7368         ret = u.gsub(ret, '{{(%x%x%x%x+)}}',
7369             function (n)
7370                 return u.char(tonumber(n, 16))
7371             end)
7372     end
7373     ret = ret:gsub("%[%[%]]%.%", '')
7374     ret = ret:gsub("%.%[%[%]]%", '')
7375     return key .. [[=function(m) return ]] .. ret .. [[ end]]
7376 end
7377
7378 function Babel.capt_map(from, mapno)
7379     return Babel.capture_maps[mapno][from] or from
7380 end
7381
7382 -- Handle the {n|abc|ABC} syntax in captures
7383 function Babel.capture_func_map(capno, from, to)
7384     local u = unicode.utf8
7385     from = u.gsub(from, '{{(%x%x%x%x+)}}',
7386         function (n)
7387             return u.char(tonumber(n, 16))
7388         end)
7389     to = u.gsub(to, '{{(%x%x%x%x+)}}',

```

```

7390     function (n)
7391         return u.char(tonumber(n, 16))
7392     end)
7393 local froms = {}
7394 for s in string.utfcharacters(from) do
7395     table.insert(froms, s)
7396 end
7397 local cnt = 1
7398 table.insert(Babel.capture_maps, {})
7399 local mlen = table.getn(Babel.capture_maps)
7400 for s in string.utfcharacters(to) do
7401     Babel.capture_maps[mlen][froms[cnt]] = s
7402     cnt = cnt + 1
7403 end
7404 return "]]..Babel.capt_map(m[" .. capno .. "], " ..
7405     (mlen) .. ").." .. "["
7406 end
7407
7408 -- Create/Extend reversed sorted list of kashida weights:
7409 function Babel.capture_kashida(key, wt)
7410     wt = tonumber(wt)
7411     if Babel.kashida_wts then
7412         for p, q in ipairs(Babel.kashida_wts) do
7413             if wt == q then
7414                 break
7415             elseif wt > q then
7416                 table.insert(Babel.kashida_wts, p, wt)
7417                 break
7418             elseif table.getn(Babel.kashida_wts) == p then
7419                 table.insert(Babel.kashida_wts, wt)
7420             end
7421         end
7422     else
7423         Babel.kashida_wts = { wt }
7424     end
7425     return 'kashida = ' .. wt
7426 end
7427
7428 -- Experimental: applies prehyphenation transforms to a string (letters
7429 -- and spaces).
7430 function Babel.string_prehyphenation(str, locale)
7431     local n, head, last, res
7432     head = node.new(8, 0) -- dummy (hack just to start)
7433     last = head
7434     for s in string.utfvalues(str) do
7435         if s == 20 then
7436             n = node.new(12, 0)
7437         else
7438             n = node.new(29, 0)
7439             n.char = s
7440         end
7441         node.set_attribute(n, Babel.attr_locale, locale)
7442         last.next = n
7443         last = n
7444     end
7445     head = Babel.hyphenate_replace(head, 0)
7446     res = ''
7447     for n in node.traverse(head) do
7448         if n.id == 12 then
7449             res = res .. ' '
7450         elseif n.id == 29 then
7451             res = res .. unicode.utf8.char(n.char)
7452         end
7453     end

```

```

7453 end
7454 tex.print(res)
7455 end
7456 \transforms)

```

10.12 Lua: Auto bidi with basic and basic-r

The file `babel-data-bidi.lua` currently only contains data. It is a large and boring file and it is not shown here (see the generated file), but here is a sample:

```

[0x25]={d='et'},
[0x26]={d='on'},
[0x27]={d='on'},
[0x28]={d='on', m=0x29},
[0x29]={d='on', m=0x28},
[0x2A]={d='on'},
[0x2B]={d='es'},
[0x2C]={d='cs'},

```

For the meaning of these codes, see the Unicode standard.

Now the `basic-r` bidi mode. One of the aims is to implement a fast and simple bidi algorithm, with a single loop. I managed to do it for R texts, with a second smaller loop for a special case. The code is still somewhat chaotic, but its behavior is essentially correct. I cannot resist copying the following text from Emacs `bidi.c` (which also attempts to implement the bidi algorithm with a single loop):

Arrrrgh!! The UAX#9 algorithm is too deeply entrenched in the assumption of batch-style processing [...]. May the fleas of a thousand camels infest the armpits of those who design supposedly general-purpose algorithms by looking at their own implementations, and fail to consider other possible implementations!

Well, it took me some time to guess what the batch rules in UAX#9 actually mean (in other word, *what* they do and *why*, and not only *how*), but I think (or I hope) I've managed to understand them. In some sense, there are two bidi modes, one for numbers, and the other for text. Furthermore, setting just the direction in R text is not enough, because there are actually *two* R modes (set explicitly in Unicode with RLM and ALM). In `babel` the `dir` is set by a higher protocol based on the language/script, which in turn sets the correct `dir` (<l>, <r> or <al>).

From UAX#9: “Where available, markup should be used instead of the explicit formatting characters”. So, this simple version just ignores formatting characters. Actually, most of that annex is devoted to how to handle them.

BD14-BD16 are not implemented. Unicode (and the W3C) are making a great effort to deal with some special problematic cases in “streamed” plain text. I don't think this is the way to go – particular issues should be fixed by a high level interface taking into account the needs of the document. And here is where `luatex` excels, because everything related to bidi writing is under our control.

```

7457 (*basic-r)
7458 Babel = Babel or {}
7459
7460 Babel.bidi_enabled = true
7461
7462 require('babel-data-bidi.lua')
7463
7464 local characters = Babel.characters
7465 local ranges = Babel.ranges
7466
7467 local DIR = node.id("dir")
7468
7469 local function dir_mark(head, from, to, outer)
7470   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
7471   local d = node.new(DIR)
7472   d.dir = '+' .. dir
7473   node.insert_before(head, from, d)
7474   d = node.new(DIR)
7475   d.dir = '-' .. dir
7476   node.insert_after(head, to, d)

```

```

7477 end
7478
7479 function Babel.bidi(head, ispar)
7480   local first_n, last_n          -- first and last char with nums
7481   local last_es                 -- an auxiliary 'last' used with nums
7482   local first_d, last_d         -- first and last char in L/R block
7483   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):

```

7484   local strong = ('TRT' == tex.pardir) and 'r' or 'l'
7485   local strong_lr = (strong == 'l') and 'l' or 'r'
7486   local outer = strong
7487
7488   local new_dir = false
7489   local first_dir = false
7490   local inmath = false
7491
7492   local last_lr
7493
7494   local type_n = ''
7495
7496   for item in node.traverse(head) do
7497
7498     -- three cases: glyph, dir, otherwise
7499     if item.id == node.id'glyph'
7500       or (item.id == 7 and item.subtype == 2) then
7501
7502       local itemchar
7503       if item.id == 7 and item.subtype == 2 then
7504         itemchar = item.replace.char
7505       else
7506         itemchar = item.char
7507       end
7508       local chardata = characters[itemchar]
7509       dir = chardata and chardata.d or nil
7510       if not dir then
7511         for nn, et in ipairs(ranges) do
7512           if itemchar < et[1] then
7513             break
7514           elseif itemchar <= et[2] then
7515             dir = et[3]
7516             break
7517           end
7518         end
7519       end
7520       dir = dir or 'l'
7521       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).

```

7522     if new_dir then
7523       attr_dir = 0
7524       for at in node.traverse(item.attr) do
7525         if at.number == Babel.attr_dir then
7526           attr_dir = at.value & 0x3
7527         end
7528       end
7529       if attr_dir == 1 then
7530         strong = 'r'

```

```

7531     elseif attr_dir == 2 then
7532         strong = 'al'
7533     else
7534         strong = 'l'
7535     end
7536     strong_lr = (strong == 'l') and 'l' or 'r'
7537     outer = strong_lr
7538     new_dir = false
7539 end
7540
7541 if dir == 'nsm' then dir = strong end          -- W1

```

Numbers. The dual <al>/<r> system for R is somewhat cumbersome.

```

7542     dir_real = dir          -- We need dir_real to set strong below
7543     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:

```

7544     if strong == 'al' then
7545         if dir == 'en' then dir = 'an' end          -- W2
7546         if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
7547         strong_lr = 'r'                             -- W3
7548     end

```

Once finished the basic setup for glyphs, consider the two other cases: dir node and the rest.

```

7549     elseif item.id == node.id'dir' and not inmath then
7550         new_dir = true
7551         dir = nil
7552     elseif item.id == node.id'math' then
7553         inmath = (item.subtype == 0)
7554     else
7555         dir = nil          -- Not a char
7556     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>.

```

7557     if dir == 'en' or dir == 'an' or dir == 'et' then
7558         if dir ~= 'et' then
7559             type_n = dir
7560         end
7561         first_n = first_n or item
7562         last_n = last_es or item
7563         last_es = nil
7564     elseif dir == 'es' and last_n then -- W3+W6
7565         last_es = item
7566     elseif dir == 'cs' then          -- it's right - do nothing
7567     elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
7568         if strong_lr == 'r' and type_n ~= '' then
7569             dir_mark(head, first_n, last_n, 'r')
7570         elseif strong_lr == 'l' and first_d and type_n == 'an' then
7571             dir_mark(head, first_n, last_n, 'r')
7572             dir_mark(head, first_d, last_d, outer)
7573             first_d, last_d = nil, nil
7574         elseif strong_lr == 'l' and type_n ~= '' then
7575             last_d = last_n
7576         end
7577         type_n = ''
7578         first_n, last_n = nil, nil
7579     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:

```

7580   if dir == 'l' or dir == 'r' then
7581     if dir ~= outer then
7582       first_d = first_d or item
7583       last_d = item
7584     elseif first_d and dir ~= strong_lr then
7585       dir_mark(head, first_d, last_d, outer)
7586       first_d, last_d = nil, nil
7587     end
7588   end

```

Mirroring. Each chunk of text in a certain language is considered a “closed” sequence. If <r on r> and <l on l>, it's clearly <r> and <l>, resptly, but with other combinations depends on outer. From all these, we select only those resolving <on> → <r>. At the beginning (when last_lr is nil) of an R text, they are mirrored directly.

TODO - numbers in R mode are processed. It doesn't hurt, but should not be done.

```

7589   if dir and not last_lr and dir ~= 'l' and outer == 'r' then
7590     item.char = characters[item.char] and
7591               characters[item.char].m or item.char
7592   elseif (dir or new_dir) and last_lr ~= item then
7593     local mir = outer .. strong_lr .. (dir or outer)
7594     if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
7595       for ch in node.traverse(node.next(last_lr)) do
7596         if ch == item then break end
7597         if ch.id == node.id'glyph' and characters[ch.char] then
7598           ch.char = characters[ch.char].m or ch.char
7599         end
7600       end
7601     end
7602   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).

```

7603   if dir == 'l' or dir == 'r' then
7604     last_lr = item
7605     strong = dir_real           -- Don't search back - best save now
7606     strong_lr = (strong == 'l') and 'l' or 'r'
7607   elseif new_dir then
7608     last_lr = nil
7609   end
7610 end

```

Mirror the last chars if they are no directed. And make sure any open block is closed, too.

```

7611   if last_lr and outer == 'r' then
7612     for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
7613       if characters[ch.char] then
7614         ch.char = characters[ch.char].m or ch.char
7615       end
7616     end
7617   end
7618   if first_n then
7619     dir_mark(head, first_n, last_n, outer)
7620   end
7621   if first_d then
7622     dir_mark(head, first_d, last_d, outer)
7623   end

```

In boxes, the dir node could be added before the original head, so the actual head is the previous node.

```

7624   return node.prev(head) or head

```



```

7625 end
7626 </basic-r>

And here the Lua code for bidi=basic:

7627 (*basic)
7628 Babel = Babel or {}
7629
7630 -- eg, Babel.fontmap[1][<prefontid>]=<dirfontid>
7631
7632 Babel.fontmap = Babel.fontmap or {}
7633 Babel.fontmap[0] = {} -- l
7634 Babel.fontmap[1] = {} -- r
7635 Babel.fontmap[2] = {} -- al/an
7636
7637 -- To cancel mirroring. Also OML, OMS, U?
7638 Babel.symbol_fonts = Babel.symbol_fonts or {}
7639 Babel.symbol_fonts[font.id('tenln')] = true
7640 Babel.symbol_fonts[font.id('tenlnw')] = true
7641 Babel.symbol_fonts[font.id('tencirc')] = true
7642 Babel.symbol_fonts[font.id('tencircw')] = true
7643
7644 Babel.bidi_enabled = true
7645 Babel.mirroring_enabled = true
7646
7647 require('babel-data-bidi.lua')
7648
7649 local characters = Babel.characters
7650 local ranges = Babel.ranges
7651
7652 local DIR = node.id('dir')
7653 local GLYPH = node.id('glyph')
7654
7655 local function insert_implicit(head, state, outer)
7656   local new_state = state
7657   if state.sim and state.eim and state.sim ~= state.eim then
7658     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
7659     local d = node.new(DIR)
7660     d.dir = '+' .. dir
7661     node.insert_before(head, state.sim, d)
7662     local d = node.new(DIR)
7663     d.dir = '-' .. dir
7664     node.insert_after(head, state.eim, d)
7665   end
7666   new_state.sim, new_state.eim = nil, nil
7667   return head, new_state
7668 end
7669
7670 local function insert_numeric(head, state)
7671   local new
7672   local new_state = state
7673   if state.san and state.ean and state.san ~= state.ean then
7674     local d = node.new(DIR)
7675     d.dir = '+TLT'
7676     _, new = node.insert_before(head, state.san, d)
7677     if state.san == state.sim then state.sim = new end
7678     local d = node.new(DIR)
7679     d.dir = '-TLT'
7680     _, new = node.insert_after(head, state.ean, d)
7681     if state.ean == state.eim then state.eim = new end
7682   end
7683   new_state.san, new_state.ean = nil, nil
7684   return head, new_state
7685 end

```

```

7686
7687 local function glyph_not_symbol_font(node)
7688   if node.id == GLYPH then
7689     return not Babel.symbol_fonts[node.font]
7690   else
7691     return false
7692   end
7693 end
7694
7695 -- TODO - \hbox with an explicit dir can lead to wrong results
7696 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>. A small attempt
7697 -- was s made to improve the situation, but the problem is the 3-dir
7698 -- model in babel/Unicode and the 2-dir model in LuaTeX don't fit
7699 -- well.
7700
7701 function Babel.bidi(head, ispar, hdir)
7702   local d -- d is used mainly for computations in a loop
7703   local prev_d = ''
7704   local new_d = false
7705
7706   local nodes = {}
7707   local outer_first = nil
7708   local inmath = false
7709
7710   local glue_d = nil
7711   local glue_i = nil
7712
7713   local has_en = false
7714   local first_et = nil
7715
7716   local has_hyperlink = false
7717
7718   local ATDIR = Babel.attr_dir
7719
7720   local save_outer
7721   local temp = node.get_attribute(head, ATDIR)
7722   if temp then
7723     temp = temp & 0x3
7724     save_outer = (temp == 0 and 'l') or
7725                 (temp == 1 and 'r') or
7726                 (temp == 2 and 'al')
7727   elseif ispar then -- Or error? Shouldn't happen
7728     save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
7729   else -- Or error? Shouldn't happen
7730     save_outer = ('TRT' == hdir) and 'r' or 'l'
7731   end
7732   -- when the callback is called, we are just _after_ the box,
7733   -- and the textdir is that of the surrounding text
7734   -- if not ispar and hdir ~= tex.textdir then
7735   --   save_outer = ('TRT' == hdir) and 'r' or 'l'
7736   -- end
7737   local outer = save_outer
7738   local last = outer
7739   -- 'al' is only taken into account in the first, current loop
7740   if save_outer == 'al' then save_outer = 'r' end
7741
7742   local fontmap = Babel.fontmap
7743
7744   for item in node.traverse(head) do
7745
7746     -- In what follows, #node is the last (previous) node, because the
7747     -- current one is not added until we start processing the neutrals.
7748

```

```

7749 -- three cases: glyph, dir, otherwise
7750 if glyph_not_symbol_font(item)
7751     or (item.id == 7 and item.subtype == 2) then
7752
7753     local d_font = nil
7754     local item_r
7755     if item.id == 7 and item.subtype == 2 then
7756         item_r = item.replace -- automatic discs have just 1 glyph
7757     else
7758         item_r = item
7759     end
7760     local chardata = characters[item_r.char]
7761     d = chardata and chardata.d or nil
7762     if not d or d == 'nsm' then
7763         for nn, et in ipairs(ranges) do
7764             if item_r.char < et[1] then
7765                 break
7766             elseif item_r.char <= et[2] then
7767                 if not d then d = et[3]
7768                 elseif d == 'nsm' then d_font = et[3]
7769                 end
7770             break
7771         end
7772     end
7773 end
7774 d = d or 'l'
7775
7776 -- A short 'pause' in bidi for mapfont
7777 d_font = d_font or d
7778 d_font = (d_font == 'l' and 0) or
7779         (d_font == 'nsm' and 0) or
7780         (d_font == 'r' and 1) or
7781         (d_font == 'al' and 2) or
7782         (d_font == 'an' and 2) or nil
7783 if d_font and fontmap and fontmap[d_font][item_r.font] then
7784     item_r.font = fontmap[d_font][item_r.font]
7785 end
7786
7787 if new_d then
7788     table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
7789     if inmath then
7790         attr_d = 0
7791     else
7792         attr_d = node.get_attribute(item, ATDIR)
7793         attr_d = attr_d & 0x3
7794     end
7795     if attr_d == 1 then
7796         outer_first = 'r'
7797         last = 'r'
7798     elseif attr_d == 2 then
7799         outer_first = 'r'
7800         last = 'al'
7801     else
7802         outer_first = 'l'
7803         last = 'l'
7804     end
7805     outer = last
7806     has_en = false
7807     first_et = nil
7808     new_d = false
7809 end
7810
7811 if glue_d then

```

```

7812     if (d == 'l' and 'l' or 'r') ~= glue_d then
7813         table.insert(nodes, {glue_i, 'on', nil})
7814     end
7815     glue_d = nil
7816     glue_i = nil
7817 end
7818
7819 elseif item.id == DIR then
7820     d = nil
7821
7822     if head ~= item then new_d = true end
7823
7824 elseif item.id == node.id'glue' and item.subtype == 13 then
7825     glue_d = d
7826     glue_i = item
7827     d = nil
7828
7829 elseif item.id == node.id'math' then
7830     inmath = (item.subtype == 0)
7831
7832 elseif item.id == 8 and item.subtype == 19 then
7833     has_hyperlink = true
7834
7835 else
7836     d = nil
7837 end
7838
7839 -- AL <= EN/ET/ES      -- W2 + W3 + W6
7840 if last == 'al' and d == 'en' then
7841     d = 'an'          -- W3
7842 elseif last == 'al' and (d == 'et' or d == 'es') then
7843     d = 'on'          -- W6
7844 end
7845
7846 -- EN + CS/ES + EN      -- W4
7847 if d == 'en' and #nodes >= 2 then
7848     if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
7849         and nodes[#nodes-1][2] == 'en' then
7850         nodes[#nodes][2] = 'en'
7851     end
7852 end
7853
7854 -- AN + CS + AN          -- W4 too, because uax9 mixes both cases
7855 if d == 'an' and #nodes >= 2 then
7856     if (nodes[#nodes][2] == 'cs')
7857         and nodes[#nodes-1][2] == 'an' then
7858         nodes[#nodes][2] = 'an'
7859     end
7860 end
7861
7862 -- ET/EN                  -- W5 + W7->l / W6->on
7863 if d == 'et' then
7864     first_et = first_et or (#nodes + 1)
7865 elseif d == 'en' then
7866     has_en = true
7867     first_et = first_et or (#nodes + 1)
7868 elseif first_et then      -- d may be nil here !
7869     if has_en then
7870         if last == 'l' then
7871             temp = 'l'     -- W7
7872         else
7873             temp = 'en'    -- W5
7874         end

```

```

7875     else
7876         temp = 'on'      -- W6
7877     end
7878     for e = first_et, #nodes do
7879         if glyph_not_symbol_font(nodes[e][1]) then nodes[e][2] = temp end
7880     end
7881     first_et = nil
7882     has_en = false
7883 end
7884
7885 -- Force mathdir in math if ON (currently works as expected only
7886 -- with 'l')
7887 if inmath and d == 'on' then
7888     d = ('TRT' == tex.mathdir) and 'r' or 'l'
7889 end
7890
7891 if d then
7892     if d == 'al' then
7893         d = 'r'
7894         last = 'al'
7895     elseif d == 'l' or d == 'r' then
7896         last = d
7897     end
7898     prev_d = d
7899     table.insert(nodes, {item, d, outer_first})
7900 end
7901
7902     outer_first = nil
7903
7904 end
7905
7906 -- TODO -- repeated here in case EN/ET is the last node. Find a
7907 -- better way of doing things:
7908 if first_et then      -- dir may be nil here !
7909     if has_en then
7910         if last == 'l' then
7911             temp = 'l'      -- W7
7912         else
7913             temp = 'en'     -- W5
7914         end
7915     else
7916         temp = 'on'        -- W6
7917     end
7918     for e = first_et, #nodes do
7919         if glyph_not_symbol_font(nodes[e][1]) then nodes[e][2] = temp end
7920     end
7921 end
7922
7923 -- dummy node, to close things
7924 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
7925
7926 ----- NEUTRAL -----
7927
7928 outer = save_outer
7929 last = outer
7930
7931 local first_on = nil
7932
7933 for q = 1, #nodes do
7934     local item
7935
7936     local outer_first = nodes[q][3]
7937     outer = outer_first or outer

```

```

7938 last = outer_first or last
7939
7940 local d = nodes[q][2]
7941 if d == 'an' or d == 'en' then d = 'r' end
7942 if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
7943
7944 if d == 'on' then
7945     first_on = first_on or q
7946 elseif first_on then
7947     if last == d then
7948         temp = d
7949     else
7950         temp = outer
7951     end
7952     for r = first_on, q - 1 do
7953         nodes[r][2] = temp
7954         item = nodes[r][1] -- MIRRORING
7955         if Babel.mirroring_enabled and glyph_not_symbol_font(item)
7956             and temp == 'r' and characters[item.char] then
7957             local font_mode = ''
7958             if item.font > 0 and font.fonts[item.font].properties then
7959                 font_mode = font.fonts[item.font].properties.mode
7960             end
7961             if font_mode ~= 'harf' and font_mode ~= 'plug' then
7962                 item.char = characters[item.char].m or item.char
7963             end
7964         end
7965     end
7966     first_on = nil
7967 end
7968
7969 if d == 'r' or d == 'l' then last = d end
7970 end
7971
7972 ----- IMPLICIT, REORDER -----
7973
7974 outer = save_outer
7975 last = outer
7976
7977 local state = {}
7978 state.has_r = false
7979
7980 for q = 1, #nodes do
7981     local item = nodes[q][1]
7982
7983     outer = nodes[q][3] or outer
7984
7985     local d = nodes[q][2]
7986
7987     if d == 'nsm' then d = last end -- W1
7988     if d == 'en' then d = 'an' end
7989     local isdir = (d == 'r' or d == 'l')
7990
7991     if outer == 'l' and d == 'an' then
7992         state.san = state.san or item
7993         state.ean = item
7994     elseif state.san then
7995         head, state = insert_numeric(head, state)
7996     end
7997
7998     if outer == 'l' then
7999         if d == 'an' or d == 'r' then -- im -> implicit

```

```

8001     if d == 'r' then state.has_r = true end
8002     state.sim = state.sim or item
8003     state.eim = item
8004 elseif d == 'l' and state.sim and state.has_r then
8005     head, state = insert_implicit(head, state, outer)
8006 elseif d == 'l' then
8007     state.sim, state.eim, state.has_r = nil, nil, false
8008 end
8009 else
8010     if d == 'an' or d == 'l' then
8011         if nodes[q][3] then -- nil except after an explicit dir
8012             state.sim = item -- so we move sim 'inside' the group
8013         else
8014             state.sim = state.sim or item
8015         end
8016         state.eim = item
8017     elseif d == 'r' and state.sim then
8018         head, state = insert_implicit(head, state, outer)
8019     elseif d == 'r' then
8020         state.sim, state.eim = nil, nil
8021     end
8022 end
8023
8024 if isdir then
8025     last = d -- Don't search back - best save now
8026 elseif d == 'on' and state.san then
8027     state.san = state.san or item
8028     state.ean = item
8029 end
8030
8031 end
8032
8033 head = node.prev(head) or head
8034
8035 ----- FIX HYPERLINKS -----
8036
8037 if has_hyperlink then
8038     local flag, linking = 0, 0
8039     for item in node.traverse(head) do
8040         if item.id == DIR then
8041             if item.dir == '+TRT' or item.dir == '+TLT' then
8042                 flag = flag + 1
8043             elseif item.dir == '-TRT' or item.dir == '-TLT' then
8044                 flag = flag - 1
8045             end
8046         elseif item.id == 8 and item.subtype == 19 then
8047             linking = flag
8048         elseif item.id == 8 and item.subtype == 20 then
8049             if linking > 0 then
8050                 if item.prev.id == DIR and
8051                     (item.prev.dir == '-TRT' or item.prev.dir == '-TLT') then
8052                     d = node.new(DIR)
8053                     d.dir = item.prev.dir
8054                     node.remove(head, item.prev)
8055                     node.insert_after(head, item, d)
8056                 end
8057             end
8058             linking = 0
8059         end
8060     end
8061 end
8062
8063 return head

```

```
8064 end
8065 </basic>
```

11 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.

12 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.

```
8066 <*nil>
8067 \ProvidesLanguage{nil}[<<date>> v<<version>> Nil language]
8068 \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.

```
8069 \ifx\l@nil\@undefined
8070   \newlanguage\l@nil
8071   \@namedef{bbl@hyphendata@the\l@nil}{}{}% Remove warning
8072   \let\bbl@elt\relax
8073   \edef\bbl@languages{% Add it to the list of languages
8074     \bbl@languages\bbl@elt{nil}{the\l@nil}{}{}}
8075 \fi
```

This macro is used to store the values of the hyphenation parameters `\lefthyphenmin` and `\righthyphenmin`.

```
8076 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}
```

The next step consists of defining commands to switch to (and from) the ‘nil’ language.

```
\captionnil
\datenil
8077 \let\captionnil\@empty
8078 \let\datenil\@empty
```

There is no locale file for this pseudo-language, so the corresponding fields are defined here.

```
8079 \def\bbl@inidata@nil{%
8080   \bbl@elt{identification}{tag.ini}{und}%
8081   \bbl@elt{identification}{load.level}{0}%
8082   \bbl@elt{identification}{charset}{utf8}%
8083   \bbl@elt{identification}{version}{1.0}%
8084   \bbl@elt{identification}{date}{2022-05-16}%
8085   \bbl@elt{identification}{name.local}{nil}%
8086   \bbl@elt{identification}{name.english}{nil}%
8087   \bbl@elt{identification}{name.babel}{nil}%
8088   \bbl@elt{identification}{tag.bcp47}{und}%
8089   \bbl@elt{identification}{language.tag.bcp47}{und}%
8090   \bbl@elt{identification}{tag.opentype}{dflt}%
8091   \bbl@elt{identification}{script.name}{Latin}%
8092   \bbl@elt{identification}{script.tag.bcp47}{Latn}%
```



```

8093 \bbl@elt{identification}{script.tag.opentype}{DFLT}%
8094 \bbl@elt{identification}{level}{1}%
8095 \bbl@elt{identification}{encodings}{}%
8096 \bbl@elt{identification}{derivate}{no}}
8097 \@namedef{bbl@tbcp@nil}{und}
8098 \@namedef{bbl@lbcp@nil}{und}
8099 \@namedef{bbl@casing@nil}{und} % TODO
8100 \@namedef{bbl@lotf@nil}{dflt}
8101 \@namedef{bbl@elname@nil}{nil}
8102 \@namedef{bbl@lname@nil}{nil}
8103 \@namedef{bbl@esname@nil}{Latin}
8104 \@namedef{bbl@sname@nil}{Latin}
8105 \@namedef{bbl@sbcp@nil}{Latn}
8106 \@namedef{bbl@sotf@nil}{latn}

```

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.

```

8107 \ldf@finish{nil}
8108 \</nil>

```

13 Calendars

The code for specific calendars are placed in the specific files, loaded when requested by an ini file in the identification section with `require.calendars`.

Start with function to compute the Julian day. It's based on the little library `calendar.js`, by John Walker, in the public domain.

```

8109 <<*Compute Julian day>> ≡
8110 \def\bbl@fpmo#1#2{(#1-#2*floor(#1/#2))}
8111 \def\bbl@cs@gregleap#1{%
8112   (\bbl@fpmo{#1}{4} == 0) &&
8113   (!( \bbl@fpmo{#1}{100} == 0) && (\bbl@fpmo{#1}{400} != 0))}
8114 \def\bbl@cs@jd#1#2#3{% year, month, day
8115   \fp_eval:n{ 1721424.5 + (365 * (#1 - 1)) +
8116     floor((#1 - 1) / 4) + (-floor((#1 - 1) / 100)) +
8117     floor((#1 - 1) / 400) + floor(((367 * #2) - 362) / 12) +
8118     ((#2 <= 2) ? 0 : (\bbl@cs@gregleap{#1} ? -1 : -2)) + #3} }
8119 <</Compute Julian day>>

```

13.1 Islamic

The code for the Civil calendar is based on it, too.

```

8120 <*ca-islamic>
8121 \ExplSyntaxOn
8122 <<Compute Julian day>>
8123 % == islamic (default)
8124 % Not yet implemented
8125 \def\bbl@ca@islamic#1-#2-#3\@#4#5#6{

```

The Civil calendar.

```

8126 \def\bbl@cs@isltojd#1#2#3{ % year, month, day
8127   ((#3 + ceil(29.5 * (#2 - 1)) +
8128     (#1 - 1) * 354 + floor((3 + (11 * #1)) / 30) +
8129     1948439.5) - 1) }
8130 \@namedef{bbl@ca@islamic-civil++}{\bbl@ca@islamicvl@x{+2}}
8131 \@namedef{bbl@ca@islamic-civil+}{\bbl@ca@islamicvl@x{+1}}
8132 \@namedef{bbl@ca@islamic-civil}{\bbl@ca@islamicvl@x{}}
8133 \@namedef{bbl@ca@islamic-civil-}{\bbl@ca@islamicvl@x{-1}}
8134 \@namedef{bbl@ca@islamic-civil--}{\bbl@ca@islamicvl@x{-2}}
8135 \def\bbl@ca@islamicvl@x#1#2-#3-#4\@#5#6#7{%
8136   \edef\bbl@tempa{%
8137     \fp_eval:n{ floor(\bbl@cs@jd{#2}{#3}{#4})+0.5 #1}}%
8138   \edef#5{%

```

```

8139 \fp_eval:n{ floor(((30*(\bbl@tempa-1948439.5)) + 10646)/10631) }}%
8140 \edef#6{\fp_eval:n{
8141 min(12,ceil((\bbl@tempa-(29+\bbl@cs@isltojd{#5}{1}{1}))/29.5)+1) }}%
8142 \edef#7{\fp_eval:n{ \bbl@tempa - \bbl@cs@isltojd{#5}{#6}{1} + 1 }}

```

The Umm al-Qura calendar, used mainly in Saudi Arabia, is based on moment-hijri, by Abdullah Alsigar (license MIT).

Since the main aim is to provide a suitable \today, and maybe some close dates, data just covers Hijri ~1435/~1460 (Gregorian ~2014/~2038).

```

8143 \def\bbl@cs@umalqura@data{56660, 56690,56719,56749,56778,56808,%
8144 56837,56867,56897,56926,56956,56985,57015,57044,57074,57103,%
8145 57133,57162,57192,57221,57251,57280,57310,57340,57369,57399,%
8146 57429,57458,57487,57517,57546,57576,57605,57634,57664,57694,%
8147 57723,57753,57783,57813,57842,57871,57901,57930,57959,57989,%
8148 58018,58048,58077,58107,58137,58167,58196,58226,58255,58285,%
8149 58314,58343,58373,58402,58432,58461,58491,58521,58551,58580,%
8150 58610,58639,58669,58698,58727,58757,58786,58816,58845,58875,%
8151 58905,58934,58964,58994,59023,59053,59082,59111,59141,59170,%
8152 59200,59229,59259,59288,59318,59348,59377,59407,59436,59466,%
8153 59495,59525,59554,59584,59613,59643,59672,59702,59731,59761,%
8154 59791,59820,59850,59879,59909,59939,59968,59997,60027,60056,%
8155 60086,60115,60145,60174,60204,60234,60264,60293,60323,60352,%
8156 60381,60411,60440,60469,60499,60528,60558,60588,60618,60648,%
8157 60677,60707,60736,60765,60795,60824,60853,60883,60912,60942,%
8158 60972,61002,61031,61061,61090,61120,61149,61179,61208,61237,%
8159 61267,61296,61326,61356,61385,61415,61445,61474,61504,61533,%
8160 61563,61592,61621,61651,61680,61710,61739,61769,61799,61828,%
8161 61858,61888,61917,61947,61976,62006,62035,62064,62094,62123,%
8162 62153,62182,62212,62242,62271,62301,62331,62360,62390,62419,%
8163 62448,62478,62507,62537,62566,62596,62625,62655,62685,62715,%
8164 62744,62774,62803,62832,62862,62891,62921,62950,62980,63009,%
8165 63039,63069,63099,63128,63157,63187,63216,63246,63275,63305,%
8166 63334,63363,63393,63423,63453,63482,63512,63541,63571,63600,%
8167 63630,63659,63689,63718,63747,63777,63807,63836,63866,63895,%
8168 63925,63955,63984,64014,64043,64073,64102,64131,64161,64190,%
8169 64220,64249,64279,64309,64339,64368,64398,64427,64457,64486,%
8170 64515,64545,64574,64603,64633,64663,64692,64722,64752,64782,%
8171 64811,64841,64870,64899,64929,64958,64987,65017,65047,65076,%
8172 65106,65136,65166,65195,65225,65254,65283,65313,65342,65371,%
8173 65401,65431,65460,65490,65520}
8174 \@namedef{bbl@ca@islamic-umalqura+}{\bbl@ca@islamcuqr{x}{+1}}
8175 \@namedef{bbl@ca@islamic-umalqura}{\bbl@ca@islamcuqr{x}{}}
8176 \@namedef{bbl@ca@islamic-umalqura-}{\bbl@ca@islamcuqr{x}{-1}}
8177 \def\bbl@ca@islamcuqr@x#1#2-#3-#4\@#5#6#7{%
8178 \ifnum#2>2014 \ifnum#2<2038
8179 \bbl@afterfi\expandafter@gobble
8180 \fi\fi
8181 {\bbl@error{year-out-range}{2014-2038}{}}%
8182 \edef\bbl@tempd{\fp_eval:n{ % (Julian) day
8183 \bbl@cs@jd{#2}{#3}{#4} + 0.5 - 2400000 #1}}%
8184 \count@\@ne
8185 \bbl@foreach\bbl@cs@umalqura@data{%
8186 \advance\count@\@ne
8187 \ifnum##1>\bbl@tempd\else
8188 \edef\bbl@tempe{\the\count@}%
8189 \edef\bbl@tempb{##1}%
8190 \fi}%
8191 \edef\bbl@templ{\fp_eval:n{ \bbl@tempe + 16260 + 949 }}% month~lunar
8192 \edef\bbl@tempa{\fp_eval:n{ floor((\bbl@templ - 1) / 12) }}% annus
8193 \edef#5{\fp_eval:n{ \bbl@tempa + 1 }}%
8194 \edef#6{\fp_eval:n{ \bbl@templ - (12 * \bbl@tempa) }}%
8195 \edef#7{\fp_eval:n{ \bbl@tempd - \bbl@tempb + 1 }}
8196 \ExplSyntaxOff

```

```

8197 \bbl@add\bbl@precalendar{%
8198  \bbl@replace\bbl@ld@calendar{-civil}{}%
8199  \bbl@replace\bbl@ld@calendar{-umalqura}{}%
8200  \bbl@replace\bbl@ld@calendar{+}{}%
8201  \bbl@replace\bbl@ld@calendar{-}{}}
8202 </ca-islamic)

```

13.2 Hebrew

This is basically the set of macros written by Michail Rozman in 1991, with corrections and adaptations by Rama Porrat, Misha, Dan Haran and Boris Lavva. This must be eventually replaced by computations with l3fp. An explanation of what's going on can be found in `hebcsl.sty`

```

8203 (*ca-hebrew)
8204 \newcount\bbl@cntcommon
8205 \def\bbl@remainder#1#2#3{%
8206   #3=#1\relax
8207   \divide #3 by #2\relax
8208   \multiply #3 by -#2\relax
8209   \advance #3 by #1\relax}%
8210 \newif\ifbbl@divisible
8211 \def\bbl@checkifdivisible#1#2{%
8212   {\countdef\tmp=0
8213    \bbl@remainder{#1}{#2}{\tmp}%
8214    \ifnum \tmp=0
8215      \global\bbl@divisibletrue
8216    \else
8217      \global\bbl@divisiblefalse
8218    \fi}}
8219 \newif\ifbbl@gregleap
8220 \def\bbl@ifgregleap#1{%
8221   \bbl@checkifdivisible{#1}{4}%
8222   \ifbbl@divisible
8223     \bbl@checkifdivisible{#1}{100}%
8224     \ifbbl@divisible
8225       \bbl@checkifdivisible{#1}{400}%
8226       \ifbbl@divisible
8227         \bbl@gregleaptrue
8228       \else
8229         \bbl@gregleapfalse
8230     \fi
8231   \else
8232     \bbl@gregleaptrue
8233   \fi
8234 \else
8235   \bbl@gregleapfalse
8236 \fi
8237 \ifbbl@gregleap}
8238 \def\bbl@regdayspriormonths#1#2#3{%
8239   {#3=\ifcase #1 0 \or 0 \or 31 \or 59 \or 90 \or 120 \or 151 \or
8240     181 \or 212 \or 243 \or 273 \or 304 \or 334 \fi
8241   \bbl@ifgregleap{#2}%
8242   \ifnum #1 > 2
8243     \advance #3 by 1
8244   \fi
8245   \fi
8246   \global\bbl@cntcommon=#3}%
8247   #3=\bbl@cntcommon}
8248 \def\bbl@regdaysprioryears#1#2{%
8249   {\countdef\tmpc=4
8250    \countdef\tmpb=2
8251    \tmpb=#1\relax
8252    \advance \tmpb by -1
8253    \tmpc=\tmpb

```

```

8254 \multiply \tmpc by 365
8255 #2=\tmpc
8256 \tmpc=\tmpb
8257 \divide \tmpc by 4
8258 \advance #2 by \tmpc
8259 \tmpc=\tmpb
8260 \divide \tmpc by 100
8261 \advance #2 by -\tmpc
8262 \tmpc=\tmpb
8263 \divide \tmpc by 400
8264 \advance #2 by \tmpc
8265 \global\bbbl@cntcommon=#2\relax}%
8266 #2=\bbbl@cntcommon}
8267 \def\bbbl@absfromgreg#1#2#3#4{%
8268 {\countdef\tmpd=0
8269 #4=#1\relax
8270 \bbbl@gregdayspriormonths{#2}{#3}{\tmpd}%
8271 \advance #4 by \tmpd
8272 \bbbl@gregdaysprioryears{#3}{\tmpd}%
8273 \advance #4 by \tmpd
8274 \global\bbbl@cntcommon=#4\relax}%
8275 #4=\bbbl@cntcommon}
8276 \newif\ifbbbl@hebrleap
8277 \def\bbbl@checkleaphebryear#1{%
8278 {\countdef\tmpa=0
8279 \countdef\tmpb=1
8280 \tmpa=#1\relax
8281 \multiply \tmpa by 7
8282 \advance \tmpa by 1
8283 \bbbl@remainder{\tmpa}{19}{\tmpb}%
8284 \ifnum \tmpb < 7
8285 \global\bbbl@hebrleaptrue
8286 \else
8287 \global\bbbl@hebrleapfalse
8288 \fi}}
8289 \def\bbbl@hebreleapsedmonths#1#2{%
8290 {\countdef\tmpa=0
8291 \countdef\tmpb=1
8292 \countdef\tmpc=2
8293 \tmpa=#1\relax
8294 \advance \tmpa by -1
8295 #2=\tmpa
8296 \divide #2 by 19
8297 \multiply #2 by 235
8298 \bbbl@remainder{\tmpa}{19}{\tmpb}% \tmpa=years%19-years this cycle
8299 \tmpc=\tmpb
8300 \multiply \tmpb by 12
8301 \advance #2 by \tmpb
8302 \multiply \tmpc by 7
8303 \advance \tmpc by 1
8304 \divide \tmpc by 19
8305 \advance #2 by \tmpc
8306 \global\bbbl@cntcommon=#2}%
8307 #2=\bbbl@cntcommon}
8308 \def\bbbl@hebreleapseddays#1#2{%
8309 {\countdef\tmpa=0
8310 \countdef\tmpb=1
8311 \countdef\tmpc=2
8312 \bbbl@hebreleapsedmonths{#1}{#2}%
8313 \tmpa=#2\relax
8314 \multiply \tmpa by 13753
8315 \advance \tmpa by 5604
8316 \bbbl@remainder{\tmpa}{25920}{\tmpc}% \tmpc == ConjunctionParts

```

```

8317 \divide \tmpa by 25920
8318 \multiply #2 by 29
8319 \advance #2 by 1
8320 \advance #2 by \tmpa
8321 \bbl@remainder{#2}{7}{\tmpa}%
8322 \ifnum \tmpc < 19440
8323     \ifnum \tmpc < 9924
8324     \else
8325         \ifnum \tmpa=2
8326             \bbl@checkleaphebrewyear{#1}% of a common year
8327             \ifbbl@hebrleap
8328             \else
8329                 \advance #2 by 1
8330             \fi
8331         \fi
8332     \fi
8333     \ifnum \tmpc < 16789
8334     \else
8335         \ifnum \tmpa=1
8336             \advance #1 by -1
8337             \bbl@checkleaphebrewyear{#1}% at the end of leap year
8338             \ifbbl@hebrleap
8339                 \advance #2 by 1
8340             \fi
8341         \fi
8342     \fi
8343 \else
8344     \advance #2 by 1
8345 \fi
8346 \bbl@remainder{#2}{7}{\tmpa}%
8347 \ifnum \tmpa=0
8348     \advance #2 by 1
8349 \else
8350     \ifnum \tmpa=3
8351         \advance #2 by 1
8352     \else
8353         \ifnum \tmpa=5
8354             \advance #2 by 1
8355         \fi
8356     \fi
8357 \fi
8358 \global\bbl@cntcommon=#2\relax}%
8359 #2=\bbl@cntcommon}
8360 \def\bbl@daysinhebrewyear#1#2{%
8361     {\countdef\tmpe=12
8362     \bbl@hebreleapseddays{#1}{\tmpe}%
8363     \advance #1 by 1
8364     \bbl@hebreleapseddays{#1}{#2}%
8365     \advance #2 by -\tmpe
8366     \global\bbl@cntcommon=#2}%
8367 #2=\bbl@cntcommon}
8368 \def\bbl@hebrdayspriormonths#1#2#3{%
8369     {\countdef\tmpf= 14
8370     #3=\ifcase #1\relax
8371         0 \or
8372         0 \or
8373         30 \or
8374         59 \or
8375         89 \or
8376         118 \or
8377         148 \or
8378         148 \or
8379         177 \or

```

```

8380         207 \or
8381         236 \or
8382         266 \or
8383         295 \or
8384         325 \or
8385         400
8386     \fi
8387     \bbl@checkleaphebryear{#2}%
8388     \ifbbl@hebrleap
8389         \ifnum #1 > 6
8390             \advance #3 by 30
8391         \fi
8392     \fi
8393     \bbl@daysinhebryear{#2}{\tmpf}%
8394     \ifnum #1 > 3
8395         \ifnum \tmpf=353
8396             \advance #3 by -1
8397         \fi
8398         \ifnum \tmpf=383
8399             \advance #3 by -1
8400         \fi
8401     \fi
8402     \ifnum #1 > 2
8403         \ifnum \tmpf=355
8404             \advance #3 by 1
8405         \fi
8406         \ifnum \tmpf=385
8407             \advance #3 by 1
8408         \fi
8409     \fi
8410     \global\bbl@cntcommon=#3\relax}%
8411 #3=\bbl@cntcommon}
8412 \def\bbl@absfromhebr#1#2#3#4{%
8413 {#4=#1\relax
8414     \bbl@hebrdayspriormonths{#2}{#3}{#1}%
8415     \advance #4 by #1\relax
8416     \bbl@hebrrelapseddays{#3}{#1}%
8417     \advance #4 by #1\relax
8418     \advance #4 by -1373429
8419     \global\bbl@cntcommon=#4\relax}%
8420 #4=\bbl@cntcommon}
8421 \def\bbl@hebrfromgreg#1#2#3#4#5#6{%
8422 {\countdef\tmpx= 17
8423     \countdef\tmpy= 18
8424     \countdef\tmpz= 19
8425     #6=#3\relax
8426     \global\advance #6 by 3761
8427     \bbl@absfromgreg{#1}{#2}{#3}{#4}%
8428     \tmpz=1 \tmpy=1
8429     \bbl@absfromhebr{\tmpz}{\tmpy}{#6}{\tmpx}%
8430     \ifnum \tmpx > #4\relax
8431         \global\advance #6 by -1
8432         \bbl@absfromhebr{\tmpz}{\tmpy}{#6}{\tmpx}%
8433     \fi
8434     \advance #4 by -\tmpx
8435     \advance #4 by 1
8436     #5=#4\relax
8437     \divide #5 by 30
8438     \loop
8439         \bbl@hebrdayspriormonths{#5}{#6}{\tmpx}%
8440         \ifnum \tmpx < #4\relax
8441             \advance #5 by 1
8442             \tmpy=\tmpx

```

```

8443 \repeat
8444 \global\advance #5 by -1
8445 \global\advance #4 by -\tmpy}}
8446 \newcount\bbl@hebrday \newcount\bbl@hebrmonth \newcount\bbl@hebyear
8447 \newcount\bbl@gregday \newcount\bbl@gregmonth \newcount\bbl@gregyear
8448 \def\bbl@ca@hebrew#1-#2-#3\@#4#5#6{%
8449 \bbl@gregday=#3\relax \bbl@gregmonth=#2\relax \bbl@gregyear=#1\relax
8450 \bbl@hebrfromgreg
8451 {\bbl@gregday}{\bbl@gregmonth}{\bbl@gregyear}%
8452 {\bbl@hebrday}{\bbl@hebrmonth}{\bbl@hebyear}%
8453 \edef#4{\the\bbl@hebyear}%
8454 \edef#5{\the\bbl@hebrmonth}%
8455 \edef#6{\the\bbl@hebrday}}
8456 </ca-hebrew>

```

13.3 Persian

There is an algorithm written in TeX by Jabri, Abolhassani, Pournader and Esfahbod, created for the first versions of the FarsiTeX system (no longer available), but the original license is GPL, so its use with LPL is problematic. The code here follows loosely that by John Walker, which is free and accurate, but sadly very complex, so the relevant data for the years 2013-2050 have been pre-calculated and stored. Actually, all we need is the first day (either March 20 or March 21).

```

8457 <*ca-persian>
8458 \ExplSyntaxOn
8459 <<Compute Julian day>>
8460 \def\bbl@cs@firstjal@xx{2012,2016,2020,2024,2028,2029,% March 20
8461 2032,2033,2036,2037,2040,2041,2044,2045,2048,2049}
8462 \def\bbl@ca@persian#1-#2-#3\@#4#5#6{%
8463 \edef\bbl@tempa{#1}% 20XX-03-\bbl@tempe = 1 farvardin:
8464 \ifnum\bbl@tempa>2012 \ifnum\bbl@tempa<2051
8465 \bbl@afterfi\expandafter\gobble
8466 \fi\fi
8467 {\bbl@error{year-out-range}{2013-2050}{}}}%
8468 \bbl@xin@{\bbl@tempa}{\bbl@cs@firstjal@xx}%
8469 \ifin@def\bbl@tempe{20}\else\def\bbl@tempe{21}\fi
8470 \edef\bbl@tempc{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{#2}{#3}+.5}}% current
8471 \edef\bbl@tempb{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{03}{\bbl@tempe}+.5}}% begin
8472 \ifnum\bbl@tempc<\bbl@tempb
8473 \edef\bbl@tempa{\fp_eval:n{\bbl@tempa-1}}% go back 1 year and redo
8474 \bbl@xin@{\bbl@tempa}{\bbl@cs@firstjal@xx}%
8475 \ifin@def\bbl@tempe{20}\else\def\bbl@tempe{21}\fi
8476 \edef\bbl@tempb{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{03}{\bbl@tempe}+.5}}%
8477 \fi
8478 \edef#4{\fp_eval:n{\bbl@tempa-621}}% set Jalali year
8479 \edef#6{\fp_eval:n{\bbl@tempc-\bbl@tempb+1}}% days from 1 farvardin
8480 \edef#5{\fp_eval:n{set Jalali month
8481 (#6 <= 186) ? ceil(#6 / 31) : ceil((#6 - 6) / 30)}}
8482 \edef#6{\fp_eval:n{set Jalali day
8483 (#6 - ((#5 <= 7) ? ((#5 - 1) * 31) : (((#5 - 1) * 30) + 6))}}}%
8484 \ExplSyntaxOff
8485 </ca-persian>

```

13.4 Coptic and Ethiopic

Adapted from `jquery.calendars.package-1.1.4`, written by Keith Wood, 2010. Dual license: GPL and MIT. The only difference is the epoch.

```

8486 <*ca-coptic>
8487 \ExplSyntaxOn
8488 <<Compute Julian day>>
8489 \def\bbl@ca@coptic#1-#2-#3\@#4#5#6{%
8490 \edef\bbl@tempd{\fp_eval:n{floor(\bbl@cs@jd{#1}{#2}{#3}) + 0.5}}%
8491 \edef\bbl@tempc{\fp_eval:n{\bbl@tempd - 1825029.5}}%

```

```

8492 \edef#4{\fp_eval:n{%
8493   floor((\bbl@tempc - floor((\bbl@tempc+366) / 1461)) / 365) + 1}}%
8494 \edef\bbl@tempc{\fp_eval:n{%
8495   \bbl@tempd - (#4-1) * 365 - floor(#4/4) - 1825029.5}}%
8496 \edef#5{\fp_eval:n{floor(\bbl@tempc / 30) + 1}}%
8497 \edef#6{\fp_eval:n{\bbl@tempc - (#5 - 1) * 30 + 1}}%
8498 \ExplSyntaxOff
8499 \</ca-coptic>
8500 \<ca-ethiopic>
8501 \ExplSyntaxOn
8502 \<<Compute Julian day>>
8503 \def\bbl@ca@ethiopic#1-#2-#3\@@#4#5#6{%
8504   \edef\bbl@tempd{\fp_eval:n{floor(\bbl@cs@jd{#1}{#2}{#3}) + 0.5}}%
8505   \edef\bbl@tempc{\fp_eval:n{\bbl@tempd - 1724220.5}}%
8506   \edef#4{\fp_eval:n{%
8507     floor((\bbl@tempc - floor((\bbl@tempc+366) / 1461)) / 365) + 1}}%
8508   \edef\bbl@tempc{\fp_eval:n{%
8509     \bbl@tempd - (#4-1) * 365 - floor(#4/4) - 1724220.5}}%
8510   \edef#5{\fp_eval:n{floor(\bbl@tempc / 30) + 1}}%
8511   \edef#6{\fp_eval:n{\bbl@tempc - (#5 - 1) * 30 + 1}}%
8512 \ExplSyntaxOff
8513 \</ca-ethiopic>

```

13.5 Buddhist

That's very simple.

```

8514 \<ca-buddhist>
8515 \def\bbl@ca@buddhist#1-#2-#3\@@#4#5#6{%
8516   \edef#4{\number\numexpr#1+543\relax}%
8517   \edef#5{#2}%
8518   \edef#6{#3}}
8519 \</ca-buddhist>
8520 %
8521 % \subsection{Chinese}
8522 %
8523 % Brute force, with the Julian day of first day of each month. The
8524 % table has been computed with the help of \textsf{python-lunardate} by
8525 % Ricky Yeung, GPLv2 (but the code itself has not been used). The range
8526 % is 2015-2044.
8527 %
8528 % \begin{macrocode}
8529 \<ca-chinese>
8530 \ExplSyntaxOn
8531 \<<Compute Julian day>>
8532 \def\bbl@ca@chinese#1-#2-#3\@@#4#5#6{%
8533   \edef\bbl@tempd{\fp_eval:n{%
8534     \bbl@cs@jd{#1}{#2}{#3} - 2457072.5 }}%
8535   \count@ \z@
8536   \@tempcnta=2015
8537   \bbl@foreach\bbl@cs@chinese@data{%
8538     \ifnum##1>\bbl@tempd\else
8539       \advance\count@\@ne
8540       \ifnum\count@>12
8541         \count@\@ne
8542         \advance\@tempcnta\@ne\fi
8543       \bbl@xin@{,##1,}{,\bbl@cs@chinese@leap,}%
8544       \ifin@
8545         \advance\count@\@m@ne
8546         \edef\bbl@tempe{\the\numexpr\count@+12\relax}%
8547       \else
8548         \edef\bbl@tempe{\the\count@}%
8549       \fi
8550     \edef\bbl@tempb{##1}%

```



```

8551 \fi}%
8552 \edef#4{\the\@tempcnta}%
8553 \edef#5{\bbl@tempe}%
8554 \edef#6{\the\numexpr\bbl@tempd-\bbl@tempb+1\relax}}
8555 \def\bbl@cs@chinese@leap{%
8556 885,1920,2953,3809,4873,5906,6881,7825,8889,9893,10778}
8557 \def\bbl@cs@chinese@data{0,29,59,88,117,147,176,206,236,266,295,325,
8558 354,384,413,443,472,501,531,560,590,620,649,679,709,738,%
8559 768,797,827,856,885,915,944,974,1003,1033,1063,1093,1122,%
8560 1152,1181,1211,1240,1269,1299,1328,1358,1387,1417,1447,1477,%
8561 1506,1536,1565,1595,1624,1653,1683,1712,1741,1771,1801,1830,%
8562 1860,1890,1920,1949,1979,2008,2037,2067,2096,2126,2155,2185,%
8563 2214,2244,2274,2303,2333,2362,2392,2421,2451,2480,2510,2539,%
8564 2569,2598,2628,2657,2687,2717,2746,2776,2805,2835,2864,2894,%
8565 2923,2953,2982,3011,3041,3071,3100,3130,3160,3189,3219,3248,%
8566 3278,3307,3337,3366,3395,3425,3454,3484,3514,3543,3573,3603,%
8567 3632,3662,3691,3721,3750,3779,3809,3838,3868,3897,3927,3957,%
8568 3987,4016,4046,4075,4105,4134,4163,4193,4222,4251,4281,4311,%
8569 4341,4370,4400,4430,4459,4489,4518,4547,4577,4606,4635,4665,%
8570 4695,4724,4754,4784,4814,4843,4873,4902,4931,4961,4990,5019,%
8571 5049,5079,5108,5138,5168,5197,5227,5256,5286,5315,5345,5374,%
8572 5403,5433,5463,5492,5522,5551,5581,5611,5640,5670,5699,5729,%
8573 5758,5788,5817,5846,5876,5906,5935,5965,5994,6024,6054,6083,%
8574 6113,6142,6172,6201,6231,6260,6289,6319,6348,6378,6408,6437,%
8575 6467,6497,6526,6556,6585,6615,6644,6673,6703,6732,6762,6791,%
8576 6821,6851,6881,6910,6940,6969,6999,7028,7057,7087,7116,7146,%
8577 7175,7205,7235,7264,7294,7324,7353,7383,7412,7441,7471,7500,%
8578 7529,7559,7589,7618,7648,7678,7708,7737,7767,7796,7825,7855,%
8579 7884,7913,7943,7972,8002,8032,8062,8092,8121,8151,8180,8209,%
8580 8239,8268,8297,8327,8356,8386,8416,8446,8475,8505,8534,8564,%
8581 8593,8623,8652,8681,8711,8740,8770,8800,8829,8859,8889,8918,%
8582 8948,8977,9007,9036,9066,9095,9124,9154,9183,9213,9243,9272,%
8583 9302,9331,9361,9391,9420,9450,9479,9508,9538,9567,9597,9626,%
8584 9656,9686,9715,9745,9775,9804,9834,9863,9893,9922,9951,9981,%
8585 10010,10040,10069,10099,10129,10158,10188,10218,10247,10277,%
8586 10306,10335,10365,10394,10423,10453,10483,10512,10542,10572,%
8587 10602,10631,10661,10690,10719,10749,10778,10807,10837,10866,%
8588 10896,10926,10956,10986,11015,11045,11074,11103}
8589 \ExplSyntaxOff
8590 </ca-chinese>

```

14 Support for Plain T_EX (plain.def)

14.1 Not renaming hyphen.tex

As Don Knuth has declared that the filename `hyphen.tex` may only be used to designate *his* version of the american English hyphenation patterns, a new solution has to be found in order to be able to load hyphenation patterns for other languages in a plain-based T_EX-format. When asked he responded:

That file name is “sacred”, and if anybody changes it they will cause severe upward/downward compatibility headaches.

People can have a file `localhyphen.tex` or whatever they like, but they mustn’t diddle with `hyphen.tex` (or `plain.tex` except to preload additional fonts).

The files `bplain.tex` and `blplain.tex` can be used as replacement wrappers around `plain.tex` and `lplain.tex` to achieve the desired effect, based on the `babel` package. If you load each of them with `iniTEX`, you will get a file called either `bplain.fmt` or `blplain.fmt`, which you can use as replacements for `plain.fmt` and `lplain.fmt`.

As these files are going to be read as the first thing `iniTEX` sees, we need to set some category codes just to be able to change the definition of `\input`.

```

8591 (*bplain | blplain)
8592 \catcode\{=1 % left brace is begin-group character

```

```
8593 \catcode`\}=2 % right brace is end-group character
8594 \catcode`\#=6 % hash mark is macro parameter character
```

If a file called `hyphen.cfg` can be found, we make sure that *it* will be read instead of the file `hyphen.tex`. We do this by first saving the original meaning of `\input` (and I use a one letter control sequence for that so as not to waste multi-letter control sequence on this in the format).

```
8595 \openin 0 hyphen.cfg
8596 \ifeof0
8597 \else
8598 \let\input
```

Then `\input` is defined to forget about its argument and load `hyphen.cfg` instead. Once that's done the original meaning of `\input` can be restored and the definition of `\a` can be forgotten.

```
8599 \def\input #1 {%
8600 \let\input\input
8601 \a hyphen.cfg
8602 \let\input\input
8603 }
8604 \fi
8605 (/bplain | bplain)
```

Now that we have made sure that `hyphen.cfg` will be loaded at the right moment it is time to load `plain.tex`.

```
8606 (bplain)\a plain.tex
8607 (blplain)\a lplain.tex
```

Finally we change the contents of `\fmtname` to indicate that this is *not* the plain format, but a format based on plain with the `babel` package preloaded.

```
8608 (bplain)\def\fmtname{babel - plain}
8609 (blplain)\def\fmtname{babel - lplain}
```

When you are using a different format, based on `plain.tex` you can make a copy of `blplain.tex`, rename it and replace `plain.tex` with the name of your format file.

14.2 Emulating some \LaTeX features

The file `babel.def` expects some definitions made in the $\LaTeX 2_{\epsilon}$ style file. So, in Plain we must provide at least some predefined values as well some tools to set them (even if not all options are available). There are no package options, and therefore an alternative mechanism is provided. For the moment, only `\babeloptionstrings` and `\babeloptionmath` are provided, which can be defined before loading `babel`. `\BabelModifiers` can be set too (but not sure it works).

```
8610 <<(*Emulate LaTeX)>> ≡
8611 \def\@empty{}
8612 \def\loadlocalcfg#1{%
8613 \openin0#1.cfg
8614 \ifeof0
8615 \closein0
8616 \else
8617 \closein0
8618 {\immediate\writel6{*****}%
8619 \immediate\writel6{* Local config file #1.cfg used}%
8620 \immediate\writel6{*}%
8621 }
8622 \input #1.cfg\relax
8623 \fi
8624 \@endofldf}
```

14.3 General tools

A number of \LaTeX macro's that are needed later on.

```
8625 \long\def\@firstofone#1{#1}
8626 \long\def\@firstoftwo#1#2{#1}
8627 \long\def\@secondoftwo#1#2{#2}
```

```

8628 \def\@nnil{\@nil}
8629 \def\@gobbletwo#1#2{}
8630 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
8631 \def\@star@or@long#1{%
8632   \@ifstar
8633   {\let\l@ngrel@x\relax#1}%
8634   {\let\l@ngrel@x\long#1}}
8635 \let\l@ngrel@x\relax
8636 \def\@car#1#2\@nil{#1}
8637 \def\@cdr#1#2\@nil{#2}
8638 \let\@typeset@protect\relax
8639 \let\protected@edef\edef
8640 \long\def\@gobble#1{}
8641 \edef\@backslashchar{\expandafter\@gobble\string\}
8642 \def\strip@prefix#1>{}
8643 \def\g@addto@macro#1#2{{%
8644   \toks@\expandafter{#1#2}%
8645   \xdef#1{\the\toks@}}}
8646 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
8647 \def\@nameuse#1{\csname #1\endcsname}
8648 \def\@ifundefined#1{%
8649   \expandafter\ifx\csname#1\endcsname\relax
8650     \expandafter\@firstoftwo
8651   \else
8652     \expandafter\@secondoftwo
8653   \fi}
8654 \def\@expandtwoargs#1#2#3{%
8655   \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
8656 \def\zap@space#1 #2{%
8657   #1%
8658   \ifx#2\@empty\else\expandafter\zap@space\fi
8659   #2}
8660 \let\bbl@trace\@gobble
8661 \def\bbl@error#1{% Implicit #2#3#4
8662   \begingroup
8663     \catcode`\=0 \catcode`\==12 \catcode`\`=12
8664     \catcode`\^^M=5 \catcode`\%=14
8665     \input errbabel.def
8666   \endgroup
8667   \bbl@error{#1}}
8668 \def\bbl@warning#1{%
8669   \begingroup
8670     \newlinechar=\^^J
8671     \def\{\^^J(babel) }%
8672     \message{\#1}%
8673   \endgroup}
8674 \let\bbl@infowarn\bbl@warning
8675 \def\bbl@info#1{%
8676   \begingroup
8677     \newlinechar=\^^J
8678     \def\{\^^J}%
8679     \wlog{#1}%
8680   \endgroup}

```

$\text{\LaTeX} 2_{\epsilon}$ has the command `\@onlypreamble` which adds commands to a list of commands that are no longer needed after `\begin{document}`.

```

8681 \ifx\@preamblecmds\undefined
8682   \def\@preamblecmds{}
8683 \fi
8684 \def\@onlypreamble#1{%
8685   \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
8686     \@preamblecmds\do#1}}
8687 \@onlypreamble\@onlypreamble

```

Mimic \LaTeX 's `\AtBeginDocument`; for this to work the user needs to add `\begindocument` to his file.

```

8688 \def\begindocument{%
8689   \@begindocumenthook
8690   \global\let\@begindocumenthook\@undefined
8691   \def\do##1{\global\let##1\@undefined}%
8692   \@preamblecmds
8693   \global\let\do\noexpand}

8694 \ifx\@begindocumenthook\@undefined
8695   \def\@begindocumenthook{}
8696 \fi
8697 \@onlypreamble\@begindocumenthook
8698 \def\AtBeginDocument{\g@addto@macro\@begindocumenthook}

```

We also have to mimic \LaTeX 's `\AtEndOfPackage`. Our replacement macro is much simpler; it stores its argument in `\@endofldf`.

```

8699 \def\AtEndOfPackage#1{\g@addto@macro\@endofldf{#1}}
8700 \@onlypreamble\AtEndOfPackage
8701 \def\@endofldf{}
8702 \@onlypreamble\@endofldf
8703 \let\bb@afterlang\@empty
8704 \chardef\bb@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.

```

8705 \catcode`\&=\z@
8706 \ifx&\if@filesw\@undefined
8707   \expandafter\let\csname if@filesw\expandafter\endcsname
8708     \csname iffalse\endcsname
8709 \fi
8710 \catcode`\&=4

```

Mimic \LaTeX 's commands to define control sequences.

```

8711 \def\newcommand{\@star@or@long\new@command}
8712 \def\new@command#1{%
8713   \@testopt{\@newcommand#1}0}
8714 \def\@newcommand#1[#2]{%
8715   \@ifnextchar [{\@xargdef#1[#2]}%
8716     {\@argdef#1[#2]}}
8717 \long\def\@argdef#1[#2]#3{%
8718   \@yargdef#1\@ne{#2}{#3}}
8719 \long\def\@xargdef#1[#2][#3]#4{%
8720   \expandafter\def\expandafter#1\expandafter{%
8721     \expandafter\@protected@testopt\expandafter #1%
8722     \csname\string#1\expandafter\endcsname{#3}}%
8723   \expandafter\@yargdef \csname\string#1\endcsname
8724   \tw@{#2}{#4}}
8725 \long\def\@yargdef#1#2#3{%
8726   \@tempcnta#3\relax
8727   \advance \@tempcnta \@ne
8728   \let\@hash@\relax
8729   \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
8730   \@tempcntb #2%
8731   \@whilenum\@tempcntb <\@tempcnta
8732   \do{%
8733     \edef\reserved@a{\reserved@a\@hash@\the\@tempcntb}%
8734     \advance\@tempcntb \@ne}%
8735   \let\@hash@##%
8736   \l@ngrel\x\expandafter\def\expandafter#1\reserved@a}
8737 \def\providecommand{\@star@or@long\provide@command}
8738 \def\provide@command#1{%
8739   \begingroup
8740     \escapechar\m@ne\xdef\@gtempa{\string#1}%

```

```

8741 \endgroup
8742 \expandafter\ifundefined\@tempa
8743   {\def\reserved@a{\new@command#1}}%
8744   {\let\reserved@a\relax
8745   \def\reserved@a{\new@command\reserved@a}}%
8746   \reserved@a}%

8747 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}
8748 \def\declare@robustcommand#1{%
8749   \edef\reserved@a{\string#1}%
8750   \def\reserved@b{#1}%
8751   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
8752   \edef#1{%
8753     \ifx\reserved@a\reserved@b
8754       \noexpand\x@protect
8755       \noexpand#1%
8756     \fi
8757     \noexpand\protect
8758     \expandafter\noexpand\csname
8759       \expandafter\@gobble\string#1 \endcsname
8760   }%
8761   \expandafter\new@command\csname
8762     \expandafter\@gobble\string#1 \endcsname
8763 }
8764 \def\x@protect#1{%
8765   \ifx\protect\@typeset@protect\else
8766     \@x@protect#1%
8767   \fi
8768 }
8769 \catcode`\&=\z@ % Trick to hide conditionals
8770 \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`.

```

8771 \def\bbl@tempa{\csname newif\endcsname&ifin@}
8772 \catcode`\&=4
8773 \ifx\in@\@undefined
8774   \def\in@#1#2{%
8775     \def\in@@##1##2##3\in@@{%
8776       \ifx\in@##2\in@false\else\in@true\fi}%
8777     \in@@#2#1\in@\in@@}
8778 \else
8779   \let\bbl@tempa\@empty
8780 \fi
8781 \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).

```

8782 \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.

```

8783 \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.

```

8784 \ifx\@tempcnta\@undefined
8785   \csname newcount\endcsname\@tempcnta\relax
8786 \fi

```

```

8787 \ifx\@tempcntb\undefined
8788   \csname newcount\endcsname\@tempcntb\relax
8789 \fi

```

To prevent wasting two counters in \TeX (because counters with the same name are allocated later by it) we reset the counter that holds the next free counter (`\count10`).

```

8790 \ifx\bye\undefined
8791   \advance\count10 by -2\relax
8792 \fi
8793 \ifx\@ifnextchar\undefined
8794   \def\@ifnextchar#1#2#3{%
8795     \let\reserved@#1%
8796     \def\reserved@a{#2}\def\reserved@b{#3}%
8797     \futurelet\@let@token\@ifnch}
8798   \def\@ifnch{%
8799     \ifx\@let@token\@sptoken
8800       \let\reserved@c\@xifnch
8801     \else
8802       \ifx\@let@token\reserved@d
8803         \let\reserved@c\reserved@a
8804       \else
8805         \let\reserved@c\reserved@b
8806       \fi
8807     \fi
8808     \reserved@c}
8809   \def\{\let\@sptoken= } \: % this makes \@sptoken a space token
8810   \def\{\@xifnch} \expandafter\def\{\futurelet\@let@token\@ifnch}
8811 \fi
8812 \def\@testopt#1#2{%
8813   \@ifnextchar[#{1}{#1[#{2}]}
8814 \def\@protected@testopt#1{%
8815   \ifx\protect\@typeset@protect
8816     \expandafter\@testopt
8817   \else
8818     \@x@protect#1%
8819   \fi}
8820 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
8821   #2\relax}\fi}
8822 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
8823   \else\expandafter\@gobble\fi{#1}}

```

14.4 Encoding related macros

Code from `ltoutenc.dtx`, adapted for use in the plain \TeX environment.

```

8824 \def\DeclareTextCommand{%
8825   \@dec@text@cmd\providecommand
8826 }
8827 \def\ProvideTextCommand{%
8828   \@dec@text@cmd\providecommand
8829 }
8830 \def\DeclareTextSymbol#1#2#3{%
8831   \@dec@text@cmd\chardef#1{#2}#3\relax
8832 }
8833 \def\@dec@text@cmd#1#2#3{%
8834   \expandafter\def\expandafter#2%
8835     \expandafter{%
8836       \csname#3-cmd\expandafter\endcsname
8837       \expandafter#2%
8838       \csname#3\string#2\endcsname
8839     }%
8840 %   \let\@ifdefinable\@rc@ifdefinable
8841   \expandafter#1\csname#3\string#2\endcsname
8842 }

```

```

8843 \def\@current@cmd#1{%
8844   \ifx\protect\@typeset@protect\else
8845     \noexpand#1\expandafter\@gobble
8846   \fi
8847 }
8848 \def\@changed@cmd#1#2{%
8849   \ifx\protect\@typeset@protect
8850     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax
8851       \expandafter\ifx\csname ?\string#1\endcsname\relax
8852         \expandafter\def\csname ?\string#1\endcsname{%
8853           \@changed@x@err{#1}%
8854         }%
8855       \fi
8856     \global\expandafter\let
8857       \csname\cf@encoding\string#1\expandafter\endcsname
8858       \csname ?\string#1\endcsname
8859     \fi
8860     \csname\cf@encoding\string#1%
8861     \expandafter\endcsname
8862   \else
8863     \noexpand#1%
8864   \fi
8865 }
8866 \def\@changed@x@err#1{%
8867   \errhelp{Your command will be ignored, type <return> to proceed}%
8868   \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
8869 \def\DeclareTextCommandDefault#1{%
8870   \DeclareTextCommand#1?%
8871 }
8872 \def\ProvideTextCommandDefault#1{%
8873   \ProvideTextCommand#1?%
8874 }
8875 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
8876 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
8877 \def\DeclareTextAccent#1#2#3{%
8878   \DeclareTextCommand#1{#2}[1]{\accent#3 ##1}
8879 }
8880 \def\DeclareTextCompositeCommand#1#2#3#4{%
8881   \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
8882   \edef\reserved@b{\string##1}%
8883   \edef\reserved@c{%
8884     \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
8885   \ifx\reserved@b\reserved@c
8886     \expandafter\expandafter\expandafter\ifx
8887       \expandafter\@car\reserved@a\relax\relax\@nil
8888     \@text@composite
8889   \else
8890     \edef\reserved@b##1{%
8891       \def\expandafter\noexpand
8892         \csname#2\string#1\endcsname###1{%
8893           \noexpand\@text@composite
8894             \expandafter\noexpand\csname#2\string#1\endcsname
8895             ###1\noexpand\@empty\noexpand\@text@composite
8896             {##1}%
8897           }%
8898     }%
8899     \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
8900   \fi
8901   \expandafter\def\csname\expandafter\string\csname
8902     #2\endcsname\string#1-\string#3\endcsname{#4}
8903   \else
8904     \errhelp{Your command will be ignored, type <return> to proceed}%
8905     \errmessage{\string\DeclareTextCompositeCommand\space used on

```

```

8906         inappropriate command \protect#1}
8907     \fi
8908 }
8909 \def\@text@composite#1#2#3\@text@composite{%
8910     \expandafter\@text@composite@x
8911         \csname\string#1-\string#2\endcsname
8912 }
8913 \def\@text@composite@x#1#2{%
8914     \ifx#1\relax
8915         #2%
8916     \else
8917         #1%
8918     \fi
8919 }
8920 %
8921 \def\@strip@args#1:#2-#3\@strip@args{#2}
8922 \def\DeclareTextComposite#1#2#3#4{%
8923     \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
8924     \bgroup
8925         \lccode\@=#4%
8926         \lowercase{%
8927     \egroup
8928     \reserved@a @%
8929     }%
8930 }
8931 %
8932 \def\UseTextSymbol#1#2{#2}
8933 \def\UseTextAccent#1#2#3{#3}
8934 \def\@use@text@encoding#1{#1}
8935 \def\DeclareTextSymbolDefault#1#2{%
8936     \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
8937 }
8938 \def\DeclareTextAccentDefault#1#2{%
8939     \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
8940 }
8941 \def\cf@encoding{OT1}

```

Currently we only use the $\LaTeX 2_{\epsilon}$ method for accents for those that are known to be made active in *some* language definition file.

```

8942 \DeclareTextAccent{"}{OT1}{127}
8943 \DeclareTextAccent{'}{OT1}{19}
8944 \DeclareTextAccent{^}{OT1}{94}
8945 \DeclareTextAccent{\`}{OT1}{18}
8946 \DeclareTextAccent{~}{OT1}{126}

```

The following control sequences are used in `babel.def` but are not defined for PLAIN \TeX .

```

8947 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
8948 \DeclareTextSymbol{\textquotedblright}{OT1}{`\"}
8949 \DeclareTextSymbol{\textquoteleft}{OT1}{`\'}
8950 \DeclareTextSymbol{\textquoteright}{OT1}{`\'}
8951 \DeclareTextSymbol{\i}{OT1}{16}
8952 \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`.

```

8953 \ifx\scriptsize\undefined
8954     \let\scriptsize\sevenrm
8955 \fi

```

And a few more “dummy” definitions.

```

8956 \def\languagename{english}%
8957 \let\bbl@opt@shorthands\@nnil
8958 \def\bbl@ifshorthand#1#2#3{#2}%
8959 \let\bbl@language@opts\@empty

```



```

8960 \let\bb@ensureinfo@gobble
8961 \let\bb@provide@locale\relax
8962 \ifx\babeloptionstrings\undefined
8963   \let\bb@opt@strings\@nnil
8964 \else
8965   \let\bb@opt@strings\babeloptionstrings
8966 \fi
8967 \def\BabelStringsDefault{generic}
8968 \def\bb@tempa{normal}
8969 \ifx\babeloptionmath\bb@tempa
8970   \def\bb@mathnormal{\noexpand\textormath}
8971 \fi
8972 \def\AfterBabelLanguage#1#2{}
8973 \ifx\BabelModifiers\undefined\let\BabelModifiers\relax\fi
8974 \let\bb@afterlang\relax
8975 \def\bb@opt@safe{BR}
8976 \ifx@uclclist\undefined\let@uclclist@empty\fi
8977 \ifx\bb@trace\undefined\def\bb@trace#1{}\fi
8978 \expandafter\newif\csname ifbb@single\endcsname
8979 \chardef\bb@bidimode\z@
8980 <</Emulate LaTeX>>

A proxy file:
8981 <*plain>
8982 \input babel.def
8983 </plain>

```

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