

Babel

Code

Version 24.12.66368
2024/10/24

Javier Bezos
Current maintainer

Johannes L. Braams
Original author

Localization and
internationalization

Unicode

T_EX

pdfT_EX

LuaT_EX

XeT_EX

Contents

1	Identification and loading of required files	3
2	locale directory	3
3	Tools	3
3.1	A few core definitions	7
3.2	LaTeX: babel.sty (start)	8
3.3	base	9
3.4	key=value options and other general option	10
3.5	Post-process some options	11
3.6	Plain: babel.def (start)	13
4	babel.sty and babel.def (common)	13
4.1	Selecting the language	15
4.2	Errors	23
4.3	More on selection	23
4.4	Short tags	25
4.5	Compatibility with language.def	25
4.6	Hooks	26
4.7	Setting up language files	26
4.8	Shorthands	28
4.9	Language attributes	37
4.10	Support for saving and redefining macros	39
4.11	French spacing	40
4.12	Hyphens	41
4.13	Multiencoding strings	43
4.14	Tailor captions	47
4.15	Making glyphs available	48
4.15.1	Quotation marks	48
4.15.2	Letters	50
4.15.3	Shorthands for quotation marks	51
4.15.4	Umlauts and tremas	52
4.16	Layout	53
4.17	Load engine specific macros	53
4.18	Creating and modifying languages	53
4.19	Main loop in ‘provide’	61
4.20	Processing keys in ini	64
4.21	French spacing (again)	69
4.22	Handle language system	71
4.23	Numerals	72
4.24	Casing	73
4.25	Getting info	74
4.26	BCP-47 related commands	75
5	Adjusting the Babel behavior	76
5.1	Cross referencing macros	78
5.2	Layout	81
5.3	Marks	81
5.4	Other packages	82
5.4.1	ifthen	82
5.4.2	varioref	83
5.4.3	hhline	83
5.5	Encoding and fonts	84
5.6	Basic bidi support	86
5.7	Local Language Configuration	89
5.8	Language options	89

6	The kernel of Babel	93
7	Error messages	93
8	Loading hyphenation patterns	96
9	xetex + luatex: common stuff	100
10	Hooks for XeTeX and LuaTeX	105
10.1	XeTeX	105
10.2	Support for interchar	106
10.3	Layout	108
10.4	8-bit TeX	109
10.5	LuaTeX	110
10.6	Southeast Asian scripts	117
10.7	CJK line breaking	118
10.8	Arabic justification	120
10.9	Common stuff	124
10.10	Automatic fonts and ids switching	124
10.11	Bidi	130
10.12	Layout	133
10.13	Lua: transforms	142
10.14	Lua: Auto bidi with basic and basic-r	151
11	Data for CJK	162
12	The ‘nil’ language	163
13	Calendars	164
13.1	Islamic	164
13.2	Hebrew	166
13.3	Persian	170
13.4	Coptic and Ethiopic	170
13.5	Buddhist	171
14	Support for Plain T_EX (plain.def)	172
14.1	Not renaming hyphen.tex	172
14.2	Emulating some L ^A T _E X features	173
14.3	General tools	173
14.4	Encoding related macros	177
15	Acknowledgements	180

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

The babel package after unpacking consists of the following files:

babel.sty is the \LaTeX 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 300 languages. They are distributed as a separate zip file, not packed as dtx. Many 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=24.12.66368>>
2 <<date=2024/10/24>>
```

Do not use the following macros in ldf files. They may change in the future. This applies mainly to those recently added for replacing, trimming and looping. The older ones, like `\bbl@afterfi`, will not change. We define some basic macros which just make the code cleaner. `\bbl@add` is now used internally instead of `\addto` because of the unpredictable behavior of the latter. Used in babel.def and in babel.sty, which means in \LaTeX is executed twice, but we need them when defining options and babel.def cannot be load until options have been defined. This does not hurt, but should be fixed somehow.

```
3 <<*Basic macros>> ≡
4 \bbl@trace{Basic macros}
5 \def\bbl@stripslash{\expandafter\@gobble\string}
6 \def\bbl@add#1#2{%
7   \bbl@ifunset{\bbl@stripslash#1}%
8     {\def#1{#2}}%
9     {\expandafter\def\expandafter#1\expandafter{#1#2}}
10 \def\bbl@xin@{\@expandtwoargs\in@}
11 \def\bbl@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@carg#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

\bbl@afterfi Because the code that is used in the handling of active characters may need to look ahead, we take extra care to ‘throw’ it over the \else and \fi parts of an \if-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##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}}

```

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

\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 \ifcename, which is more efficient, and does not waste memory. Defined inside a group, to avoid \ifcename being implicitly set to \relax by the \cename test.

```

56 \begingroup
57 \gdef\bbl@ifunset#1{%
58   \expandafter\ifx\cename#1\endcename\relax
59   \expandafter\@firstoftwo
60   \else
61   \expandafter\@secondoftwo
62   \fi}
63 \bbl@ifunset{ifcename}%
64 {}%
65 {\gdef\bbl@ifunset#1{%
66   \ifcename#1\endcename
67   \expandafter\ifx\cename#1\endcename\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{\bbl@ifblank{\@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@kvnext#1,\@nil,}
84 \def\bbl@kvnext#1,{%
85   \ifx\@nil#1\relax\else
86   \bbl@ifblank{#1}{\bbl@forkv@eq#1=\@empty=\@nil{#1}}%
87   \expandafter\bbl@kvnext
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\bbl@nil##2%
105     \toks@\expandafter{\the\toks@##1}%
106   \else
107     \toks@\expandafter{\the\toks@##1#3}%
108     \bbl@afterfi
109     \bbl@replace@aux##2#2%
110   \fi}%
111 \expandafter\bbl@replace@aux#1#2\bbl@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 \bbl@TG@@date, and also fails if there are macros with spaces, because they are retokenized). It may change! (or even merged with \bbl@replace; I'm not sure checking the replacement is really necessary or just paranoia).

```

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

```

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

```

140 \def\bbl@ifsamestring#1#2{%
141   \begingroup
142     \protected@edef\bbl@tempb{#1}%
143     \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
144     \protected@edef\bbl@tempc{#2}%
145     \edef\bbl@tempc{\expandafter\strip@prefix\meaning\bbl@tempc}%
146     \ifx\bbl@tempb\bbl@tempc
147       \aftergroup\@firstoftwo
148     \else
149       \aftergroup\@secondoftwo
150     \fi
151   \endgroup}
152 \chardef\bbl@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\bbl@bsphack{%
163   \ifhmode
164     \hskip\z@skip
165   \def\bbl@esphack{\loop\ifdim\lastskip>\z@\unskip\repeat\unskip}%
166   \else
167     \let\bbl@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\bbl@cased{%
170   \ifx\oe\OE
171     \expandafter\in@\expandafter
172       {\expandafter\OE\expandafter}\expandafter{\oe}%
173   \ifin@
174     \bbl@afterelse\expandafter\MakeUppercase
175   \else
176     \bbl@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\bbl@extras@wrap#1#2#3{% 1:in-test, 2:before, 3:after
182   \toks@{\expandafter\expandafter\expandafter}%
183   \csname extras\language\endcsname}%
184   \bbl@exp{\in@{#1}{\the\toks@}}%
185   \ifin@\else
186     \@temptokena{#2}%
187     \edef\bbl@tempc{\the\@temptokena\the\toks@}%
188     \toks@\expandafter{\bbl@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. A few core definitions

Language Just for compatibility, for not to touch `hyphen.cfg`.

```

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. \LaTeX : `babel.sty` (start)

Here starts the style file for \LaTeX . It also takes care of a number of compatibility issues with other packages.

```
208 <*package>
209 \NeedsTeXFormat{LaTeX2e}
210 \ProvidesPackage{babel}%
211 [ <@date@> v<@version@> %%NB%%
212 The multilingual framework for pdfLaTeX, LuaLaTeX and XeLaTeX]
```

Start with some “private” debugging tools, and then define macros for errors. The global lua ‘space’ Babel is declared here, too (inside the test for debug).

```
213 \@ifpackagewith{babel}{debug}
214 {\providecommand\bbl@trace[1]{\message{^^J[ #1 ]}}%
215 \let\bbl@debug@firstofone
216 \ifx\directlua\undefined\else
217 \directlua{
218   Babel = Babel or {}
219   Babel.debug = true }%
220 \input{babel-debug.tex}%
221 \fi}
222 {\providecommand\bbl@trace[1]{}%
223 \let\bbl@debug@gobble
224 \ifx\directlua\undefined\else
225 \directlua{
226   Babel = Babel or {}
227   Babel.debug = false }%
228 \fi}
```

Macros to deal with errors, warnings, etc. Errors are stored in a separate file.

```
229 \def\bbl@error#1{% Implicit #2#3#4
230 \begingroup
231 \catcode`\=0 \catcode`\==12 \catcode`\`=12
232 \input errbabel.def
233 \endgroup
234 \bbl@error{#1}}
235 \def\bbl@warning#1{%
236 \begingroup
237 \def\{\{MessageBreak}%
238 \PackageWarning{babel}{#1}%
239 \endgroup}
240 \def\bbl@infowarn#1{%
241 \begingroup
242 \def\{\{MessageBreak}%
243 \PackageNote{babel}{#1}%
```

```

244 \endgroup}
245 \def\bbl@info#1{%
246 \begingroup
247 \def\{\MessageBreak}%
248 \PackageInfo{babel}{#1}%
249 \endgroup}

```

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.

```

250 <@Basic macros>
251 \ifpackagewith{babel}{silent}
252 {\let\bbl@info@gobble
253 \let\bbl@infowarn@gobble
254 \let\bbl@warning@gobble}
255 {}
256 %
257 \def\AfterBabelLanguage#1{%
258 \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.

```

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

```

3.3. base

The first 'real' option to be processed is base, which set the hyphenation patterns then resets ver@babel.sty so that L^AT_EX 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.

```

277 \bbl@trace{Defining option 'base'}
278 \ifpackagewith{babel}{base}{%
279 \let\bbl@onlyswitch@empty
280 \let\bbl@provide@locale@relax
281 \input babel.def
282 \let\bbl@onlyswitch@undefined
283 \ifx\directlua@undefined
284 \DeclareOption*{\bbl@patterns{\CurrentOption}}%
285 \else
286 \input luababel.def
287 \DeclareOption*{\bbl@patterns@lua{\CurrentOption}}%
288 \fi
289 \DeclareOption{base}{%
290 \DeclareOption{showlanguages}{%
291 \ProcessOptions

```

```

292 \global\expandafter\let\csname opt@babel.sty\endcsname\relax
293 \global\expandafter\let\csname ver@babel.sty\endcsname\relax
294 \global\let\@ifl@ter@@\@ifl@ter
295 \def\@ifl@ter#1#2#3#4#5{\global\let\@ifl@ter\@ifl@ter@@}%
296 \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`.

```

297 \bbl@trace{key=value and another general options}
298 \bbl@csarg\let\tempa\expandafter\csname opt@babel.sty\endcsname
299 \def\bbl@tempb#1.#2{% Remove trailing dot
300   #1\ifx\@empty#2\else,\bbl@afterfi\bbl@tempb#2\fi}%
301 \def\bbl@tempe#1=#2\@@{%
302   \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}}
303 \def\bbl@tempd#1.#2\@nnil{%^A TODO. Refactor lists?
304   \ifx\@empty#2%
305     \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
306   \else
307     \in@{,provide=}{, #1}%
308     \ifin@
309       \edef\bbl@tempc{%
310         \ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.\bbl@tempb#2}%
311     \else
312       \in@{$modifiers$}{$#1$}%^A TODO. Allow spaces.
313       \ifin@
314         \bbl@tempe#2\@@
315       \else
316         \in@{=}{#1}%
317         \ifin@
318           \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1.#2}%
319         \else
320           \edef\bbl@tempc{\ifx\bbl@tempc\@empty\else\bbl@tempc,\fi#1}%
321           \bbl@csarg\edef{mod@#1}{\bbl@tempb#2}%
322         \fi
323       \fi
324     \fi
325   \fi}
326 \let\bbl@tempc\@empty
327 \bbl@foreach\bbl@tempa{\bbl@tempd#1.\@empty\@nnil}
328 \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.

```

329 \DeclareOption{KeepShorthandsActive}{}
330 \DeclareOption{activeacute}{}
331 \DeclareOption{activegrave}{}
332 \DeclareOption{debug}{}
333 \DeclareOption{noconfigs}{}
334 \DeclareOption{showlanguages}{}
335 \DeclareOption{silent}{}
336 \DeclareOption{shorthands=off}{\bbl@tempa shorthands=\bbl@tempa}
337 \chardef\bbl@iniflag\z@
338 \DeclareOption{provide=*}{\chardef\bbl@iniflag\@ne} % main -> +1
339 \DeclareOption{provide+=*}{\chardef\bbl@iniflag\tw@} % second = 2
340 \DeclareOption{provide*=*}{\chardef\bbl@iniflag\thr@@} % second + main
341 % A separate option
342 \let\bbl@autoload@options\@empty
343 \DeclareOption{provide=*}{\def\bbl@autoload@options{import}}
344 % Don't use. Experimental. TODO.

```

```

345 \newif\ifbbl@single
346 \DeclareOption{selectors=off}{\bbl@singletrue}
347 <@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 $\langle key \rangle = \langle value \rangle$, 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.

```

348 \let\bbl@opt@shorthands\@nnil
349 \let\bbl@opt@config\@nnil
350 \let\bbl@opt@main\@nnil
351 \let\bbl@opt@headfoot\@nnil
352 \let\bbl@opt@layout\@nnil
353 \let\bbl@opt@provide\@nnil

```

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

```

354 \def\bbl@tempa#1=#2\bbl@tempa{%
355   \bbl@csarg\ifx{opt#1}\@nnil
356   \bbl@csarg\edef{opt#1}{#2}%
357   \else
358   \bbl@error{bad-package-option}{#1}{#2}{}%
359   \fi}

```

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

```

360 \let\bbl@language@opts\@empty
361 \DeclareOption*{%
362   \bbl@xin@{\string=}{\CurrentOption}%
363   \ifin@
364     \expandafter\bbl@tempa\CurrentOption\bbl@tempa
365   \else
366     \bbl@add@list\bbl@language@opts{\CurrentOption}%
367   \fi}

```

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

```

368 \ProcessOptions*

```

3.5. Post-process some options

```

369 \ifx\bbl@opt@provide\@nnil
370   \let\bbl@opt@provide\@empty % %%% MOVE above
371 \else
372   \chardef\bbl@iniflag\@ne
373   \bbl@exp{\bbl@forkv{\@nameuse{@raw@opt@babel.sty}}}{%
374     \in@{,provide,}{, #1,}%
375     \ifin@
376       \def\bbl@opt@provide{#2}%
377     \fi}
378 \fi

```

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

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

```

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

```

```

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

```

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

```

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

```

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

```

400 \edef\bbl@opt@shorthands{%
401 \expandafter\bbl@sh@string\bbl@opt@shorthands\@empty}%

```

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

```

402 \bbl@ifshorthand{'}%
403 {\PassOptionsToPackage{activeacute}{babel}}{}
404 \bbl@ifshorthand{'}%
405 {\PassOptionsToPackage{activegrave}{babel}}{}
406 \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.

```

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

```

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

```

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

```

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

```

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

```

3.6. Plain: babel.def (start)

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*.

First, exit immediately if previously loaded.

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

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.

4. babel.sty and babel.def (common)

```
446 < *package | core >
447 \def\bbl@version{<@version@>}
448 \def\bbl@date{<@date@>}
449 <@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.

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

`\bbl@iflanguage` executes code only if the language `l@` exists. Otherwise raises an error.

The argument of `\bbl@fixname` has to be a macro name, as it may get “fixed” if casing (lc/uc) is wrong. It’s 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.

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

```

477 \empty
478 \edef\bbl@tempd{\endgroup\def\noexpand#1{#1}}%
479 \bbl@tempd
480 \bbl@expf{\bbl@usehooks{language}{\language}{#1}}%
481 \def\bbl@iflanguage#1{%
482 \ifundefined{l@#1}{\no!anerr{#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`.

```

483 \def\bbl@bcpcase#1#2#3#4\@#5{%
484 \ifx\empty#3%
485 \uppercase{\def#5{#1#2}}%
486 \else
487 \uppercase{\def#5{#1}}%
488 \lowercase{\edef#5{#5#2#3#4}}%
489 \fi}
490 \def\bbl@bcpllookup#1-#2-#3-#4\@#5{%
491 \let\bbl@bcp\relax
492 \lowercase{\def\bbl@tempa{#1}}%
493 \ifx\empty#2%
494 \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
495 \else\ifx\empty#3%
496 \bbl@bcpcase#2\empty\empty\@#5\bbl@tempb
497 \IfFileExists{babel-\bbl@tempa-\bbl@tempb.ini}%
498 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb}}%
499 {}%
500 \ifx\bbl@bcp\relax
501 \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
502 \fi
503 \else
504 \bbl@bcpcase#2\empty\empty\@#5\bbl@tempb
505 \bbl@bcpcase#3\empty\empty\@#5\bbl@tempc
506 \IfFileExists{babel-\bbl@tempa-\bbl@tempb-\bbl@tempc.ini}%
507 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempb-\bbl@tempc}}%
508 {}%
509 \ifx\bbl@bcp\relax
510 \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
511 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}%
512 {}%
513 \fi
514 \ifx\bbl@bcp\relax
515 \IfFileExists{babel-\bbl@tempa-\bbl@tempc.ini}%
516 {\edef\bbl@bcp{\bbl@tempa-\bbl@tempc}}%
517 {}%
518 \fi
519 \ifx\bbl@bcp\relax
520 \IfFileExists{babel-\bbl@tempa.ini}{\let\bbl@bcp\bbl@tempa}{}%
521 \fi
522 \fi\fi}
523 \let\bbl@initoload\relax

```

\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.

```

524 \def\iflanguage#1{%
525 \bbl@iflanguage{#1}{%
526 \ifnum\csname l@#1\endcsname=\language

```

```

527     \expandafter\@firstoftwo
528     \else
529     \expandafter\@secondoftwo
530     \fi}}

```

4.1. Selecting the language

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

```

531 \let\bbl@select@type\z@
532 \edef\selectlanguage{%
533     \noexpand\protect
534     \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`.

```

535 \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.

```

536 \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.

```

537 \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

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

```

538 \def\bbl@push@language{%
539     \ifx\language\@undefined\else
540     \ifx\currentgrouplevel\@undefined
541     \xdef\bbl@language@stack{\language+\bbl@language@stack}%
542     \else
543     \ifnum\currentgrouplevel=\z@
544     \xdef\bbl@language@stack{\language+}%
545     \else
546     \xdef\bbl@language@stack{\language+\bbl@language@stack}%
547     \fi
548     \fi
549     \fi}

```

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

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

```
550 \def\bbl@pop@lang#1+#2\@@{%
551   \edef\language{#1}%
552   \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).

```
553 \let\bbl@ifrestoring\@secondoftwo
554 \def\bbl@pop@language{%
555   \expandafter\bbl@pop@lang\bbl@language@stack\@@
556   \let\bbl@ifrestoring\@firstoftwo
557   \expandafter\bbl@set@language\expandafter{\language}%
558   \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).

```
559 \chardef\localeid\z@
560 \def\bbl@id@last{0} % No real need for a new counter
561 \def\bbl@id@assign{%
562   \bbl@ifunset{bbl@id@\language}%
563   {\count@bbl@id@last\relax
564     \advance\count@\@ne
565     \bbl@csarg\chardef{id@\language}\count@
566     \edef\bbl@id@last{\the\count@}%
567     \ifcase\bbl@engine\or
568       \directlua{
569         Babel.locale_props[\bbl@id@last] = {}
570         Babel.locale_props[\bbl@id@last].name = '\language'
571         Babel.locale_props[\bbl@id@last].vars = {}
572       }%
573     \fi}%
574   {}}%
575   \chardef\localeid\bbl@c{l{id@}}
```

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

```
576 \expandafter\def\csname selectlanguage \endcsname#1{%
577   \ifnum\bbl@hymapsel=\@ccclv\let\bbl@hymapsel\tw@\fi
578   \bbl@push@language
579   \aftergroup\bbl@pop@language
580   \bbl@set@language{#1}}
581 \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@save@lastskip 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).

```

582 \def\BabelContentsFiles{toc,lof,lot}
583 \def\babel@set@language#1{% from selectlanguage, pop@
584 % The old buggy way. Preserved for compatibility, but simplified
585 \edef\language{\expandafter\string#1\@empty}%
586 \select@language{\language}%
587 % write to auxs
588 \expandafter\ifx\cscname date\language\endcscname\relax\else
589 \if@filesw
590 \ifx\babel@aux\@gobbletwo\else % Set if single in the first, redundant
591 \babel@savelastskip
592 \protected@write\@auxout{}\string\babel@aux{\babel@auxname{}}%
593 \babel@restorelastskip
594 \fi
595 \babel@usehooks{write}{}%
596 \fi
597 \fi}
598 %
599 \let\babel@restorelastskip\relax
600 \let\babel@savelastskip\relax
601 %
602 \def\select@language#1{% from set@, babel@aux, babel@toc
603 \ifx\babel@selectorname\@empty
604 \def\babel@selectorname{select}%
605 \fi
606 % set hmap
607 \ifnum\babel@hmapsel=\@ccclv\chardef\babel@hmapsel4\relax\fi
608 % set name (when coming from babel@aux)
609 \edef\language{#1}%
610 \babel@fixname\language
611 % define \localename when coming from set@, with a trick
612 \ifx\scantokens\@undefined
613 \def\localename{??}%
614 \else
615 \babel@exp{\scantokens{\def\localename{\language}\noexpand}\relax}%
616 \fi
617 %^A TODO. name@map must be here?
618 \babel@provide@locale
619 \babel@iflanguage\language{%
620 \let\babel@select@type\z@
621 \expandafter\babel@switch\expandafter{\language}}
622 \def\babel@aux#1#2{%
623 \select@language{#1}%
624 \babel@foreach\BabelContentsFiles{% \relax -> don't assume vertical mode
625 \@writefile{##1}{\babel@toc{#1}{#2}\relax}}}%^A TODO - plain?
626 \def\babel@toc#1#2{%
627 \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{language}` command at definition time by expanding the `\cscname` primitive.

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

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

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

```

628 \newif\ifbabel@usedategroup
629 \let\babel@savedextras\@empty

```

```

630 \def\bbl@switch#1{% from select@, foreign@
631 % make sure there is info for the language if so requested
632 \bbl@ensureinfo{#1}%
633 % restore
634 \originalTeX
635 \expandafter\def\expandafter\originalTeX\expandafter{%
636   \csname noextras#1\endcsname
637   \let\originalTeX\@empty
638   \babel@beginsave}%
639 \bbl@usehooks{afterreset}{}%
640 \languageshorthands{none}%
641 % set the locale id
642 \bbl@id@assign
643 % switch captions, date
644 \bbl@bsphack
645   \ifcase\bbl@select@type
646     \csname captions#1\endcsname\relax
647     \csname date#1\endcsname\relax
648   \else
649     \bbl@xin@{,captions,}{,\bbl@select@opts,}%
650     \ifin@
651       \csname captions#1\endcsname\relax
652     \fi
653     \bbl@xin@{,date,}{,\bbl@select@opts,}%
654     \ifin@ % if \foreign... within \<language>date
655       \csname date#1\endcsname\relax
656     \fi
657   \fi
658 \bbl@esphack
659 % switch extras
660 \csname bbl@preextras@#1\endcsname
661 \bbl@usehooks{beforeextras}{}%
662 \csname extras#1\endcsname\relax
663 \bbl@usehooks{afterextras}{}%
664 % > babel-ensure
665 % > babel-sh-<short>
666 % > babel-bidi
667 % > babel-fontspec
668 \let\bbl@savextras\@empty
669 % hyphenation - case mapping
670 \ifcase\bbl@opt@hyphenmap\or
671   \def\BabelLower##1##2{\lccode##1=##2\relax}%
672   \ifnum\bbl@hymapsel>4\else
673     \csname\language @bbl@hyphenmap\endcsname
674   \fi
675   \chardef\bbl@opt@hyphenmap\z@
676 \else
677   \ifnum\bbl@hymapsel>\bbl@opt@hyphenmap\else
678     \csname\language @bbl@hyphenmap\endcsname
679   \fi
680 \fi
681 \let\bbl@hymapsel\@cclv
682 % hyphenation - select rules
683 \ifnum\csname l@\language\endcsname=\l@unhyphenated
684   \edef\bbl@tempa{u}%
685 \else
686   \edef\bbl@tempa{\bbl@cl{\lnbrk}}%
687 \fi
688 % linebreaking - handle u, e, k (v in the future)
689 \bbl@xin@{/u}{/\bbl@tempa}%
690 \ifin@\else\bbl@xin@{/e}{/\bbl@tempa}\fi % elongated forms
691 \ifin@\else\bbl@xin@{/k}{/\bbl@tempa}\fi % only kashida
692 \ifin@\else\bbl@xin@{/p}{/\bbl@tempa}\fi % padding (eg, Tibetan)

```

```

693 \ifin@else\bbl@xin@{/v}{/\bbl@tempa}\fi % variable font
694 % hyphenation - save mins
695 \babel@savevariable\lefthyphenmin
696 \babel@savevariable\righthyphenmin
697 \ifnum\bbl@engine=@ne
698 \babel@savevariable\hyphenationmin
699 \fi
700 \ifin@
701 % unhyphenated/kashida/elongated/padding = allow stretching
702 \language\l@unhyphenated
703 \babel@savevariable\emergencystretch
704 \emergencystretch\maxdimen
705 \babel@savevariable\hbadness
706 \hbadness\@M
707 \else
708 % other = select patterns
709 \bbl@patterns{#1}%
710 \fi
711 % hyphenation - set mins
712 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
713 \set@hyphenmins\tw@thr@@\relax
714 \@nameuse{bbl@hyphenmins@}%
715 \else
716 \expandafter\expandafter\expandafter\set@hyphenmins
717 \csname #1hyphenmins\endcsname\relax
718 \fi
719 \@nameuse{bbl@hyphenmins@}%
720 \@nameuse{bbl@hyphenmins@\language}%
721 \@nameuse{bbl@hyphenatmin@}%
722 \@nameuse{bbl@hyphenatmin@\language}%
723 \let\bbl@selectorname\@empty}

```

otherlanguage It 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.

```

724 \long\def\otherlanguage#1{%
725 \def\bbl@selectorname{other}%
726 \ifnum\bbl@hymapsel=\ccclv\let\bbl@hymapsel\thr@@\fi
727 \csname selectlanguage \endcsname{#1}%
728 \ignorespaces}

```

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

```

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

```

otherlanguage* It 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’. It makes use of `\foreign@language`.

```

730 \expandafter\def\csname otherlanguage*\endcsname{%
731 \@ifnextchar[\bbl@otherlanguage@s{\bbl@otherlanguage@s[]}}
732 \def\bbl@otherlanguage@s[#1]#2{%
733 \def\bbl@selectorname{other*}%
734 \ifnum\bbl@hymapsel=\ccclv\chardef\bbl@hymapsel4\relax\fi
735 \def\bbl@select@opts{#1}%
736 \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”.

```

737 \expandafter\let\csname endotherlanguage*\endcsname\relax

```

\foreignlanguage 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{language}` command doesn't make any `\global` changes. The coding is very similar to part of `\selectlanguage`.

`\bbl@beforeforeign` is a trick to fix a bug in bidi texts. `\foreignlanguage` is supposed to be a 'text' command, and therefore it must emit a `\leavevmode`, but it does not, and therefore the indent is placed on the opposite margin. For backward compatibility, however, it is done only if a right-to-left script is requested; otherwise, it is no-op.

`(3.11) \foreignlanguage*` is a temporary, experimental macro for a few lines with a different script direction, while preserving the paragraph format (thank the braces around `\par`, things like `\hangindent` are not reset). Do not use it in production, because its semantics and its syntax may change (and very likely will, or even it could be removed altogether). Currently it enters in `vmode` and then selects the language (which in turn sets the paragraph direction).

(3.11) Also experimental are the hook `foreign` and `foreign*`. With them you can redefine `\BabelText` which by default does nothing. Its behavior is not well defined yet. So, use it in horizontal mode only if you do not want surprises.

In other words, at the beginning of a paragraph `\foreignlanguage` enters into `hmode` with the surrounding `lang`, and with `\foreignlanguage*` with the new `lang`.

```

738 \providecommand\bbl@beforeforeign{}
739 \edef\foreignlanguage{%
740   \noexpand\protect
741   \expandafter\noexpand\csname foreignlanguage \endcsname}
742 \expandafter\def\csname foreignlanguage \endcsname{%
743   \@ifstar\bbl@foreign@s\bbl@foreign@x}
744 \providecommand\bbl@foreign@x[3][]{%
745   \begingroup
746     \def\bbl@select@name{foreign}%
747     \def\bbl@select@opts{#1}%
748     \let\BabelText\@firstofone
749     \bbl@beforeforeign
750     \foreign@language{#2}%
751     \bbl@usehooks{foreign}{}%
752     \BabelText{#3}% Now in horizontal mode!
753   \endgroup}
754 \def\bbl@foreign@s#1#2{% TODO - \shapemode, \@setpar, ?\@@par
755   \begingroup
756     {\par}%
757     \def\bbl@select@name{foreign*}%
758     \let\bbl@select@opts\@empty
759     \let\BabelText\@firstofone
760     \foreign@language{#1}%
761     \bbl@usehooks{foreign*}{}%
762     \bbl@dirparastext
763     \BabelText{#2}% Still in vertical mode!
764     {\par}%
765   \endgroup}
766 \providecommand\BabelWrapText[1]{%
767   \def\bbl@tempa{\def\BabelText###1}%
768   \expandafter\bbl@tempa\expandafter{\BabelText{#1}}}
```

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

```

769 \def\foreign@language#1{%
770   % set name
771   \edef\language#1}%
772 \ifbbl@usedatagroup
773   \bbl@add\bbl@select@opts{,date,}%
774   \bbl@usedatagroupfalse
775 \fi
```

```

776 \bbl@fixname\language\language
777 \let\localename\language
778 % TODO. name@map here?
779 \bbl@provide@locale
780 \bbl@iflanguage\language{%
781   \let\bbl@select@type\@ne
782   \expandafter\bbl@switch\expandafter{\language}}

```

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

```

783 \def\IfBabelSelectorTF#1{%
784   \bbl@xin@{\bbl@select@name,}{,\zap@space#1 \@empty,}%
785   \ifin@
786     \expandafter\@firstoftwo
787   \else
788     \expandafter\@secondoftwo
789   \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.

```

790 \let\bbl@hyphlist\@empty
791 \let\bbl@hyphenation@relax
792 \let\bbl@pttnlist\@empty
793 \let\bbl@patterns@relax
794 \let\bbl@hymapsel\@cclv
795 \def\bbl@patterns#1{%
796   \language=\expandafter\ifx\csname l@#1:f@encoding\endcsname\relax
797     \csname l@#1\endcsname
798     \edef\bbl@tempa{#1}%
799   \else
800     \csname l@#1:f@encoding\endcsname
801     \edef\bbl@tempa{#1:f@encoding}%
802   \fi
803   \@expandtwoargs\bbl@usehooks{patterns}{#{1}}{\bbl@tempa}}%
804 % > luatex
805 \ifundefined{bbl@hyphenation@}{% Can be \relax!
806   \begingroup
807     \bbl@xin@{\number\language,}{,\bbl@hyphlist}%
808     \ifin@\else
809       \@expandtwoargs\bbl@usehooks{hyphenation}{#{1}}{\bbl@tempa}}%
810     \hyphenation{%
811       \bbl@hyphenation@
812       \ifundefined{bbl@hyphenation@#1}%
813         \@empty
814         {\space\csname bbl@hyphenation@#1\endcsname}}%
815     \xdef\bbl@hyphlist{\bbl@hyphlist\number\language,}%
816   \fi
817   \endgroup}}

```

hyphenrules It can be used to select *just* the hyphenation rules. It 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*`.

```

818 \def\hyphenrules#1{%
819   \edef\bbl@tempf{#1}%
820   \bbl@fixname\bbl@tempf
821   \bbl@iflanguage\bbl@tempf{%
822     \expandafter\bbl@patterns\expandafter{\bbl@tempf}%

```

```

823 \ifx\languageshorthands\@undefined\else
824 \languageshorthands{none}%
825 \fi
826 \expandafter\ifx\csname\bbl@tempf hyphenmins\endcsname\relax
827 \set@hyphenmins\tw@thr@@\relax
828 \else
829 \expandafter\expandafter\expandafter\set@hyphenmins
830 \csname\bbl@tempf hyphenmins\endcsname\relax
831 \fi}}
832 \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 `\(language)hyphenmins` is already defined this command has no effect.

```

833 \def\providehyphenmins#1#2{%
834 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
835 \@namedef{#1hyphenmins}{#2}%
836 \fi}

```

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

```

837 \def\set@hyphenmins#1#2{%
838 \lefthyphenmin#1\relax
839 \righthyphenmin#2\relax}

```

\ProvidesLanguage The identification code for each file is something that was introduced in $\text{\TeX 2.}\epsilon$. When the command `\ProvidesFile` does not exist, a dummy definition is provided temporarily. For use in the language definition file the command `\ProvidesLanguage` is defined by `babel`.

Depending on the format, ie, on if the former is defined, we use a similar definition or not.

```

840 \ifx\ProvidesFile\@undefined
841 \def\ProvidesLanguage#1[#2 #3 #4]{%
842 \wlog{Language: #1 #4 #3 <#2>}%
843 }
844 \else
845 \def\ProvidesLanguage#1{%
846 \begingroup
847 \catcode`\ 10 %
848 \@makeother\/%
849 \@ifnextchar[%]
850 {\@provideslanguage{#1}}{\@provideslanguage{#1}[]}}
851 \def\@provideslanguage#1[#2]{%
852 \wlog{Language: #1 #2}%
853 \expandafter\xdef\csname ver@#1.ldf\endcsname{#2}%
854 \endgroup}
855 \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`.

```

856 \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.

```

857 \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’:

```

858 \providecommand\setlocale{\bbl@error{not-yet-available}}{}{}{}
859 \let\uselocale\setlocale
860 \let\locale\setlocale
861 \let\selectlocale\setlocale
862 \let\textlocale\setlocale
863 \let\textlanguage\setlocale
864 \let\languagegettext\setlocale

```

4.2. Errors

\@nolanerr

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

\@noopterr When the package was loaded without options not everything will work as expected. An error message is issued in that case.

When the format knows about \PackageError it must be $\text{\LaTeX 2}_{\epsilon}$, 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.

```
865 \edef\bbl@nulllanguage{\string\language=0}
866 \def\bbl@nocaption{\protect\bbl@nocaption@i}
867 \def\bbl@nocaption@i#1#2{% 1: text to be printed 2: caption macro \langXname
868   \global\@namedef{#2}{\textbf{?#1?}}}%
869   \nameuse{#2}%
870 \edef\bbl@tempa{#1}%
871 \bbl@sreplace\bbl@tempa{name}{}}%
872 \bbl@warning{%
873   \@backslashchar#1 not set for '\language'. Please,\\%
874   define it after the language has been loaded\\%
875   (typically in the preamble) with:\\%
876   \string\setlocalecaption{\language}{\bbl@tempa}{.}\\%
877   Feel free to contribute on github.com/latex3/babel.\\%
878   Reported}}
879 \def\bbl@tentative{\protect\bbl@tentative@i}
880 \def\bbl@tentative@i#1{%
881   \bbl@warning{%
882     Some functions for '#1' are tentative.\\%
883     They might not work as expected and their behavior\\%
884     could change in the future.\\%
885     Reported}}
886 \def\@nolanerr#1{\bbl@error{undefined-language}{#1}{}}
887 \def\@nopatterns#1{%
888   \bbl@warning
889     {No hyphenation patterns were preloaded for\\%
890     the language '#1' into the format.\\%
891     Please, configure your TeX system to add them and\\%
892     rebuild the format. Now I will use the patterns\\%
893     preloaded for \bbl@nulllanguage\space instead}}
894 \let\bbl@usehooks@gobbletwo
895 \ifx\bbl@onlyswitch\empty\endinput\fi
```

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

4.3. More on selection

\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.

```
896 \bbl@trace{Defining babelensure}
897 \newcommand\babelensure[2][{}%
```



```

898 \AddBabelHook{babel-ensure}{afterextras}{%
899   \ifcase\bbbl@select@type
900     \bbbl@c{l}{e}%
901   \fi}%
902 \begingroup
903   \let\bbbl@ens@include\@empty
904   \let\bbbl@ens@exclude\@empty
905   \def\bbbl@ens@fontenc{\relax}%
906   \def\bbbl@tempb##1{%
907     \ifx\@empty##1\else\noexpand##1\expandafter\bbbl@tempb\fi}%
908   \edef\bbbl@tempa{\bbbl@tempb#1\@empty}%
909   \def\bbbl@tempb##1=##2\@{\@namedef{bbbl@ens@##1}{##2}}%
910   \bbbl@foreach\bbbl@tempa{\bbbl@tempb##1\@}%
911   \def\bbbl@tempc{\bbbl@ensure}%
912   \expandafter\bbbl@add\expandafter\bbbl@tempc\expandafter{%
913     \expandafter{\bbbl@ens@include}}%
914   \expandafter\bbbl@add\expandafter\bbbl@tempc\expandafter{%
915     \expandafter{\bbbl@ens@exclude}}%
916   \toks@\expandafter{\bbbl@tempc}%
917   \bbbl@exp{%
918     \endgroup
919     \def<bbbl@e@#2>{\the\toks@{\bbbl@ens@fontenc}}}%
920 \def\bbbl@ensure#1#2#3{% 1: include 2: exclude 3: fontenc
921   \def\bbbl@tempb##1{% elt for (excluding) \bbbl@captionslist list
922     \ifx##1\@undefined % 3.32 - Don't assume the macro exists
923       \edef##1{\noexpand\bbbl@nocaption
924         {\bbbl@stripslash##1}{\language\bbbl@stripslash##1}}%
925     \fi
926     \ifx##1\@empty\else
927       \in@{##1}{#2}%
928       \ifin@ \else
929         \bbbl@ifunset{bbbl@ensure@\language\bbbl@stripslash##1}%
930         {\bbbl@exp{%
931           \\DeclareRobustCommand\<bbbl@ensure@\language\bbbl@stripslash##1>[1]{%
932             \\foreignlanguage{\language\bbbl@stripslash##1}%
933             {\ifx\relax#3\else
934               \\fontencoding{#3}\\selectfont
935             \fi
936             #####1}}}%
937         }%
938         \toks@\expandafter{##1}%
939         \edef##1{%
940           \bbbl@csarg\noexpand{ensure@\language\bbbl@stripslash##1}%
941           {\the\toks@}}%
942       \fi
943       \expandafter\bbbl@tempb
944     \fi}%
945   \expandafter\bbbl@tempb\bbbl@captionslist\today\@empty
946   \def\bbbl@tempa##1{% elt for include list
947     \ifx##1\@empty\else
948       \bbbl@csarg\in@{ensure@\language\bbbl@stripslash##1}\expandafter{##1}%
949       \ifin@ \else
950         \bbbl@tempb##1\@empty
951       \fi
952       \expandafter\bbbl@tempa
953     \fi}%
954   \bbbl@tempa#1\@empty}
955 \def\bbbl@captionslist{%
956   \prefacename\refname\abstractname\bibname\chaptername\appendixname
957   \contentsname\listfigurename\listtablename\indexname\figurename
958   \tablename\partname\enclname\ccname\headtoname\pagename\seename
959   \alsoname\proofname\glossaryname}

```

4.4. 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.

```
960 \bbl@trace{Short tags}
961 \newcommand\babeltags[1]{%
962   \edef\bbl@tempa{\zap@space#1 \@empty}%
963   \def\bbl@tempb##1=##2\@{#1}%
964   \edef\bbl@tempc{%
965     \noexpand\newcommand
966     \expandafter\noexpand\csname ##1\endcsname{%
967       \noexpand\protect
968       \expandafter\noexpand\csname otherlanguage*\endcsname{##2}}
969     \noexpand\newcommand
970     \expandafter\noexpand\csname text##1\endcsname{%
971       \noexpand\foreignlanguage{##2}}
972   \bbl@tempc}%
973 \bbl@for\bbl@tempa\bbl@tempa{%
974   \expandafter\bbl@tempb\bbl@tempa\@{}}
```

4.5. Compatibility with language.def

Plain e-TeX doesn't rely on language.dat, but babel can be made compatible with this format easily.

```
975 \bbl@trace{Compatibility with language.def}
976 \ifx\directlua\@undefined\else
977   \ifx\bbl@luapatterns\@undefined
978     \input luabelabel.def
979   \fi
980 \fi
981 \ifx\bbl@languages\@undefined
982   \ifx\directlua\@undefined
983     \openin1 = language.def % TODO. Remove hardcoded number
984     \ifeof1
985       \closein1
986       \message{I couldn't find the file language.def}
987     \else
988       \closein1
989       \begingroup
990         \def\addlanguage#1#2#3#4#5{%
991           \expandafter\ifx\csname lang@#1\endcsname\relax\else
992             \global\expandafter\let\csname l@#1\endcsname\expandafter\endcsname
993             \csname lang@#1\endcsname
994           \fi}%
995         \def\uselanguage#1{%
996           \input language.def
997         \endgroup
998       \fi
999     \fi
1000 \chardef\l@english\z@
1001 \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.

```
1002 \def\addto#1#2{%
1003   \ifx#1\@undefined
1004     \def#1{#2}%
1005   \else
1006     \ifx#1\relax
```

```

1007     \def#1{#2}%
1008     \else
1009     {\toks@ \expandafter{#1#2}%
1010     \xdef#1{\the\toks@}}%
1011     \fi
1012 \fi}

```

4.6. 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.

```

1013 \bbl@trace{Hooks}
1014 \newcommand\AddBabelHook[3][ ]{%
1015   \bbl@i funset{\bbl@hk@#2}{\EnableBabelHook{#2}}}%
1016   \def\bbl@tempa##1,##3=##2,##3\@empty{\def\bbl@tempb{##2}}%
1017   \expandafter\bbl@tempa\bbl@evargs,##3=,\@empty
1018   \bbl@i funset{\bbl@ev@#2@#3@#1}%
1019   {\bbl@csarg\bbl@add{ev@#3@#1}{\bbl@elth{#2}}}%
1020   {\bbl@csarg\let{ev@#2@#3@#1}\relax}%
1021   \bbl@csarg\newcommand{ev@#2@#3@#1}{\bbl@tempb}}
1022 \newcommand\EnableBabelHook[1]{\bbl@csarg\let{hk@#1}\@firstofone}
1023 \newcommand\DisableBabelHook[1]{\bbl@csarg\let{hk@#1}\@gobble}
1024 \def\bbl@usehooks{\bbl@usehooks@lang\language}
1025 \def\bbl@usehooks@lang#1#2#3{% Test for Plain
1026   \ifx\UseHook\@undefined\else\UseHook{babel/*/#2}\fi
1027   \def\bbl@elth##1{%
1028     \bbl@cs{hk@##1}{\bbl@cs{ev@##1@#2@#3}}%
1029     \bbl@cs{ev@#2@#3}%
1030     \ifx\language\@undefined\else % Test required for Plain (?)
1031       \ifx\UseHook\@undefined\else\UseHook{babel/#1/#2}\fi
1032       \def\bbl@elth##1{%
1033         \bbl@cs{hk@##1}{\bbl@cs{ev@##1@#2@#3}}%
1034         \bbl@cs{ev@#2@#3}%
1035       \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).

```

1036 \def\bbl@evargs{,% <- don't delete this comma
1037   everylanguage=1,loadkernel=1,loadpatterns=1,loadexceptions=1,%
1038   adddialect=2,patterns=2,defaultcommands=0,encodedcommands=2,write=0,%
1039   beforeextras=0,afterextras=0,stopcommands=0,stringprocess=0,%
1040   hyphenation=2,initiateactive=3,afterreset=0,foreign=0,foreign*=0,%
1041   beforestart=0,language=2,beginndocument=1}
1042 \ifx\NewHook\@undefined\else % Test for Plain (?)
1043   \def\bbl@tempa#1=#2\@{ \NewHook{babel/#1}}
1044   \bbl@foreach\bbl@evargs{\bbl@tempa#1\@{ }
1045 \fi

```

Since the following command is meant for a hook (although a `LaTeXone`), it's placed here.

```

1046 \providecommand\PassOptionsToLocale[2]{%
1047   \bbl@csarg\bbl@add@list{passto@#2}{#1}}

```

4.7. 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`.

```

1048 \bbl@trace{Macros for setting language files up}
1049 \def\bbl@ldfinit{%
1050   \let\bbl@screset\@empty
1051   \let\BabelStrings\bbl@opt@string
1052   \let\BabelOptions\@empty
1053   \let\BabelLanguages\relax
1054   \ifx\originalTeX\@undefined
1055     \let\originalTeX\@empty
1056   \else
1057     \originalTeX
1058   \fi}
1059 \def\LdfInit#1#2{%
1060   \chardef\atcatcode=\catcode`\@
1061   \catcode`\@=11\relax
1062   \chardef\eqcatcode=\catcode`\=
1063   \catcode`\==12\relax
1064   \expandafter\if\expandafter\@backslashchar
1065     \expandafter\@car\string#2\@nil
1066   \ifx#2\@undefined\else
1067     \ldf@quit{#1}%
1068   \fi
1069 \else
1070   \expandafter\ifx\csname#2\endcsname\relax\else
1071     \ldf@quit{#1}%
1072   \fi
1073 \fi
1074 \bbl@ldfinit}

```

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

```

1075 \def\ldf@quit#1{%
1076   \expandafter\main@language\expandafter{#1}%
1077   \catcode`\@=\atcatcode \let\atcatcode\relax
1078   \catcode`\==\eqcatcode \let\eqcatcode\relax
1079   \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.

```

1080 \def\bbl@afterldf#1{%^A TODO. #1 is not used. Remove
1081   \bbl@afterlang
1082   \let\bbl@afterlang\relax
1083   \let\BabelModifiers\relax
1084   \let\bbl@screset\relax}%
1085 \def\ldf@finish#1{%
1086   \loadlocalcfg{#1}%
1087   \bbl@afterldf{#1}%
1088   \expandafter\main@language\expandafter{#1}%
1089   \catcode`\@=\atcatcode \let\atcatcode\relax
1090   \catcode`\==\eqcatcode \let\eqcatcode\relax}

```

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

```
1091 \@onlypreamble\LdfInit
1092 \@onlypreamble\ldf@quit
1093 \@onlypreamble\ldf@finish
```

\main@language

\bbl@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.

```
1094 \def\main@language#1{%
1095   \def\bbl@main@language{#1}%
1096   \let\language\main@language
1097   \let\localename\bbl@main@language
1098   \let\mainlocalename\bbl@main@language
1099   \bbl@id@assign
1100   \bbl@patterns{\language}}
```

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

The code written to the aux file attempts to avoid errors if babel is removed from the document.

```
1101 \def\bbl@beforestart{%
1102   \def\@nolanerr##1{%
1103     \bbl@carg\chardef{l@##1}\z@
1104     \bbl@warning{Undefined language '##1' in aux.\@Reported}}%
1105   \bbl@usehooks{beforestart}{}%
1106   \global\let\bbl@beforestart\relax}
1107 \AtBeginDocument{%
1108   {\@nameuse{bbl@beforestart}}% Group!
1109   \if@filesw
1110     \providecommand\babel@aux[2]{}%
1111     \immediate\write\@mainaux{unexpanded{%
1112       \providecommand\babel@aux[2]{\global\let\babel@toc\@gobbletwo}}}%
1113     \immediate\write\@mainaux{string\@nameuse{bbl@beforestart}}}%
1114   \fi
1115   \expandafter\selectlanguage\expandafter{\bbl@main@language}%
1116   \ifbbl@single % must go after the line above.
1117     \renewcommand\selectlanguage[1]{}%
1118     \renewcommand\foreignlanguage[2]{#2}%
1119     \global\let\babel@aux\@gobbletwo % Also as flag
1120   \fi}
1121 %
1122 \ifcase\bbl@engine\or
1123   \AtBeginDocument{\pagedir\bodydir} %^^A TODO - a better place
1124 \fi
```

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

```
1125 \def\select@language@x#1{%
1126   \ifcase\bbl@select@type
1127     \bbl@ifsamestring\language{#1}{\select@language{#1}}%
1128   \else
1129     \select@language{#1}%
1130   \fi}
```

4.8. Shorthands

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.

```
1131 \bbl@trace{Shorthands}
1132 \def\bbl@withactive#1#2{%
```

```

1133 \begingroup
1134 \lccode`~=`#2\relax
1135 \lowercase{\endgroup#1~}}

```

\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 \TeX 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.

```

1136 \def\bbl@add@special#1{% 1:a macro like \", \?, etc.
1137 \bbl@add\dospecials{\do#1}% test @sanitize = \relax, for back. compat.
1138 \bbl@ifunset{@sanitize}{\bbl@add@sanitize{\@makeother#1}}%
1139 \ifx\nfss@catcodes\undefined\else % TODO - same for above
1140 \begingroup
1141 \catcode`#1\active
1142 \nfss@catcodes
1143 \ifnum\catcode`#1=\active
1144 \endgroup
1145 \bbl@add\nfss@catcodes{\@makeother#1}%
1146 \else
1147 \endgroup
1148 \fi
1149 \fi}

```

\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).

```

1150 \def\bbl@active@def#1#2#3#4{%
1151 \namedef{#3#1}{%
1152 \expandafter\ifx\csname#2@sh@#1\endcsname\relax
1153 \bbl@afterelse\bbl@sh@select#2#1{#3@arg#1}{#4#1}%
1154 \else
1155 \bbl@afterfi\csname#2@sh@#1\endcsname
1156 \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.

```

1157 \long\namedef{#3@arg#1}##1{%
1158 \expandafter\ifx\csname#2@sh@#1@string##1\endcsname\relax
1159 \bbl@afterelse\csname#4#1\endcsname##1%
1160 \else
1161 \bbl@afterfi\csname#2@sh@#1@string##1\endcsname
1162 \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.

```

1163 \def\initiate@active@char#1{%
1164   \bbl@ifunset{active@char\string#1}%
1165   {\bbl@withactive
1166    {\expandafter\@initiate@active@char\expandafter}#1\string#1}%
1167   {}}

```

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).

```

1168 \def\@initiate@active@char#1#2#3{%
1169   \bbl@csarg\edef{oricat@#2}{\catcode`#2=\the\catcode`#2\relax}%
1170   \ifx#1\@undefined
1171     \bbl@csarg\def{oridef@#2}{\def#1{\active@prefix#1\@undefined}}%
1172   \else
1173     \bbl@csarg\let{oridef@#2}#1%
1174     \bbl@csarg\edef{oridef@#2}{%
1175       \let\noexpand#1%
1176       \expandafter\noexpand\csname bbl@oridef@#2\endcsname}%
1177   \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*).

```

1178   \ifx#1#3\relax
1179     \expandafter\let\csname normal@char#2\endcsname#3%
1180   \else
1181     \bbl@info{Making #2 an active character}%
1182     \ifnum\mathcode`#2=\ifodd\bbl@engine"1000000 \else"8000 \fi
1183     \@namedef{normal@char#2}{%
1184       \textormath{#3}{\csname bbl@oridef@#2\endcsname}}%
1185     \else
1186       \@namedef{normal@char#2}{#3}%
1187     \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).

```

1188   \bbl@restoreactive{#2}%
1189   \AtBeginDocument{%
1190     \catcode`#2\active
1191     \if@filesw
1192       \immediate\write\@mainaux{\catcode`\string#2\active}%
1193     \fi}%
1194   \expandafter\bbl@add@special\csname#2\endcsname
1195   \catcode`#2\active
1196   \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⟩).

```

1197   \let\bbl@tempa\@firstoftwo
1198   \if\string^#2%
1199     \def\bbl@tempa{\noexpand\textormath}%
1200   \else
1201     \ifx\bbl@mathnormal\@undefined\else
1202       \let\bbl@tempa\bbl@mathnormal
1203     \fi

```

```

1204 \fi
1205 \expandafter\edef\csname active@char#2\endcsname{%
1206   \bbl@tempa
1207   {\noexpand\if@safe@actives
1208     \noexpand\expandafter
1209     \expandafter\noexpand\csname normal@char#2\endcsname
1210     \noexpand\else
1211       \noexpand\expandafter
1212       \expandafter\noexpand\csname bbl@doactive#2\endcsname
1213     \noexpand\fi}%
1214   {\expandafter\noexpand\csname normal@char#2\endcsname}}%
1215 \bbl@csarg\edef{doactive#2}{%
1216   \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

$$\backslash active@prefix \langle char \rangle \backslash normal@char \langle char \rangle$$

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

```

1217 \bbl@csarg\edef{active@#2}{%
1218   \noexpand\active@prefix\noexpand#1%
1219   \expandafter\noexpand\csname active@char#2\endcsname}%
1220 \bbl@csarg\edef{normal@#2}{%
1221   \noexpand\active@prefix\noexpand#1%
1222   \expandafter\noexpand\csname normal@char#2\endcsname}%
1223 \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.

```

1224 \bbl@active@def#2\user@group{user@active}{language@active}%
1225 \bbl@active@def#2\language@group{language@active}{system@active}%
1226 \bbl@active@def#2\system@group{system@active}{normal@char}%

```

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

```

1227 \expandafter\edef\csname\user@group @sh#2@@\endcsname
1228   {\expandafter\noexpand\csname normal@char#2\endcsname}%
1229 \expandafter\edef\csname\user@group @sh#2@\string\protect@\endcsname
1230   {\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 $\backslash prim@s$ as well. Also, make sure that a single ' in math mode 'does the right thing'. (2) If we are using the caret (^) as a shorthand character special care should be taken to make sure math still works. Therefore an extra level of expansion is introduced with a check for math mode on the upper level.

```

1231 \if\string'#2%
1232   \let\prim@s\bbl@prim@s
1233   \let\active@math@prime#1%
1234 \fi
1235 \bbl@usehooks{initiateactive}{\#1}{\#2}{\#3}}

```

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

```

1236 << *More package options >> ≡
1237 \DeclareOption{math=active}{}
1238 \DeclareOption{math=normal}{\def\bbl@mathnormal{\noexpand\textormath}}
1239 << /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*.


```

1240 \@ifpackagewith{babel}{KeepShorthandsActive}%
1241 {\let\bbl@restoreactive\@gobble}%
1242 {\def\bbl@restoreactive#1{%
1243   \bbl@exp{%
1244     \\AfterBabelLanguage\\CurrentOption
1245     {\catcode`#1=\the\catcode`#1\relax}%
1246     \\AtEndOfPackage
1247     {\catcode`#1=\the\catcode`#1\relax}}}%
1248   \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.

```

1249 \def\bbl@sh@select#1#2{%
1250   \expandafter\ifx\csname#1@sh@#2@sel\endcsname\relax
1251     \bbl@afterelse\bbl@scndcs
1252   \else
1253     \bbl@afterfi\csname#1@sh@#2@sel\endcsname
1254   \fi}

```

\active@prefix 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.

```

1255 \beginingroup
1256 \bbl@ifunset{ifincsname}%^^A Ugly. Correct? Only Plain?
1257 {\gdef\active@prefix#1{%
1258   \ifx\protect\@typeset@protect
1259     \else
1260       \ifx\protect\@unexpandable@protect
1261         \noexpand#1%
1262       \else
1263         \protect#1%
1264       \fi
1265       \expandafter\@gobble
1266     \fi}}
1267 {\gdef\active@prefix#1{%
1268   \ifincsname
1269     \string#1%
1270     \expandafter\@gobble
1271   \else
1272     \ifx\protect\@typeset@protect
1273     \else
1274       \ifx\protect\@unexpandable@protect
1275         \noexpand#1%
1276       \else
1277         \protect#1%
1278       \fi
1279       \expandafter\expandafter\expandafter\@gobble
1280     \fi
1281   \fi}}
1282 \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@activestruer), 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`).

```
1283 \newif\if@safe@actives
1284 \@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.

```
1285 \def\bbl@restore@actives{\if@safe@actives\@safe@activesfalse\fi}
```

\bbl@activate

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

```
1286 \chardef\bbl@activated\z@
1287 \def\bbl@activate#1{%
1288   \chardef\bbl@activated\@ne
1289   \bbl@withactive{\expandafter\let\expandafter}#1%
1290   \csname bbl@active@\string#1\endcsname}
1291 \def\bbl@deactivate#1{%
1292   \chardef\bbl@activated\tw@
1293   \bbl@withactive{\expandafter\let\expandafter}#1%
1294   \csname bbl@normal@\string#1\endcsname}
```

\bbl@firstcs

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

```
1295 \def\bbl@firstcs#1#2{\csname#1\endcsname}
1296 \def\bbl@scndcs#1#2{\csname#2\endcsname}
```

\declare@shorthand 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.

```
1297 \def\babel@texpdf#1#2#3#4{%
1298   \ifx\texorpdfstring\undefined
1299     \textormath{#1}{#3}%
1300   \else
1301     \texorpdfstring{\textormath{#1}{#3}}{#2}%
1302     % \texorpdfstring{\textormath{#1}{#3}}{\textormath{#2}{#4}}%
1303   \fi}
1304 %
1305 \def\declare@shorthand#1#2{\@decl@short{#1}#2\@nil}
1306 \def\@decl@short#1#2#3\@nil#4{%
1307   \def\bbl@tempa{#3}%
1308   \ifx\bbl@tempa\@empty
1309     \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bbl@scndcs
1310     \bbl@ifunset{#1@sh@\string#2@}{}%
1311     {\def\bbl@tempa{#4}%
1312      \expandafter\ifx\csname#1@sh@\string#2@\endcsname\bbl@tempa
1313      \else
1314        \bbl@info
1315          {Redefining #1 shorthand \string#2\\%
1316           in language \CurrentOption}%
1317      \fi}%
1318   \@namedef{#1@sh@\string#2@}{#4}%
```

```

1319 \else
1320 \expandafter\let\csname #1@sh@\string#2@sel\endcsname\bb@firstcs
1321 \bb@ifunset{#1@sh@\string#2@\string#3@}{}%
1322 {\def\bb@tempa{#4}%
1323 \expandafter\ifx\csname#1@sh@\string#2@\string#3@\endcsname\bb@tempa
1324 \else
1325 \bb@info
1326 {Redefining #1 shorthand \string#2\string#3\\%
1327 in language \CurrentOption}%
1328 \fi}%
1329 \@namedef{#1@sh@\string#2@\string#3@}{#4}%
1330 \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.

```

1331 \def\textormath{%
1332 \ifmmode
1333 \expandafter\@secondoftwo
1334 \else
1335 \expandafter\@firstoftwo
1336 \fi}

```

\user@group

\language@group

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

```

1337 \def\user@group{user}
1338 \def\language@group{english} %^^A I don't like defaults
1339 \def\system@group{system}

```

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

```

1340 \def\usesshorthands{%
1341 \@ifstar\bb@usesesh@s{\bb@usesesh@x{}}
1342 \def\bb@usesesh@s#1{%
1343 \bb@usesesh@x
1344 {\AddBabelHook{babel-sh-\string#1}{afterextras}{\bb@activate{#1}}}%
1345 {#1}}
1346 \def\bb@usesesh@x#1#2{%
1347 \bb@ifshorthand{#2}%
1348 {\def\user@group{user}%
1349 \initiate@active@char{#2}%
1350 #1%
1351 \bb@activate{#2}}%
1352 {\bb@error{shorthand-is-off}{#2}{}}}

```

\defineshorthand Currently we only support two groups of user level shorthands, named internally `user` and `user@(\language)` (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.

```

1353 \def\user@language@group{user@\language@group}
1354 \def\bb@set@user@generic#1#2{%
1355 \bb@ifunset{user@generic@active#1}%
1356 {\bb@active@def#1\user@language@group{user@active}{user@generic@active}%
1357 \bb@active@def#1\user@group{user@generic@active}{language@active}%
1358 \expandafter\edef\csname#2@sh@#1@\endcsname{%
1359 \expandafter\noexpand\csname normal@char#1\endcsname}%

```

```

1360 \expandafter\edef\csname#2@sh@#1\string\protect@endcsname{%
1361 \expandafter\noexpand\csname user@active#1@endcsname}}%
1362 \@empty}
1363 \newcommand\defineshorthand[3][user]{%
1364 \edef\bbl@tempa{\zap@space#1 \@empty}%
1365 \bbl@for\bbl@tempb\bbl@tempa{%
1366 \if*\expandafter\@car\bbl@tempb\@nil
1367 \edef\bbl@tempb{user@\expandafter\@gobble\bbl@tempb}%
1368 \@expandtwoargs
1369 \bbl@setuser@generic{\expandafter\string\@car#2\@nil}\bbl@tempb
1370 \fi
1371 \declare@shorthand{\bbl@tempb}{#2}{#3}}

```

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

```

1372 \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".

```

1373 \def\aliasshorthand#1#2{%
1374 \bbl@ifshorthand{#2}%
1375 {\expandafter\ifx\csname active@char\string#2@endcsname\relax
1376 \ifx\document\@notprerr
1377 \@notshorthand{#2}%
1378 \else
1379 \initiate@active@char{#2}%
1380 \bbl@ccarg\let{active@char\string#2}{active@char\string#1}%
1381 \bbl@ccarg\let{normal@char\string#2}{normal@char\string#1}%
1382 \bbl@activate{#2}%
1383 \fi
1384 \fi}%
1385 {\bbl@error{shorthand-is-off}{#2}{}}}

```

\@notshorthand

```

1386 \def\@notshorthand#1{\bbl@error{not-a-shorthand}{#1}{}}

```

\shorthandon

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

```

1387 \newcommand*\shorthandon[1]{\bbl@switch@sh\@ne#1\@nnil}
1388 \DeclareRobustCommand*\shorthandoff{%
1389 \@ifstar{\bbl@shorthandoff\tw@}{\bbl@shorthandoff\z@}}
1390 \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.

```

1391 \def\bbl@switch@sh#1#2{%
1392 \ifx#2\@nnil\else
1393 \bbl@ifunset{\bbl@active@\string#2}%
1394 {\bbl@error{not-a-shorthand-b}{#2}{}}%
1395 {\ifcase#1% off, on, off*
1396 \catcode`#212\relax

```

```

1397 \or
1398 \catcode`#2\active
1399 \bbl@ifunset{bbl@shdef@\string#2}%
1400 {}%
1401 {\bbl@withactive{\expandafter\let\expandafter}#2%
1402 \csname bbl@shdef@\string#2\endcsname
1403 \bbl@csarg\let{shdef@\string#2}\relax}%
1404 \ifcase\bbl@activated\or
1405 \bbl@activate{#2}%
1406 \else
1407 \bbl@deactivate{#2}%
1408 \fi
1409 \or
1410 \bbl@ifunset{bbl@shdef@\string#2}%
1411 {\bbl@withactive{\bbl@csarg\let{shdef@\string#2}}#2}%
1412 {}%
1413 \csname bbl@oricat@\string#2\endcsname
1414 \csname bbl@oridef@\string#2\endcsname
1415 \fi}%
1416 \bbl@afterfi\bbl@switch@sh#1%
1417 \fi}

```

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

```

1418 \def\babelshorthand{\active@prefix\babelshorthand\bbl@putsh}
1419 \def\bbl@putsh#1{%
1420 \bbl@ifunset{bbl@active@\string#1}%
1421 {\bbl@putsh@i#1\@empty\@nnil}%
1422 {\csname bbl@active@\string#1\endcsname}}
1423 \def\bbl@putsh@i#1#2\@nnil{%
1424 \csname\language@group @sh@\string#1@%
1425 \ifx\@empty#2\else\string#2@\fi\endcsname}
1426 %
1427 \ifx\bbl@opt@shorthands\@nnil\else
1428 \let\bbl@s@initiate@active@char\initiate@active@char
1429 \def\initiate@active@char#1{%
1430 \bbl@ifshorthand{#1}{\bbl@s@initiate@active@char{#1}}{}}
1431 \let\bbl@s@switch@sh\bbl@switch@sh
1432 \def\bbl@switch@sh#1#2{%
1433 \ifx#2\@nnil\else
1434 \bbl@afterfi
1435 \bbl@ifshorthand{#2}{\bbl@s@switch@sh#1{#2}}{\bbl@switch@sh#1}%
1436 \fi}
1437 \let\bbl@s@activate\bbl@activate
1438 \def\bbl@activate#1{%
1439 \bbl@ifshorthand{#1}{\bbl@s@activate{#1}}{}}
1440 \let\bbl@s@deactivate\bbl@deactivate
1441 \def\bbl@deactivate#1{%
1442 \bbl@ifshorthand{#1}{\bbl@s@deactivate{#1}}{}}
1443 \fi

```

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

```

1444 \newcommand\ifbabelshorthand[3]{\bbl@ifunset{bbl@active@\string#1}{#3}{#2}}

```

\bbl@prim@s

\bbl@pr@m@s One of the internal macros that are involved in substituting \prime for each right quote in 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.

```

1445 \def\bbl@prim@s{%
1446 \prime\futurelet\@let@token\bbl@pr@m@s}
1447 \def\bbl@if@primes#1#2{%
1448 \ifx#1\@let@token

```

```

1449 \expandafter\@firstoftwo
1450 \else\ifx#2\@let@token
1451 \bbl@afterelse\expandafter\@firstoftwo
1452 \else
1453 \bbl@afterfi\expandafter\@secondoftwo
1454 \fi\fi}
1455 \begingroup
1456 \catcode\^=7 \catcode\*= \active \lccode\*= \^
1457 \catcode\'=12 \catcode\"= \active \lccode\"= \'
1458 \lowercase{%
1459 \gdef\bbl@pr@m@s{%
1460 \bbl@if@primes" '%
1461 \pr@@s
1462 {\bbl@if@primes*\pr@@t\egroup}}
1463 \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).

```

1464 \initiate@active@char{~}
1465 \declare@shorthand{system}{~}{\leavevmode\nobreak\ }
1466 \bbl@activate{~}

```

\OT1dqpos

\T1dqpos 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.

```

1467 \expandafter\def\csname OT1dqpos\endcsname{127}
1468 \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

```

1469 \ifx\f@encoding\undefined
1470 \def\f@encoding{OT1}
1471 \fi

```

4.9. 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.

```

1472 \bbl@trace{Language attributes}
1473 \newcommand\languageattribute[2]{%
1474 \def\bbl@tempc{#1}%
1475 \bbl@fixname\bbl@tempc
1476 \bbl@iflanguage\bbl@tempc{%
1477 \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.

```

1478 \ifx\bbl@known@attrs\undefined
1479 \in@false
1480 \else
1481 \bbl@xin@{\,\bbl@tempc-##1,}{\,\bbl@known@attrs,}%
1482 \fi
1483 \ifin@

```

```

1484      \bbl@warning{%
1485          You have more than once selected the attribute '##1'\%
1486          for language #1. Reported}%
1487      \else

```

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

```

1488      \bbl@exp{%
1489          \\bbl@add@list\\bbl@known@attribs{\bbl@tempc-##1}}%
1490      \edef\bbl@tempa{\bbl@tempc-##1}%
1491      \expandafter\bbl@ifknown@ttrib\expandafter{\bbl@tempa}\bbl@attributes%
1492      {\csname\bbl@tempc @attr##1\endcsname}%
1493      {\@attrerr{\bbl@tempc}{##1}}%
1494      \fi}}
1495 \onlypreamble\languageattribute

```

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

```

1496 \newcommand*{\@attrerr}[2]{%
1497     \bbl@error{unknown-attribute}{#1}{#2}{}}

```

\bbl@declare@ttribute This command adds the new language/attribute combination to the list of known attributes.

Then it defines a control sequence to be executed when the attribute is used in a document. The result of this should be that the macro `\extras...` for the current language is extended, otherwise the attribute will not work as its code is removed from memory at `\begin{document}`.

```

1498 \def\bbl@declare@ttribute#1#2#3{%
1499     \bbl@xin@{,#2,}{,\BabelModifiers,}%
1500     \ifin@
1501         \AfterBabelLanguage{#1}{\languageattribute{#1}{#2}}%
1502     \fi
1503     \bbl@add@list\bbl@attributes{#1-#2}%
1504     \expandafter\def\csname#1@attr#2\endcsname{#3}}

```

\bbl@ifattributeset This internal macro has 4 arguments. It can be used to interpret T_EX code based on whether a certain attribute was set. This command should appear inside the argument to `\AtBeginDocument` because the attributes are set in the document preamble, *after* babel is loaded.

The first argument is the language, the second argument the attribute being checked, and the third and fourth arguments are the true and false clauses.

```

1505 \def\bbl@ifattributeset#1#2#3#4{%
1506     \ifx\bbl@known@attribs\@undefined
1507         \in@false
1508     \else
1509         \bbl@xin@{,#1-#2,}{,\bbl@known@attribs,}%
1510     \fi
1511     \ifin@
1512         \bbl@afterelse#3%
1513     \else
1514         \bbl@afterfi#4%
1515     \fi}

```

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

We first assume the attribute is unknown. Then we loop over the list of known attributes, trying to find a match.

```

1516 \def\bbl@ifknown@ttrib#1#2{%
1517     \let\bbl@tempa\@secondoftwo
1518     \bbl@loopx\bbl@tempb{#2}{%
1519         \expandafter\in@\expandafter{\expandafter,\bbl@tempb,}{,#1,}%
1520     \ifin@
1521         \let\bbl@tempa\@firstoftwo

```

```

1522 \else
1523 \fi}%
1524 \bbl@tempa}

```

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

```

1525 \def\bbl@clear@ttribs{%
1526 \ifx\bbl@attributes\undefined\else
1527 \bbl@loopx\bbl@tempa{\bbl@attributes}{%
1528 \expandafter\bbl@clear@ttrib\bbl@tempa.}%
1529 \let\bbl@attributes\undefined
1530 \fi}
1531 \def\bbl@clear@ttrib#1-#2.{%
1532 \expandafter\let\csname#1@attr@#2\endcsname\undefined}
1533 \AtBeginDocument{\bbl@clear@ttribs}

```

4.10. Support for saving and redefining macros

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

\babel@beginsave The initialization of a new save cycle: reset the counter to zero.

```

1534 \bbl@trace{Macros for saving definitions}
1535 \def\babel@beginsave{\babel@savecnt\z@}

```

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

```

1536 \newcount\babel@savecnt
1537 \babel@beginsave

```

\babel@save

\babel@savevariable The macro `\babel@save{csname}` saves the current meaning of the control sequence `<csname>` to `\originalTeX` (which has to be expandable, i. e. you shouldn't let it to `\relax`). 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.

```

1538 \def\babel@save#1{%
1539 \def\bbl@tempa{{, #1,}}% Clumsy, for Plain
1540 \expandafter\bbl@add\expandafter\bbl@tempa\expandafter{%
1541 \expandafter{\expandafter, \bbl@savextras,}}%
1542 \expandafter\in@\bbl@tempa
1543 \ifin@ \else
1544 \bbl@add\bbl@savextras{, #1,}%
1545 \bbl@carg\let\babel@number\babel@savecnt\#1\relax
1546 \toks@ \expandafter{\originalTeX\let#1=}%
1547 \bbl@exp{%
1548 \def\\originalTeX{\the\toks@<\babel@number\babel@savecnt>\relax}}%
1549 \advance\babel@savecnt@ne
1550 \fi}
1551 \def\babel@savevariable#1{%
1552 \toks@ \expandafter{\originalTeX #1=}%
1553 \bbl@exp{\def\\originalTeX{\the\toks@ \the#1\relax}}}

```


\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`.

```
1554 \def\bbl@redefine#1{%
1555   \edef\bbl@tempa{\bbl@stripslash#1}%
1556   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
1557   \expandafter\def\csname\bbl@tempa\endcsname}
1558 \@onlypreamble\bbl@redefine
```

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

```
1559 \def\bbl@redefine@long#1{%
1560   \edef\bbl@tempa{\bbl@stripslash#1}%
1561   \expandafter\let\csname org@\bbl@tempa\endcsname#1%
1562   \long\expandafter\def\csname\bbl@tempa\endcsname}
1563 \@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`.

```
1564 \def\bbl@redefineroobust#1{%
1565   \edef\bbl@tempa{\bbl@stripslash#1}%
1566   \bbl@ifunset{\bbl@tempa\space}%
1567   {\expandafter\let\csname org@\bbl@tempa\endcsname#1%
1568    \bbl@exp{\def\#1{\protect\<\bbl@tempa\space>}}}%
1569   {\bbl@exp{\let\<org@\bbl@tempa>\<\bbl@tempa\space>}}}%
1570   \@namedef{\bbl@tempa\space}}
1571 \@onlypreamble\bbl@redefineroobust
```

4.11. French spacing

\bbl@frenchspacing

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

```
1572 \def\bbl@frenchspacing{%
1573   \ifnum\the\sfcodes\<.\<.\m
1574   \let\bbl@nonfrenchspacing\relax
1575   \else
1576     \frenchspacing
1577     \let\bbl@nonfrenchspacing\nonfrenchspacing
1578   \fi}
1579 \let\bbl@nonfrenchspacing\nonfrenchspacing
```

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.

```
1580 \let\bbl@elt\relax
1581 \edef\bbl@fs@chars{%
1582   \bbl@elt{\string.}\@m{3000}\bbl@elt{\string?}\@m{3000}%
1583   \bbl@elt{\string!}\@m{3000}\bbl@elt{\string:}\@m{2000}%
1584   \bbl@elt{\string;}\@m{1500}\bbl@elt{\string,}\@m{1250}}
1585 \def\bbl@pre@fs{%
1586   \def\bbl@elt##1##2##3{\sfcodes`##1=\the\sfcodes`##1\relax}%
1587   \edef\bbl@save@sfcodes{\bbl@fs@chars}%
1588   \def\bbl@post@fs{%
1589     \bbl@save@sfcodes
1590     \edef\bbl@tempa{\bbl@cl{frspc}}%
1591     \edef\bbl@tempa{\expandafter\@car\bbl@tempa\@nil}%
```

```

1592 \if u\bbbl@tempa      % do nothing
1593 \else\if n\bbbl@tempa  % non french
1594   \def\bbbl@elt##1##2##3{%
1595     \ifnum\sfcode`##1=##2\relax
1596       \babel@savevariable{\sfcode`##1}%
1597       \sfcode`##1=##3\relax
1598     \fi}%
1599   \bbbl@fs@chars
1600 \else\if y\bbbl@tempa   % french
1601   \def\bbbl@elt##1##2##3{%
1602     \ifnum\sfcode`##1=##3\relax
1603       \babel@savevariable{\sfcode`##1}%
1604       \sfcode`##1=##2\relax
1605     \fi}%
1606   \bbbl@fs@chars
1607 \fi\fi\fi}

```

4.12. Hyphens

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

```

1608 \bbbl@trace{Hyphens}
1609 \@onlypreamble\babelhyphenation
1610 \AtEndOfPackage{%
1611   \newcommand\babelhyphenation[2][\@empty]{%
1612     \ifx\bbbl@hyphenation@\relax
1613       \let\bbbl@hyphenation@\@empty
1614     \fi
1615     \ifx\bbbl@hyphlist\@empty\else
1616       \bbbl@warning{%
1617         You must not intermingle \string\selectlanguage\space and\\%
1618         \string\babelhyphenation\space or some exceptions will not\\%
1619         be taken into account. Reported}%
1620       \fi
1621       \ifx\@empty#1%
1622         \protected@edef\bbbl@hyphenation@{\bbbl@hyphenation@\space#2}%
1623       \else
1624         \bbbl@vforeach{#1}{%
1625           \def\bbbl@tempa{##1}%
1626           \bbbl@fixname\bbbl@tempa
1627           \bbbl@iflanguage\bbbl@tempa{%
1628             \bbbl@csarg\protected@edef{hyphenation@\bbbl@tempa}{%
1629               \bbbl@ifunset{bbbl@hyphenation@\bbbl@tempa}%
1630               {}%
1631               {\csname bbl@hyphenation@\bbbl@tempa\endcsname\space}%
1632               #2}}}%
1633         \fi}}

```

\babelhyphenmins Only \LaTeX (basically because it's defined with a \LaTeX tool).

```

1634 \ifx\NewDocumentCommand\@undefined\else
1635   \NewDocumentCommand\babelhyphenmins{sommo}{%
1636     \IfNoValueTF{#2}%
1637       {\protected@edef\bbbl@hyphenmins@{\set@hyphenmins{#3}{#4}}}%
1638       \IfValueT{#5}{%
1639         \protected@edef\bbbl@hyphenatmin@{\hyphenationmin=#5\relax}}%
1640       \IfBooleanT{#1}{%
1641         \lefthyphenmin=#3\relax
1642         \righthyphenmin=#4\relax
1643         \IfValueT{#5}{\hyphenationmin=#5\relax}}}%
1644     {\edef\bbbl@tempb{\zap@space#2 \@empty}%

```

```

1645 \bbl@for\bbl@tempa\bbl@tempb{%
1646 \namedef\bbl@hyphenmins@bbl@tempa{\set@hyphenmins{#3}{#4}}%
1647 \IfValueT{#5}{%
1648 \namedef\bbl@hyphenatmin@bbl@tempa{\hyphenationmin=#5\relax}}}%
1649 \IfBooleanT{#1}{\bbl@error{hyphenmins-args}{}}{}}
1650 \fi

```

\bbl@allowhyphens This macro makes hyphenation possible. Basically its definition is nothing more than `\nobreak\hskip 0pt plus 0pt`. \TeX begins and ends a word for hyphenation at a glue node. The penalty prevents a linebreak at this glue node.

```

1651 \def\bbl@allowhyphens{\ifvmode\else\nobreak\hskip\z@skip\fi}
1652 \def\bbl@t@one{T1}
1653 \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`.

```

1654 \newcommand\babelnullhyphen{\char\hyphenchar\font}
1655 \def\babelhyphen{\active@prefix\babelhyphen\bbl@hyphen}
1656 \def\bbl@hyphen{%
1657 \ifstar{\bbl@hyphen@i @}{\bbl@hyphen@i \@empty}}
1658 \def\bbl@hyphen@i#1#2{%
1659 \bbl@iifunset\bbl@hy@#1#2\@empty}%
1660 {\csname bbl@#1usehyphen\endcsname{\discretionary{#2}{}{#2}}}%
1661 {\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.

```

1662 \def\bbl@usehyphen#1{%
1663 \leavevmode
1664 \ifdim\lastskip>\z@\mbox{#1}\else\nobreak#1\fi
1665 \nobreak\hskip\z@skip}
1666 \def\bbl@@usehyphen#1{%
1667 \leavevmode\ifdim\lastskip>\z@\mbox{#1}\else#1\fi}

```

The following macro inserts the hyphen char.

```

1668 \def\bbl@hyphenchar{%
1669 \ifnum\hyphenchar\font=\m@ne
1670 \babelnullhyphen
1671 \else
1672 \char\hyphenchar\font
1673 \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.

```

1674 \def\bbl@hy@soft{\bbl@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
1675 \def\bbl@hy@@soft{\bbl@@usehyphen{\discretionary{\bbl@hyphenchar}{}}{}}
1676 \def\bbl@hy@hard{\bbl@usehyphen\bbl@hyphenchar}
1677 \def\bbl@hy@@hard{\bbl@@usehyphen\bbl@hyphenchar}
1678 \def\bbl@hy@nobreak{\bbl@usehyphen{\mbox{\bbl@hyphenchar}}}
1679 \def\bbl@hy@@nobreak{\mbox{\bbl@hyphenchar}}
1680 \def\bbl@hy@repeat{%
1681 \bbl@usehyphen{%
1682 \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}
1683 \def\bbl@hy@@repeat{%
1684 \bbl@@usehyphen{%
1685 \discretionary{\bbl@hyphenchar}{\bbl@hyphenchar}{\bbl@hyphenchar}}}

```

```

1686 \def\bbl@hy@empty{\hskip\z@skip}
1687 \def\bbl@hy@@empty{\discretionary{}{}{}}

```

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

```

1688 \def\bbl@disc#1#2{\nobreak\discretionary{#2-}{}{#1}\bbl@allowhyphens}

```

4.13. 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.

```

1689 \bbl@trace{Multiencoding strings}
1690 \def\bbl@tglobal#1{\global\let#1#1}

```

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

```

1691 << *More package options >> ≡
1692 \DeclareOption{nocase}{}
1693 << /More package options >>

```

The following package options control the behavior of \SetString.

```

1694 << *More package options >> ≡
1695 \let\bbl@opt@strings\@nnil % accept strings=value
1696 \DeclareOption{strings}{\def\bbl@opt@strings{\BabelStringsDefault}}
1697 \DeclareOption{strings=encoded}{\let\bbl@opt@strings\relax}
1698 \def\BabelStringsDefault{generic}
1699 << /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.

```

1700 \@onlypreamble\StartBabelCommands
1701 \def\StartBabelCommands{%
1702   \begingroup
1703   \@tempcnta="7F
1704   \def\bbl@tempa{%
1705     \ifnum\@tempcnta>"FF\else
1706       \catcode\@tempcnta=11
1707       \advance\@tempcnta\@ne
1708       \expandafter\bbl@tempa
1709     \fi}%
1710   \bbl@tempa
1711   <@Macros local to BabelCommands@>
1712   \def\bbl@provstring##1##2{%
1713     \providecommand##1{##2}%
1714     \bbl@tglobal##1}%
1715   \global\let\bbl@scafter\@empty
1716   \let\StartBabelCommands\bbl@startcmds
1717   \ifx\BabelLanguages\relax
1718     \let\BabelLanguages\CurrentOption
1719   \fi
1720   \begingroup
1721   \let\bbl@screset\@nnil % local flag - disable 1st stopcommands
1722   \StartBabelCommands}
1723 \def\bbl@startcmds{%
1724   \ifx\bbl@screset\@nnil\else
1725     \bbl@usehooks{stopcommands}{}%
1726   \fi
1727   \endgroup

```

```

1728 \beginngroup
1729 \@ifstar
1730   {\ifx\bbbl@opt@strings\@nnil
1731     \let\bbbl@opt@strings\BabelStringsDefault
1732     \fi
1733     \bbbl@startcmds@i}%
1734   \bbbl@startcmds@i}
1735 \def\bbbl@startcmds@i#1#2{%
1736   \edef\bbbl@L{\zap@space#1 \@empty}%
1737   \edef\bbbl@G{\zap@space#2 \@empty}%
1738   \bbbl@startcmds@ii}
1739 \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.

```

1740 \newcommand\bbbl@startcmds@ii[1][\@empty]{%
1741   \let\SetString\@gobbletwo
1742   \let\bbbl@stringdef\@gobbletwo
1743   \let\AfterBabelCommands\@gobble
1744   \ifx\@empty#1%
1745     \def\bbbl@sc@label{generic}%
1746     \def\bbbl@encstring##1##2{%
1747       \ProvideTextCommandDefault##1{##2}%
1748       \bbbl@tglobal##1%
1749       \expandafter\bbbl@tglobal\csname\string?\string##1\endcsname}%
1750     \let\bbbl@sctest\in@true
1751   \else
1752     \let\bbbl@sc@charset\space % <- zapped below
1753     \let\bbbl@sc@fontenc\space % <- " "
1754     \def\bbbl@tempa##1=##2\@nil{%
1755       \bbbl@csarg\edef{sc@zap@space##1 \@empty}{##2 }}%
1756     \bbbl@vforeach{label=#1}{\bbbl@tempa##1\@nil}%
1757     \def\bbbl@tempa##1 ##2{% space -> comma
1758       ##1%
1759       \ifx\@empty##2\else\ifx,##1,\else,\fi\bbbl@afterfi\bbbl@tempa##2\fi}%
1760     \edef\bbbl@sc@fontenc{\expandafter\bbbl@tempa\bbbl@sc@fontenc\@empty}%
1761     \edef\bbbl@sc@label{\expandafter\zap@space\bbbl@sc@label\@empty}%
1762     \edef\bbbl@sc@charset{\expandafter\zap@space\bbbl@sc@charset\@empty}%
1763     \def\bbbl@encstring##1##2{%
1764       \bbbl@foreach\bbbl@sc@fontenc{%
1765         \bbbl@ifunset{T@####1}%
1766         }%
1767         {\ProvideTextCommand##1{####1}{##2}%
1768         \bbbl@tglobal##1%
1769         \expandafter
1770         \bbbl@tglobal\csname####1\string##1\endcsname}}}%
1771     \def\bbbl@sctest{%
1772       \bbbl@xin@{\bbbl@opt@strings,}{,\bbbl@sc@label,\bbbl@sc@fontenc,}}%
1773   \fi
1774   \ifx\bbbl@opt@strings\@nnil % ie, no strings key -> defaults
1775   \else\ifx\bbbl@opt@strings\relax % ie, strings=encoded
1776     \let\AfterBabelCommands\bbbl@aftercmds
1777     \let\SetString\bbbl@setstring
1778     \let\bbbl@stringdef\bbbl@encstring
1779   \else % ie, strings=value
1780     \bbbl@sctest

```

```

1781 \ifin@
1782 \let\AfterBabelCommands\bbbl@aftercmds
1783 \let\SetString\bbbl@setstring
1784 \let\bbbl@stringdef\bbbl@provstring
1785 \fi\fi\fi
1786 \bbbl@scswitch
1787 \ifx\bbbl@G\@empty
1788 \def\SetString##1##2{%
1789 \bbbl@error{missing-group}{##1}{}}}%
1790 \fi
1791 \ifx\@empty#1%
1792 \bbbl@usehooks{defaultcommands}{}%
1793 \else
1794 \@expandtwoargs
1795 \bbbl@usehooks{encodedcommands}{\bbbl@sc@charset}\bbbl@sc@fontenc}}%
1796 \fi}

```

There are two versions of `\bbbl@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 (`\bbbl@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 `\bbbl@forlang` loops `\bbbl@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 `\bbbl@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).

```

1797 \def\bbbl@forlang#1#2{%
1798 \bbbl@for#1\bbbl@L{%
1799 \bbbl@xin@{, #1, }{, \BabelLanguages, }%
1800 \ifin@#2\relax\fi}}
1801 \def\bbbl@scswitch{%
1802 \bbbl@forlang\bbbl@tempa{%
1803 \ifx\bbbl@G\@empty\else
1804 \ifx\SetString\@gobbletwo\else
1805 \edef\bbbl@GL{\bbbl@G\bbbl@tempa}%
1806 \bbbl@xin@{, \bbbl@GL, }{, \bbbl@screset, }%
1807 \ifin@else
1808 \global\expandafter\let\csname\bbbl@GL\endcsname\@undefined
1809 \xdef\bbbl@screset{\bbbl@screset, \bbbl@GL}%
1810 \fi
1811 \fi
1812 \fi}}
1813 \AtEndOfPackage{%
1814 \def\bbbl@forlang#1#2{\bbbl@for#1\bbbl@L{\bbbl@ifunset{date#1}{}}{#2}}}%
1815 \let\bbbl@scswitch\relax}
1816 \@onlypreamble\EndBabelCommands
1817 \def\EndBabelCommands{%
1818 \bbbl@usehooks{stopcommands}{}%
1819 \endgroup
1820 \endgroup
1821 \bbbl@scafter}
1822 \let\bbbl@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.

```

1823 \def\bbbl@setstring#1#2{% eg, \prefacename{<string>}
1824 \bbbl@forlang\bbbl@tempa{%
1825 \edef\bbbl@LC{\bbbl@tempa\bbbl@stripslash#1}%
1826 \bbbl@ifunset{\bbbl@LC}% eg, \germanchaptername

```

```

1827     {\bbl@exp{%
1828       \global\bbbl@add\<\bbl@G\bbl@tempa>{\bbbl@scset\#1\<\bbl@LC>}}}%
1829     }%
1830     \def\BabelString{#2}%
1831     \bbl@usehooks{stringprocess}{}%
1832     \expandafter\bbl@stringdef
1833     \csname\bbl@LC\expandafter\endcsname\expandafter{\BabelString}}

```

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

```

1834 \def\bbl@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.

```

1835 <<*Macros local to BabelCommands>> ≡
1836 \def\SetStringLoop##1##2{%
1837   \def\bbl@templ####1{\expandafter\noexpand\csname##1\endcsname}%
1838   \count@\z@
1839   \bbl@loop\bbl@tempa{##2}{% empty items and spaces are ok
1840     \advance\count@\@ne
1841     \toks@\expandafter{\bbl@tempa}%
1842     \bbl@exp{%
1843       \\SetString\bbl@templ{\romannumeral\count@}{\the\toks@}%
1844       \count@=\the\count@\relax}}}%
1845 <</Macros local to BabelCommands>>

```

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

```

1846 \def\bbl@aftercmds#1{%
1847   \toks@\expandafter{\bbl@scafter#1}%
1848   \xdef\bbl@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.

```

1849 <<*Macros local to BabelCommands>> ≡
1850 \newcommand\SetCase[3][{}]{%
1851   \def\bbl@tempa####1####2{%
1852     \ifx####1\@empty\else
1853       \bbl@carg\bbl@add{extras\CurrentOption}{%
1854         \bbl@carg\babel@save{c__text_uppercase\_string####1_tl}%
1855         \bbl@carg\def{c__text_uppercase\_string####1_tl}{####2}%
1856         \bbl@carg\babel@save{c__text_lowercase\_string####2_tl}%
1857         \bbl@carg\def{c__text_lowercase\_string####2_tl}{####1}}%
1858       \expandafter\bbl@tempa
1859     \fi}%
1860   \bbl@tempa##1\@empty\@empty
1861   \bbl@carg\bbl@toglobal{extras\CurrentOption}}%
1862 <</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.

```

1863 <<*Macros local to BabelCommands>> ≡
1864 \newcommand\SetHyphenMap[1]{%
1865   \bbl@forlang\bbl@tempa{%
1866     \expandafter\bbl@stringdef
1867     \csname\bbl@tempa @bbl@hyphenmap\endcsname{##1}}}%
1868 <</Macros local to BabelCommands>>

```

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

```

1869 \newcommand\BabelLower[2]{% one to one.
1870   \ifnum\lccode#1=#2\else

```

```

1871 \babel@savevariable{\lccode#1}%
1872 \lccode#1=#2\relax
1873 \fi}
1874 \newcommand\BabelLowerMM[4]{% many-to-many
1875 \@tempcnta=#1\relax
1876 \@tempcntb=#4\relax
1877 \def\bbl@tempa{%
1878 \ifnum\@tempcnta>#2\else
1879 \expandafter\BabelLower{\the\@tempcnta}{\the\@tempcntb}%
1880 \advance\@tempcnta#3\relax
1881 \advance\@tempcntb#3\relax
1882 \expandafter\bbl@tempa
1883 \fi}%
1884 \bbl@tempa}
1885 \newcommand\BabelLowerM0[4]{% many-to-one
1886 \@tempcnta=#1\relax
1887 \def\bbl@tempa{%
1888 \ifnum\@tempcnta>#2\else
1889 \expandafter\BabelLower{\the\@tempcnta}{#4}%
1890 \advance\@tempcnta#3
1891 \expandafter\bbl@tempa
1892 \fi}%
1893 \bbl@tempa}

```

The following package options control the behavior of hyphenation mapping.

```

1894 << *More package options >> ≡
1895 \DeclareOption{hyphenmap=off}{\chardef\bbl@opt@hyphenmap\z@}
1896 \DeclareOption{hyphenmap=first}{\chardef\bbl@opt@hyphenmap\@ne}
1897 \DeclareOption{hyphenmap=select}{\chardef\bbl@opt@hyphenmap\tw@}
1898 \DeclareOption{hyphenmap=other}{\chardef\bbl@opt@hyphenmap\thr@@}
1899 \DeclareOption{hyphenmap=other*}{\chardef\bbl@opt@hyphenmap4\relax}
1900 << /More package options >>

```

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

```

1901 \AtEndOfPackage{%
1902 \ifx\bbl@opt@hyphenmap\@undefined
1903 \bbl@xin@{,}{\bbl@language@opts}%
1904 \chardef\bbl@opt@hyphenmap\ifin@4\else\@ne\fi
1905 \fi}

```

4.14. Tailor captions

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.

```

1906 \newcommand\setlocalecaption{%^^A Catch typos.
1907 \@ifstar\bbl@setcaption@s\bbl@setcaption@x}
1908 \def\bbl@setcaption@x#1#2#3{% language caption-name string
1909 \bbl@trim@def\bbl@tempa{#2}%
1910 \bbl@xin@{.template}{\bbl@tempa}%
1911 \ifin@
1912 \bbl@ini@captions@template{#3}{#1}%
1913 \else
1914 \edef\bbl@tempd{%
1915 \expandafter\expandafter\expandafter
1916 \strip@prefix\expandafter\meaning\csname captions#1\endcsname}%
1917 \bbl@xin@
1918 {\expandafter\string\csname #2name\endcsname}%
1919 {\bbl@tempd}%
1920 \ifin@ % Renew caption
1921 \bbl@xin@{\string\bbl@scset}{\bbl@tempd}%
1922 \ifin@
1923 \bbl@exp{%
1924 \\bbl@ifsamestring{\bbl@tempa}{\language\name}%

```



```

1925         {\bbl@scset\<#2name>\<#1#2name>}%
1926     }}%
1927     \else % Old way converts to new way
1928         \bbl@ifunset{#1#2name}%
1929         {\bbl@exp{%
1930             \\bbl@add\<captions#1>\{def\<#2name>\<#1#2name>}}%
1931             \\bbl@ifsamestring{\bbl@tempa}{\language}%
1932             {\def\<#2name>\<#1#2name>}}%
1933         }}%
1934     }%
1935     \fi
1936 \else
1937     \bbl@xin@{\string\bbl@scset}{\bbl@tempd}% New
1938     \ifin@ % New way
1939         \bbl@exp{%
1940             \\bbl@add\<captions#1>\{\\bbl@scset\<#2name>\<#1#2name>}}%
1941             \\bbl@ifsamestring{\bbl@tempa}{\language}%
1942             {\bbl@scset\<#2name>\<#1#2name>}}%
1943         }}%
1944     \else % Old way, but defined in the new way
1945         \bbl@exp{%
1946             \\bbl@add\<captions#1>\{def\<#2name>\<#1#2name>}}%
1947             \\bbl@ifsamestring{\bbl@tempa}{\language}%
1948             {\def\<#2name>\<#1#2name>}}%
1949         }}%
1950     \fi%
1951 \fi
1952 \@namedef{#1#2name}{#3}%
1953 \toks@{\expandafter\bbl@captionslist}%
1954 \bbl@exp{\in@{\<#2name>}{\the\toks@}}%
1955 \ifin@else
1956     \bbl@exp{\bbl@add\bbl@captionslist{\<#2name>}}%
1957     \bbl@tglobal\bbl@captionslist
1958 \fi
1959 \fi}
1960 %^^A \def\bbl@setcaption@s#1#2#3{} % Not yet implemented (w/o 'name')

```

4.15. 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 Tlenc.def.

\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.

```

1961 \bbl@trace{Macros related to glyphs}
1962 \def\set@low@box#1{\setbox\tw@hbox{,}\setbox\z@hbox{#1}%
1963     \dimen\z@ht\z@ \advance\dimen\z@ -\ht\tw@%
1964     \setbox\z@hbox{\lower\dimen\z@ \box\z@}\ht\z@ \ht\tw@ \dp\z@\dp\tw@}

```

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

```

1965 \def\save@sf@q#1{\leavevmode
1966     \begingroup
1967     \edef\@SF{\spacefactor\the\spacefactor}\#1\@SF
1968     \endgroup}

```

4.15.1. 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.

```

1969 \ProvideTextCommand{\quotedblbase}{OT1}{%

```

```

1970 \save@sf@q{\set@low@box{\textquotedblright\}}%
1971 \box\z@\kern-.04em\bbbl@allowhyphens}}

```

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

```

1972 \ProvideTextCommandDefault{\quotedblbase}{%
1973 \UseTextSymbol{OT1}{\quotedblbase}}

```

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

```

1974 \ProvideTextCommand{\quotesinglbase}{OT1}{%
1975 \save@sf@q{\set@low@box{\textquoteright\}}%
1976 \box\z@\kern-.04em\bbbl@allowhyphens}}

```

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

```

1977 \ProvideTextCommandDefault{\quotesinglbase}{%
1978 \UseTextSymbol{OT1}{\quotesinglbase}}

```

\guillemetleft

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

```

1979 \ProvideTextCommand{\guillemetleft}{OT1}{%
1980 \ifmmode
1981 \ll
1982 \else
1983 \save@sf@q{\nobreak
1984 \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bbbl@allowhyphens}%
1985 \fi}
1986 \ProvideTextCommand{\guillemetright}{OT1}{%
1987 \ifmmode
1988 \gg
1989 \else
1990 \save@sf@q{\nobreak
1991 \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bbbl@allowhyphens}%
1992 \fi}
1993 \ProvideTextCommand{\guillemotleft}{OT1}{%
1994 \ifmmode
1995 \ll
1996 \else
1997 \save@sf@q{\nobreak
1998 \raise.2ex\hbox{$\scriptscriptstyle\ll$}\bbbl@allowhyphens}%
1999 \fi}
2000 \ProvideTextCommand{\guillemotright}{OT1}{%
2001 \ifmmode
2002 \gg
2003 \else
2004 \save@sf@q{\nobreak
2005 \raise.2ex\hbox{$\scriptscriptstyle\gg$}\bbbl@allowhyphens}%
2006 \fi}

```

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

```

2007 \ProvideTextCommandDefault{\guillemetleft}{%
2008 \UseTextSymbol{OT1}{\guillemetleft}}
2009 \ProvideTextCommandDefault{\guillemetright}{%
2010 \UseTextSymbol{OT1}{\guillemetright}}
2011 \ProvideTextCommandDefault{\guillemotleft}{%
2012 \UseTextSymbol{OT1}{\guillemotleft}}
2013 \ProvideTextCommandDefault{\guillemotright}{%
2014 \UseTextSymbol{OT1}{\guillemotright}}

```

\guilsinglleft

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

```

2015 \ProvideTextCommand{\guilsinglleft}{OT1}{%
2016   \ifmmode
2017     <%
2018   \else
2019     \save@sf@q{\nobreak
2020       \raise.2ex\hbox{$\scriptscriptstyle<$}\bbl@allowhyphens}%
2021   \fi}
2022 \ProvideTextCommand{\guilsinglright}{OT1}{%
2023   \ifmmode
2024     >%
2025   \else
2026     \save@sf@q{\nobreak
2027       \raise.2ex\hbox{$\scriptscriptstyle>$}\bbl@allowhyphens}%
2028   \fi}

```

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

```

2029 \ProvideTextCommandDefault{\guilsinglleft}{%
2030   \UseTextSymbol{OT1}{\guilsinglleft}}
2031 \ProvideTextCommandDefault{\guilsinglright}{%
2032   \UseTextSymbol{OT1}{\guilsinglright}}

```

4.15.2. Letters

\ij

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

```

2033 \DeclareTextCommand{\ij}{OT1}{%
2034   i\kern-0.02em\bbl@allowhyphens j}
2035 \DeclareTextCommand{\IJ}{OT1}{%
2036   I\kern-0.02em\bbl@allowhyphens J}
2037 \DeclareTextCommand{\ij}{T1}{\char188}
2038 \DeclareTextCommand{\IJ}{T1}{\char156}

```

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

```

2039 \ProvideTextCommandDefault{\ij}{%
2040   \UseTextSymbol{OT1}{\ij}}
2041 \ProvideTextCommandDefault{\IJ}{%
2042   \UseTextSymbol{OT1}{\IJ}}

```

\dj

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

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

```

2043 \def\crrtic@{\hrule height0.1ex width0.3em}
2044 \def\crrtic@{\hrule height0.1ex width0.33em}
2045 \def\ddj@{%
2046   \setbox0\hbox{d}\dimen@=\ht0
2047   \advance\dimen@lex
2048   \dimen@.45\dimen@
2049   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2050   \advance\dimen@ii.5ex
2051   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
2052 \def\DDJ@{%
2053   \setbox0\hbox{D}\dimen@=.55\ht0
2054   \dimen@ii\expandafter\rem@pt\the\fontdimen\@ne\font\dimen@
2055   \advance\dimen@ii.15ex % correction for the dash position
2056   \advance\dimen@ii-.15\fontdimen7\font % correction for cmtt font
2057   \dimen\thr@@\expandafter\rem@pt\the\fontdimen7\font\dimen@
2058   \leavevmode\rlap{\raise\dimen@\hbox{\kern\dimen@ii\vbox{\crrtic@}}}}
2059 %

```

```

2060 \DeclareTextCommand{\dj}{OT1}{\ddj@ d}
2061 \DeclareTextCommand{\DJ}{OT1}{\DDJ@ D}

```

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

```

2062 \ProvideTextCommandDefault{\dj}{%
2063   \UseTextSymbol{OT1}{\dj}}
2064 \ProvideTextCommandDefault{\DJ}{%
2065   \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.

```

2066 \DeclareTextCommand{\SS}{OT1}{SS}
2067 \ProvideTextCommandDefault{\SS}{\UseTextSymbol{OT1}{\SS}}

```

4.15.3. 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

\grq The ‘german’ single quotes.

```

2068 \ProvideTextCommandDefault{\glq}{%
2069   \textormath{\quotesinglbase}{\mbox{\quotesinglbase}}}

```

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

```

2070 \ProvideTextCommand{\grq}{T1}{%
2071   \textormath{\kern\z@\textquoteleft}{\mbox{\textquoteleft}}}
2072 \ProvideTextCommand{\grq}{TU}{%
2073   \textormath{\textquoteleft}{\mbox{\textquoteleft}}}
2074 \ProvideTextCommand{\grq}{OT1}{%
2075   \save@sf@q{\kern-.0125em
2076     \textormath{\textquoteleft}{\mbox{\textquoteleft}}}%
2077     \kern.07em\relax}}
2078 \ProvideTextCommandDefault{\grq}{\UseTextSymbol{OT1}\grq}

```

\glqq

\grqq The ‘german’ double quotes.

```

2079 \ProvideTextCommandDefault{\glqq}{%
2080   \textormath{\quotedblbase}{\mbox{\quotedblbase}}}

```

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

```

2081 \ProvideTextCommand{\grqq}{T1}{%
2082   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
2083 \ProvideTextCommand{\grqq}{TU}{%
2084   \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}
2085 \ProvideTextCommand{\grqq}{OT1}{%
2086   \save@sf@q{\kern-.07em
2087     \textormath{\textquotedblleft}{\mbox{\textquotedblleft}}}%
2088     \kern.07em\relax}}
2089 \ProvideTextCommandDefault{\grqq}{\UseTextSymbol{OT1}\grqq}

```

\flq

\frq The ‘french’ single guillemets.

```

2090 \ProvideTextCommandDefault{\flq}{%
2091   \textormath{\guilsinglleft}{\mbox{\guilsinglleft}}}
2092 \ProvideTextCommandDefault{\frq}{%
2093   \textormath{\guilsinglright}{\mbox{\guilsinglright}}}

```

\flqq

\frqq The ‘french’ double guillemets.

```
2094 \ProvideTextCommandDefault{\flqq}{%
2095   \textormath{\guillemetleft}{\mbox{\guillemetleft}}}
2096 \ProvideTextCommandDefault{\frqq}{%
2097   \textormath{\guillemetright}{\mbox{\guillemetright}}}
```

4.15.4. 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

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

```
2098 \def\umlauthigh{%
2099   \def\bbl@umlauta##1{\leavevmode\bgroup%
2100     \accent\csname\fontencoding dqpos\endcsname
2101     ##1\bbl@allowhyphens\egroup}%
2102   \let\bbl@umlaute\bbl@umlauta}
2103 \def\umlautlow{%
2104   \def\bbl@umlauta{\protect\lower@umlaut}}
2105 \def\umlautelower{%
2106   \def\bbl@umlaute{\protect\lower@umlaut}}
2107 \umlauthigh
```

\lower@umlaut 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.

```
2108 \expandafter\ifx\csname U@D\endcsname\relax
2109   \csname newdimen\endcsname U@D
2110 \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.

```
2111 \def\lower@umlaut#1{%
2112   \leavevmode\bgroup
2113   \U@D lex%
2114   {\setbox\z@\hbox{%
2115     \char\csname\fontencoding dqpos\endcsname}%
2116     \dimen@ -.45ex\advance\dimen@\ht\z@
2117     \ifdim lex<\dimen@ \fontdimen5\font\dimen@ \fi}%
2118   \accent\csname\fontencoding dqpos\endcsname
2119   \fontdimen5\font\U@D #1%
2120   \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).

```
2121 \AtBeginDocument{%
2122   \DeclareTextCompositeCommand{\}{OT1}{a}{\bbl@umlauta{a}}%
2123   \DeclareTextCompositeCommand{\}{OT1}{e}{\bbl@umlaute{e}}%
2124   \DeclareTextCompositeCommand{\}{OT1}{i}{\bbl@umlaute{i}}%
```

```

2125 \DeclareTextCompositeCommand{"}{OT1}{i}{\bbl@umlaut{i}}%
2126 \DeclareTextCompositeCommand{"}{OT1}{o}{\bbl@umlaut{o}}%
2127 \DeclareTextCompositeCommand{"}{OT1}{u}{\bbl@umlaut{u}}%
2128 \DeclareTextCompositeCommand{"}{OT1}{A}{\bbl@umlaut{A}}%
2129 \DeclareTextCompositeCommand{"}{OT1}{E}{\bbl@umlaut{E}}%
2130 \DeclareTextCompositeCommand{"}{OT1}{I}{\bbl@umlaut{I}}%
2131 \DeclareTextCompositeCommand{"}{OT1}{O}{\bbl@umlaut{O}}%
2132 \DeclareTextCompositeCommand{"}{OT1}{U}{\bbl@umlaut{U}}%

```

Finally, make sure the default hyphenrules are defined (even if empty). For internal use, another empty `\language` is defined. Currently used in Amharic.

```

2133 \ifx\l@english\@undefined
2134 \chardef\l@english\z@
2135 \fi
2136 % The following is used to cancel rules in ini files (see Amharic).
2137 \ifx\l@unhyphenated\@undefined
2138 \newlanguage\l@unhyphenated
2139 \fi

```

4.16. Layout

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

```

2140 \bbl@trace{Bidi layout}
2141 \providecommand\IfBabelLayout[3]{#3}%

```

4.17. 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.

```

2142 \bbl@trace{Input engine specific macros}
2143 \ifcase\bbl@engine
2144 \input txtbabel.def
2145 \or
2146 \input luababel.def
2147 \or
2148 \input xebabel.def
2149 \fi
2150 \providecommand\babelfont{\bbl@error{only-lua-xe}}{}{}{}
2151 \providecommand\babelprehyphenation{\bbl@error{only-lua}}{}{}{}
2152 \ifx\babelposthyphenation\@undefined
2153 \let\babelposthyphenation\babelprehyphenation
2154 \let\babelpatterns\babelprehyphenation
2155 \let\babelcharproperty\babelprehyphenation
2156 \fi
2157 </package | core>

```

4.18. 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.

```

2158 <*package>
2159 \bbl@trace{Creating languages and reading ini files}
2160 \let\bbl@extend@ini\gobble
2161 \newcommand\babelprovide[2][]{%
2162 \let\bbl@savelangname\languagename
2163 \edef\bbl@savelocaleid{\the\localeid}%
2164 % Set name and locale id
2165 \edef\languagename{#2}%
2166 \bbl@id@assign
2167 % Initialize keys

```

```

2168 \bbl@vforeach{captions,date,import,main,script,language,%
2169     hyphenrules,linebreaking,justification,mapfont,maparabic,%
2170     mapdigits,intraspaces,intrapenalty,onchar,transforms,alph,%
2171     Alph,labels,labels*,calendar,date,casing,interchar,@import}%
2172 {\bbl@csarg\let{KVP@##1}\@nnil}%
2173 \global\let\bbl@release@transforms\@empty
2174 \global\let\bbl@release@casing\@empty
2175 \let\bbl@calendars\@empty
2176 \global\let\bbl@inidata\@empty
2177 \global\let\bbl@extend@ini\@gobble
2178 \global\let\bbl@included@inis\@empty
2179 \gdef\bbl@key@list{;}%
2180 \bbl@ifunset{bbl@passo@#2}%
2181 {\def\bbl@tempa{#1}}%
2182 {\bbl@exp{\def\\bbl@tempa{[bbl@passo@#2],\unexpanded{#1}}}%
2183 \expandafter\bbl@forkv\expandafter{\bbl@tempa}{%
2184 \in@{/}{#1}% With /, (re)sets a value in the ini
2185 \ifin@
2186 \global\let\bbl@extend@ini\bbl@extend@ini@aux
2187 \bbl@renewinikey##1\@{#2}%
2188 \else
2189 \bbl@csarg\ifx{KVP@##1}\@nnil\else
2190 \bbl@error{unknown-provide-key}{#1}{}%
2191 \fi
2192 \bbl@csarg\def{KVP@##1}{#2}%
2193 \fi}%
2194 \chardef\bbl@howloaded=0:none; 1:ldf without ini; 2:ini
2195 \bbl@ifunset{date#2}\z{\bbl@ifunset{bbl@llevel@#2}\one\tw@}%
2196 % == init ==
2197 \ifx\bbl@screset\@undefined
2198 \bbl@ldfinit
2199 \fi
2200 % ==
2201 \ifx\bbl@KVP@import\@nnil\else \ifx\bbl@KVP@import\@nnil
2202 \def\bbl@KVP@import{\@empty}%
2203 \fi\fi
2204 % == date (as option) ==
2205 % \ifx\bbl@KVP@date\@nnil\else
2206 % \fi
2207 % ==
2208 \let\bbl@lbkflag\relax % \@empty = do setup linebreak, only in 3 cases:
2209 \ifcase\bbl@howloaded
2210 \let\bbl@lbkflag\@empty % new
2211 \else
2212 \ifx\bbl@KVP@hyphenrules\@nnil\else
2213 \let\bbl@lbkflag\@empty
2214 \fi
2215 \ifx\bbl@KVP@import\@nnil\else
2216 \let\bbl@lbkflag\@empty
2217 \fi
2218 \fi
2219 % == import, captions ==
2220 \ifx\bbl@KVP@import\@nnil\else
2221 \bbl@exp{\bbl@ifblank{\bbl@KVP@import}}%
2222 {\ifx\bbl@initoload\relax
2223 \begingroup
2224 \def\BabelBeforeIni##1##2{\gdef\bbl@KVP@import{##1}\endinput}%
2225 \bbl@input@texini{#2}%
2226 \endgroup
2227 \else
2228 \xdef\bbl@KVP@import{\bbl@initoload}%
2229 \fi}%
2230 {}%

```

```

2231 \let\bbl@KVP@date\@empty
2232 \fi
2233 \let\bbl@KVP@captions@\bbl@KVP@captions %^^A A dirty hack
2234 \ifx\bbl@KVP@captions\@nnil
2235 \let\bbl@KVP@captions\bbl@KVP@import
2236 \fi
2237 % ==
2238 \ifx\bbl@KVP@transforms\@nnil\else
2239 \bbl@replace\bbl@KVP@transforms{ }{,}%
2240 \fi
2241 % == Load ini ==
2242 \ifcase\bbl@howloaded
2243 \bbl@provide@new{#2}%
2244 \else
2245 \bbl@ifblank{#1}%
2246 {}% With \bbl@load@basic below
2247 {\bbl@provide@renew{#2}}%
2248 \fi
2249 % == include == TODO
2250 % \ifx\bbl@included@inis\@empty\else
2251 % \bbl@replace\bbl@included@inis{ }{,}%
2252 % \bbl@foreach\bbl@included@inis{%
2253 % \openin\bbl@readstream=babel-##1.ini
2254 % \bbl@extend@ini{#2}}%
2255 % \closein\bbl@readstream
2256 % \fi
2257 % Post tasks
2258 % -----
2259 % == subsequent calls after the first provide for a locale ==
2260 \ifx\bbl@inidata\@empty\else
2261 \bbl@extend@ini{#2}%
2262 \fi
2263 % == ensure captions ==
2264 \ifx\bbl@KVP@captions\@nnil\else
2265 \bbl@ifunset{bbl@extracaps@#2}%
2266 {\bbl@exp{\\babelensure[exclude=\\today]{#2}}}%
2267 {\bbl@exp{\\babelensure[exclude=\\today,
2268 include=\\bbl@extracaps@#2]}{#2}}%
2269 \bbl@ifunset{bbl@ensure@\\language}%
2270 {\bbl@exp{%
2271 \\DeclareRobustCommand\<bbl@ensure@\\language>[1]{%
2272 \\foreignlanguage{\\language}%
2273 {###1}}}%
2274 }%
2275 \bbl@exp{%
2276 \\bbl@tglobal\<bbl@ensure@\\language>%
2277 \\bbl@tglobal\<bbl@ensure@\\language\space>%
2278 \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.

```

2279 \bbl@load@basic{#2}%
2280 % == script, language ==
2281 % Override the values from ini or defines them
2282 \ifx\bbl@KVP@script\@nnil\else
2283 \bbl@csarg\edef{sname@#2}{\bbl@KVP@script}%
2284 \fi
2285 \ifx\bbl@KVP@language\@nnil\else
2286 \bbl@csarg\edef{lname@#2}{\bbl@KVP@language}%
2287 \fi
2288 \ifcase\bbl@engine\or
2289 \bbl@ifunset{bbl@chrng@\\language}{}%

```



```

2290     {\directlua{
2291       Babel.set_chranges_b('\bbl@cl{sbcpr}', '\bbl@cl{chrng}') }}%
2292 \fi
2293 % == Line breaking: intraspace, intrapenalty ==
2294 % For CJK, East Asian, Southeast Asian, if interspace in ini
2295 \ifx\bbl@KVP@intraspace\@nnil\else % We can override the ini or set
2296   \bbl@csarg\edef{intsp@#2}{\bbl@KVP@intraspace}%
2297 \fi
2298 \bbl@provide@intraspace
2299 % == Line breaking: justification ==
2300 \ifx\bbl@KVP@justification\@nnil\else
2301   \let\bbl@KVP@linebreaking\bbl@KVP@justification
2302 \fi
2303 \ifx\bbl@KVP@linebreaking\@nnil\else
2304   \bbl@xin@{,\bbl@KVP@linebreaking,}%
2305   {,elongated,kashida,cjk,padding,unhyphenated,}%
2306   \ifin@
2307     \bbl@csarg\xdef
2308       {lnbrk@\language\name}{\expandafter\@car\bbl@KVP@linebreaking\@nil}%
2309   \fi
2310 \fi
2311 \bbl@xin@{/e}{/\bbl@cl{lnbrk}}%
2312 \ifin@ \else \bbl@xin@{/k}{/\bbl@cl{lnbrk}} \fi
2313 \ifin@\bbl@arabicjust \fi
2314 % WIP
2315 \bbl@xin@{/p}{/\bbl@cl{lnbrk}}%
2316 \ifin@\AtBeginDocument{\@nameuse{bbl@tibetanjust}} \fi
2317 % == Line breaking: hyphenate.other.(locale|script) ==
2318 \ifx\bbl@lbkflag\@empty
2319   \bbl@ifunset{bbl@hyotl@\language\name}{}%
2320   {\bbl@csarg\bbl@replace{hyotl@\language\name}{ }{,}%
2321     \bbl@startcommands*{\language\name}{}%
2322     \bbl@csarg\bbl@foreach{hyotl@\language\name}{%
2323       \ifcase\bbl@engine
2324         \ifnum##1<257
2325           \SetHyphenMap{\BabelLower{##1}{##1}}%
2326         \fi
2327       \else
2328         \SetHyphenMap{\BabelLower{##1}{##1}}%
2329       \fi}%
2330   \bbl@endcommands}%
2331 \bbl@ifunset{bbl@hyots@\language\name}{}%
2332 {\bbl@csarg\bbl@replace{hyots@\language\name}{ }{,}%
2333   \bbl@csarg\bbl@foreach{hyots@\language\name}{%
2334     \ifcase\bbl@engine
2335       \ifnum##1<257
2336         \global\lccode##1=##1\relax
2337       \fi
2338     \else
2339       \global\lccode##1=##1\relax
2340     \fi}}%
2341 \fi
2342 % == Counters: maparabic ==
2343 % Native digits, if provided in ini (TeX level, xe and lua)
2344 \ifcase\bbl@engine\else
2345   \bbl@ifunset{bbl@dgnat@\language\name}{}%
2346   {\expandafter\ifx\csname bbl@dgnat@\language\name\endcsname\@empty\else
2347     \expandafter\expandafter\expandafter
2348     \bbl@setdigits\csname bbl@dgnat@\language\name\endcsname
2349     \ifx\bbl@KVP@maparabic\@nnil\else
2350       \ifx\bbl@latinarabic\@undefined
2351         \expandafter\let\expandafter\@arabic
2352         \csname bbl@counter@\language\name\endcsname

```

```

2353         \else      % ie, if layout=counters, which redefines \@arabic
2354             \expandafter\let\expandafter\bbl@latinarabic
2355             \csname bbl@counter@\language\endcsname
2356         \fi
2357     \fi
2358 \fi}%
2359 \fi
2360 % == Counters: mapdigits ==
2361 % > luababel.def
2362 % == Counters: alph, Alph ==
2363 \ifx\bbl@KVP@alph\@nnil\else
2364     \bbl@exp{%
2365         \\bbl@add\<bbl@preextras@\language\>{%
2366             \\bbl@save\\@alph
2367             \let\\@alph\<bbl@cntr@\bbl@KVP@alph @\language\>}}%
2368 \fi
2369 \ifx\bbl@KVP@Alph\@nnil\else
2370     \bbl@exp{%
2371         \\bbl@add\<bbl@preextras@\language\>{%
2372             \\bbl@save\\@Alph
2373             \let\\@Alph\<bbl@cntr@\bbl@KVP@Alph @\language\>}}%
2374 \fi
2375 % == Casing ==
2376 \bbl@release@casing
2377 \ifx\bbl@KVP@casing\@nnil\else
2378     \bbl@csarg\xdef{casing@\language}%
2379     {\@nameuse{bbl@casing@\language}}\bbl@maybextx\bbl@KVP@casing}%
2380 \fi
2381 % == Calendars ==
2382 \ifx\bbl@KVP@calendar\@nnil
2383     \edef\bbl@KVP@calendar{\bbl@cl{calpr}}%
2384 \fi
2385 \def\bbl@tempe##1 ##2\@{ % Get first calendar
2386     \def\bbl@tempa{##1}}%
2387     \bbl@exp{\\bbl@tempe\bbl@KVP@calendar\space\\@}%
2388 \def\bbl@tempe##1.##2.##3\@{ %
2389     \def\bbl@tempc{##1}%
2390     \def\bbl@tempb{##2}}%
2391 \expandafter\bbl@tempe\bbl@tempa.\@
2392 \bbl@csarg\xdef{calpr@\language}{%
2393     \ifx\bbl@tempc\@empty\else
2394         calendar=\bbl@tempc
2395     \fi
2396     \ifx\bbl@tempb\@empty\else
2397         ,variant=\bbl@tempb
2398     \fi}%
2399 % == engine specific extensions ==
2400 % Defined in XXXbabel.def
2401 \bbl@provide@extra{#2}%
2402 % == require.babel in ini ==
2403 % To load or reload the babel-*.tex, if require.babel in ini
2404 \ifx\bbl@beforestart\relax\else % But not in doc aux or body
2405     \bbl@ifunset{bbl@rqtex@\language}{}%
2406     {\expandafter\ifx\csname bbl@rqtex@\language\endcsname\@empty\else
2407         \let\BabelBeforeIni\@gobbletwo
2408         \chardef\atcatcode=\catcode\@
2409         \catcode\@=11\relax
2410         \def\CurrentOption{#2}%
2411         \bbl@input{texini{\bbl@cs{rqtex@\language}}}%
2412         \catcode\@=\atcatcode
2413         \let\atcatcode\relax
2414         \global\bbl@csarg\let{rqtex@\language}\relax
2415     \fi}%

```

```

2416 \bbl@foreach\bbl@calendars{%
2417 \bbl@ifunset\bbl@ca@##1}{%
2418 \chardef\atcatcode=\catcode\@
2419 \catcode\@=11\relax
2420 \InputIfFileExists{babel-ca-##1.tex}{}}{%
2421 \catcode\@=\atcatcode
2422 \let\atcatcode\relax}%
2423 }}%
2424 \fi
2425 % == frenchspacing ==
2426 \ifcase\bbl@howloaded\in@true\else\in@false\fi
2427 \ifin@else\bbl@xin@{typography/frenchspacing}{\bbl@key@list}\fi
2428 \ifin@
2429 \bbl@extras@wrap{\bbl@pre@fs}%
2430 {\bbl@pre@fs}%
2431 {\bbl@post@fs}%
2432 \fi
2433 % == transforms ==
2434 % > luababel.def
2435 \def\CurrentOption{#2}%
2436 \@nameuse{\bbl@icsave@#2}%
2437 % == main ==
2438 \ifx\bbl@KVP@main\@nnil % Restore only if not 'main'
2439 \let\language\bbl@savelangname
2440 \chardef\localeid\bbl@savelocaleid\relax
2441 \fi
2442 % == hyphenrules (apply if current) ==
2443 \ifx\bbl@KVP@hyphenrules\@nnil\else
2444 \ifnum\bbl@savelocaleid=\localeid
2445 \language\@nameuse{l\language}%
2446 \fi
2447 \fi}

```

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

```

2448 \def\bbl@provide@new#1{%
2449 \namedef{date#1}{}% marks lang exists - required by \StartBabelCommands
2450 \namedef{extras#1}{}%
2451 \namedef{noextras#1}{}%
2452 \bbl@startcommands*{#1}{captions}%
2453 \ifx\bbl@KVP@captions\@nnil % and also if import, implicit
2454 \def\bbl@tempb##1{% elt for \bbl@captionslist
2455 \ifx##1\@nnil\else
2456 \bbl@exp{%
2457 \SetString\##1{%
2458 \bbl@nocaption{\bbl@stripslash##1}{#1\bbl@stripslash##1}}}%
2459 \expandafter\bbl@tempb
2460 \fi}%
2461 \expandafter\bbl@tempb\bbl@captionslist\@nnil
2462 \else
2463 \ifx\bbl@initoload\relax
2464 \bbl@read@ini{\bbl@KVP@captions}2% % Here letters cat = 11
2465 \else
2466 \bbl@read@ini{\bbl@initoload}2% % Same
2467 \fi
2468 \fi
2469 \StartBabelCommands*{#1}{date}%
2470 \ifx\bbl@KVP@date\@nnil
2471 \bbl@exp{%
2472 \SetString\today{\bbl@nocaption{today}{#1today}}}%
2473 \else
2474 \bbl@savetoday
2475 \bbl@savedate

```

```

2476 \fi
2477 \bbl@endcommands
2478 \bbl@load@basic{#1}%
2479 % == hyphenmins == (only if new)
2480 \bbl@exp{%
2481 \gdef\<#1hyphenmins>{%
2482 {\bbl@ifunset{\bbl@lfthm@#1}{2}{\bbl@cs{lfthm@#1}}}%
2483 {\bbl@ifunset{\bbl@rgthm@#1}{3}{\bbl@cs{rgthm@#1}}}%
2484 % == hyphenrules (also in renew) ==
2485 \bbl@provide@hyphens{#1}%
2486 \ifx\bbl@KVP@main\@nnil\else
2487 \expandafter\main@language\expandafter{#1}%
2488 \fi}
2489 %
2490 \def\bbl@provide@renew#1{%
2491 \ifx\bbl@KVP@captions\@nnil\else
2492 \StartBabelCommands*{#1}{captions}%
2493 \bbl@read@ini{\bbl@KVP@captions}2% % Here all letters cat = 11
2494 \EndBabelCommands
2495 \fi
2496 \ifx\bbl@KVP@date\@nnil\else
2497 \StartBabelCommands*{#1}{date}%
2498 \bbl@savetoday
2499 \bbl@savedate
2500 \EndBabelCommands
2501 \fi
2502 % == hyphenrules (also in new) ==
2503 \ifx\bbl@lbkflag\@empty
2504 \bbl@provide@hyphens{#1}%
2505 \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.

```

2506 \def\bbl@load@basic#1{%
2507 \ifcase\bbl@howloaded\or\or
2508 \ifcase\csname bbl@llevel@\language\endcsname
2509 \bbl@csarg\let\lname@\language\relax
2510 \fi
2511 \fi
2512 \bbl@ifunset{\bbl@lname@#1}%
2513 {\def\BabelBeforeIni##1##2{%
2514 \begingroup
2515 \let\bbl@ini@captions@aux\@gobbletwo
2516 \def\bbl@inidate ####1.####2.####3.####4\relax ####5####6}%
2517 \bbl@read@ini{##1}1%
2518 \ifx\bbl@initoload\relax\endinput\fi
2519 \endgroup}%
2520 \begingroup % boxed, to avoid extra spaces:
2521 \ifx\bbl@initoload\relax
2522 \bbl@input@texini{#1}%
2523 \else
2524 \setbox\z@\hbox{\BabelBeforeIni{\bbl@initoload}{}}%
2525 \fi
2526 \endgroup}%
2527 {}}

```

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`.

```

2528 \def\bbl@provide@hyphens#1{%
2529 \@tempcnta\m@ne % a flag
2530 \ifx\bbl@KVP@hyphenrules\@nnil\else
2531 \bbl@replace\bbl@KVP@hyphenrules{ }{,}%
2532 \bbl@foreach\bbl@KVP@hyphenrules{%

```

```

2533 \ifnum\@tempcnta=\m@ne % if not yet found
2534 \bbl@ifsamestring{##1}{+}%
2535 {\bbl@carg\addlanguage{l@##1}}%
2536 }%
2537 \bbl@ifunset{l@##1}% After a possible +
2538 }%
2539 {\@tempcnta\@nameuse{l@##1}}%
2540 \fi}%
2541 \ifnum\@tempcnta=\m@ne
2542 \bbl@warning{%
2543 Requested 'hyphenrules' for '\language' not found:\\%
2544 \bbl@KVP@hyphenrules.\\%
2545 Using the default value. Reported}%
2546 \fi
2547 \fi
2548 \ifnum\@tempcnta=\m@ne % if no opt or no language in opt found
2549 \ifx\bbl@KVP@captions@\@nnil % TODO. Hackish. See above.
2550 \bbl@ifunset{bbl@hyphr@#1}{}% use value in ini, if exists
2551 {\bbl@exp{\bbl@ifblank{\bbl@cs{hyphr@#1}}}%
2552 }%
2553 {\bbl@ifunset{l@bbl@cl{hyphr}}}%
2554 }% if hyphenrules found:
2555 {\@tempcnta\@nameuse{l@bbl@cl{hyphr}}}%
2556 \fi
2557 \fi
2558 \bbl@ifunset{l@#1}%
2559 {\ifnum\@tempcnta=\m@ne
2560 \bbl@carg\adddialect{l@#1}\language
2561 \else
2562 \bbl@carg\adddialect{l@#1}\@tempcnta
2563 \fi}%
2564 {\ifnum\@tempcnta=\m@ne\else
2565 \global\bbl@carg\chardef{l@#1}\@tempcnta
2566 \fi}}

```

The reader of babel-...tex files. We reset temporarily some catcodes (and make sure no space is accidentally inserted).

```

2567 \def\bbl@input@texini#1{%
2568 \bbl@bsphack
2569 \bbl@exp{%
2570 \catcode`\\%=14 \catcode`\\%=0
2571 \catcode`\\%=1 \catcode`\\%=2
2572 \lowercase{\InputIfFileExists{babel-#1.tex}}}%
2573 \catcode`\\%=the\catcode`\relax
2574 \catcode`\\%=the\catcode`\relax
2575 \catcode`\\%=the\catcode`\relax
2576 \catcode`\\%=the\catcode`\relax}%
2577 \bbl@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 \bbl@read@ini.

```

2578 \def\bbl@inline#1\bbl@inline{%
2579 \ifnextchar[\bbl@iniset{\ifnextchar;\bbl@iniskip\bbl@inistore}#1\@@}% ]
2580 \def\bbl@iniset[#1]#2\@@{\def\bbl@section{#1}}
2581 \def\bbl@iniskip#1\@@{% if starts with ;
2582 \def\bbl@inistore#1=#2\@@{% full (default)
2583 \bbl@trim@def\bbl@tempa{#1}%
2584 \bbl@trim\toks@{#2}%
2585 \bbl@xin@;\bbl@section/\bbl@tempa;}{\bbl@key@list}%
2586 \ifin@else
2587 \bbl@xin@{,identification/include.}%
2588 {\bbl@section/\bbl@tempa}%
2589 \ifin@\xdef\bbl@included@inis{the\toks@}\fi

```

```

2590 \bbl@exp{%
2591   \\g@addto@macro\\bbl@inidata{%
2592   \\bbl@elt{\bbl@section}{\bbl@tempa}{\the\toks@}}}%
2593 \fi}
2594 \def\bbl@inistore@min#1=#2\@@{% minimal (maybe set in \bbl@read@ini)
2595   \bbl@trim@def\bbl@tempa{#1}%
2596   \bbl@trim\toks@{#2}%
2597   \bbl@xin@{.identification.}{.\bbl@section.}%
2598   \ifin@
2599     \bbl@exp{\\g@addto@macro\\bbl@inidata{%
2600       \\bbl@elt{identification}{\bbl@tempa}{\the\toks@}}}%
2601   \fi}

```

4.19. Main loop in ‘provide’

Now, the ‘main loop’, which ****must be executed inside a group****. At this point, \bbl@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.

```

2602 \def\bbl@loop@ini{%
2603   \loop
2604     \if T\ifeof\bbl@readstream F\fi T\relax % Trick, because inside \loop
2605     \endlinechar\m@ne
2606     \read\bbl@readstream to \bbl@line
2607     \endlinechar`\^^M
2608     \ifx\bbl@line\empty\else
2609       \expandafter\bbl@iniline\bbl@line\bbl@iniline
2610     \fi
2611   \repeat}
2612 \ifx\bbl@readstream\undefined
2613   \csname newread\endcsname\bbl@readstream
2614 \fi
2615 \def\bbl@read@ini#1#2{%
2616   \global\let\bbl@extend@ini@gobble
2617   \openin\bbl@readstream=babel-#1.ini
2618   \ifeof\bbl@readstream
2619     \bbl@error{no-ini-file}{#1}{}}}%
2620 \else
2621   % == Store ini data in \bbl@inidata ==
2622   \catcode`\[=12 \catcode`\]=12 \catcode`\==12 \catcode`\&=12
2623   \catcode`\;=12 \catcode`\|=12 \catcode`\%=14 \catcode`\-=12
2624   \bbl@info{Importing
2625     \ifcase#2font and identification \or basic \fi
2626     data for \language\name\\%
2627     from babel-#1.ini. Reported}%
2628   \ifnum#2=\z@
2629     \global\let\bbl@inidata\empty
2630     \let\bbl@inistore\bbl@inistore@min % Remember it's local
2631   \fi
2632   \def\bbl@section{identification}%
2633   \bbl@exp{\\bbl@inistore tag.ini=#1\\@@}%
2634   \bbl@inistore load.level=#2\@@
2635   \bbl@loop@ini
2636   % == Process stored data ==
2637   \bbl@csarg\xdef{lini@\language}{#1}%
2638   \bbl@read@ini@aux
2639   % == 'Export' data ==
2640   \bbl@ini@exports{#2}%
2641   \global\bbl@csarg\let{inidata@\language}\bbl@inidata
2642   \global\let\bbl@inidata\empty
2643   \bbl@exp{\\bbl@add@list\\bbl@ini@loaded{\language}}}%

```

```

2644 \bbl@toglobal\bbl@ini@loaded
2645 \fi
2646 \closein\bbl@readstream}
2647 \def\bbl@read@ini@aux{%
2648 \let\bbl@savestrings\@empty
2649 \let\bbl@savetoday\@empty
2650 \let\bbl@savestate\@empty
2651 \def\bbl@elt##1##2##3{%
2652 \def\bbl@section{##1}%
2653 \in@{=date.}{=##1}% Find a better place
2654 \ifin@
2655 \bbl@ifunset{bbl@inikv@##1}%
2656 {\bbl@ini@calendar{##1}}%
2657 {}%
2658 \fi
2659 \bbl@ifunset{bbl@inikv@##1}{}%
2660 {\csname bbl@inikv@##1\endcsname{##2}{##3}}%
2661 \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.

```

2662 \def\bbl@extend@ini@aux#1{%
2663 \bbl@startcommands*{#1}{captions}%
2664 % Activate captions/... and modify exports
2665 \bbl@csarg\def{inikv@captions.licr}##1##2{%
2666 \setlocalecaption{#1}{##1}{##2}}%
2667 \def\bbl@inikv@captions##1##2{%
2668 \bbl@ini@captions@aux{##1}{##2}}%
2669 \def\bbl@stringdef##1##2{\gdef##1{##2}}%
2670 \def\bbl@exportkey##1##2##3{%
2671 \bbl@ifunset{bbl@kv@##2}{}%
2672 {\expandafter\ifx\csname bbl@kv@##2\endcsname\@empty\else
2673 \bbl@exp{\global\let<bbl@##1@\language>\<bbl@kv@##2>}}%
2674 \fi}}%
2675 % As with \bbl@read@ini, but with some changes
2676 \bbl@read@ini@aux
2677 \bbl@ini@exports\tw@
2678 % Update inidata@lang by pretending the ini is read.
2679 \def\bbl@elt##1##2##3{%
2680 \def\bbl@section{##1}%
2681 \bbl@iniline##2=##3\bbl@iniline}%
2682 \csname bbl@inidata@#1\endcsname
2683 \global\bbl@csarg\let{inidata@#1}\bbl@inidata
2684 \StartBabelCommands*{#1}{date}% And from the import stuff
2685 \def\bbl@stringdef##1##2{\gdef##1{##2}}%
2686 \bbl@savetoday
2687 \bbl@savestate
2688 \bbl@endcommands}

```

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

```

2689 \def\bbl@ini@calendar#1{%
2690 \lowercase{\def\bbl@tempa{=##1=}}%
2691 \bbl@replace\bbl@tempa{=date.gregorian}{}%
2692 \bbl@replace\bbl@tempa{=date.}{}%
2693 \in@{.licr=}{#1=}%
2694 \ifin@
2695 \ifcase\bbl@engine
2696 \bbl@replace\bbl@tempa{.licr=}{}%
2697 \else
2698 \let\bbl@tempa\relax
2699 \fi
2700 \fi
2701 \ifx\bbl@tempa\relax\else
2702 \bbl@replace\bbl@tempa{=}{}%

```

```

2703 \ifx\bbl@tempa\@empty\else
2704 \xdef\bbl@calendars{\bbl@calendars,\bbl@tempa}%
2705 \fi
2706 \bbl@exp{%
2707 \def<\bbl@inikv@#1>####1####2{%
2708 \\\bbl@inidate####1...\relax{####2}{\bbl@tempa}}}%
2709 \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 \bbl@inistore above).

```

2710 \def\bbl@renewinikey#1/#2\@#3{%
2711 \edef\bbl@tempa{\zap@space #1 \@empty}% section
2712 \edef\bbl@tempb{\zap@space #2 \@empty}% key
2713 \bbl@trim\toks@{#3}% value
2714 \bbl@exp{%
2715 \edef\\bbl@key@list{\bbl@key@list \bbl@tempa/\bbl@tempb;}%
2716 \\g@addto@macro\\bbl@inidata{%
2717 \\\bbl@elt{\bbl@tempa}{\bbl@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.

```

2718 \def\bbl@exportkey#1#2#3{%
2719 \bbl@ifunset{\bbl@kv@#2}%
2720 {\bbl@csarg\gdef{#1@\language}\@empty}%
2721 {\expandafter\ifx\csname\bbl@kv@#2\endcsname\@empty
2722 \bbl@csarg\gdef{#1@\language}\@empty}%
2723 \else
2724 \bbl@exp{\global\let<\bbl@#1@\language>\<\bbl@kv@#2>}%
2725 \fi}}

```

Key-value pairs are treated differently depending on the section in the ini file. The following macros are the readers for identification and typography. Note \bbl@ini@exports is called always (via \bbl@inisec), while \bbl@after@ini must be called explicitly after \bbl@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.

```

2726 \def\bbl@iniwarning#1{%
2727 \bbl@ifunset{\bbl@kv@identification.warning#1}{}%
2728 {\bbl@warning{%
2729 From babel-\bbl@cs{lini@\language}.ini:\\%
2730 \bbl@cs{@kv@identification.warning#1}\\%
2731 Reported }}}
2732 %
2733 \let\bbl@release@transforms\@empty
2734 \let\bbl@release@casing\@empty
2735 \def\bbl@ini@exports#1{%
2736 % Identification always exported
2737 \bbl@iniwarning}%
2738 \ifcase\bbl@engine
2739 \bbl@iniwarning{.pdflatex}%
2740 \or
2741 \bbl@iniwarning{.lua\latex}%
2742 \or
2743 \bbl@iniwarning{.xel\latex}%
2744 \fi%
2745 \bbl@exportkey{lllevel}{identification.load.level}{}%
2746 \bbl@exportkey{elname}{identification.name.english}{}%
2747 \bbl@exp{\\bbl@exportkey{lname}{identification.name.opentype}%
2748 {\csname\bbl@elname@\language\endcsname}}%
2749 \bbl@exportkey{tbc}{identification.tag.bcp47}{}%
2750 % Somewhat hackish. TODO:

```



```

2751 \bbl@exportkey{casing}{identification.tag.bcp47}{}%
2752 \bbl@exportkey{lbc}{identification.language.tag.bcp47}{}%
2753 \bbl@exportkey{lotf}{identification.tag.opentype}{dflt}%
2754 \bbl@exportkey{esname}{identification.script.name}{}%
2755 \bbl@exp{\bbl@exportkey{sname}{identification.script.name.opentype}%
2756 { \csname bbl@esname@ \language \endcsname }}%
2757 \bbl@exportkey{sbc}{identification.script.tag.bcp47}{}%
2758 \bbl@exportkey{sotf}{identification.script.tag.opentype}{DFLT}%
2759 \bbl@exportkey{rbcp}{identification.region.tag.bcp47}{}%
2760 \bbl@exportkey{vbcp}{identification.variant.tag.bcp47}{}%
2761 \bbl@exportkey{extt}{identification.extension.t.tag.bcp47}{}%
2762 \bbl@exportkey{extu}{identification.extension.u.tag.bcp47}{}%
2763 \bbl@exportkey{extx}{identification.extension.x.tag.bcp47}{}%
2764 % Also maps bcp47 -> language
2765 \ifbbl@bcptoname
2766 \bbl@csarg\xdef{bcp@map@ \bbl@cl{tbc}}{\language}%
2767 \fi
2768 \ifcase\bbl@engine\or
2769 \directlua{%
2770 Babel.locale_props[\the\bbl@cs{id@ \language}].script
2771 = '\bbl@cl{sbc}}'%
2772 \fi
2773 % Conditional
2774 \ifnum#1>\z@ % 0 = only info, 1, 2 = basic, (re)new
2775 \bbl@exportkey{calpr}{date.calendar.preferred}{}%
2776 \bbl@exportkey{lbrk}{typography.linebreaking}{h}%
2777 \bbl@exportkey{hyphr}{typography.hyphenrules}{}%
2778 \bbl@exportkey{lftm}{typography.lefthyphenmin}{2}%
2779 \bbl@exportkey{rgthm}{typography.righthyphenmin}{3}%
2780 \bbl@exportkey{prehc}{typography.prehyphenchar}{}%
2781 \bbl@exportkey{hyotl}{typography.hyphenate.other.locale}{}%
2782 \bbl@exportkey{hyots}{typography.hyphenate.other.script}{}%
2783 \bbl@exportkey{intsp}{typography.intraspaces}{}%
2784 \bbl@exportkey{frspc}{typography.frenchspacing}{u}%
2785 \bbl@exportkey{chrng}{characters.ranges}{}%
2786 \bbl@exportkey{quote}{characters.delimiters.quotes}{}%
2787 \bbl@exportkey{dgnat}{numbers.digits.native}{}%
2788 \ifnum#1=\tw@ % only (re)new
2789 \bbl@exportkey{rqtex}{identification.require.babel}{}%
2790 \bbl@tglobal\bbl@savetoday
2791 \bbl@tglobal\bbl@savestate
2792 \bbl@savestrings
2793 \fi
2794 \fi}

```

4.20. Processing keys in ini

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

```

2795 \def\bbl@inikv#1#2{%      key=value
2796 \toks@{#2}%              This hides #'s from ini values
2797 \bbl@csarg\xdef{kv@ \bbl@section.#1}{\the\toks@}}

```

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

```

2798 \let\bbl@inikv@identification\bbl@inikv
2799 \let\bbl@inikv@date\bbl@inikv
2800 \let\bbl@inikv@typography\bbl@inikv
2801 \let\bbl@inikv@numbers\bbl@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 `\bbl@release@casing`, which is executed in `\babelprovide`.

```

2802 \def\bbl@maybextx{-\bbl@csarg\ifx{extx@ \language}\@empty x-\fi}
2803 \def\bbl@inikv@characters#1#2{%

```

```

2804 \bbl@ifsamestring{#1}{casing}% eg, casing = uV
2805 {\bbl@exp{%
2806     \\g@addto@macro\\bbl@release@casing{%
2807         \\bbl@casemapping{\\language\\language}{\\unexpanded{#2}}}%
2808     {\in@{casing.}{#1}% eg, casing.Uv = uV
2809     \ifin@
2810         \lowercase{\def\bbl@tempb{#1}%
2811             \bbl@replace\bbl@tempb{casing.}{}%
2812             \bbl@exp{\\g@addto@macro\\bbl@release@casing{%
2813                 \\bbl@casemapping
2814                 {\\bbl@maybextx\bbl@tempb}{\\language\\language}{\\unexpanded{#2}}}%
2815             \else
2816                 \bbl@inikv{#1}{#2}%
2817             \fi}}

```

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

```

2818 \def\bbl@inikv@counters#1#2{%
2819     \bbl@ifsamestring{#1}{digits}%
2820     {\bbl@error{digits-is-reserved}{}}}%
2821     {}%
2822 \def\bbl@tempc{#1}%
2823 \bbl@trim@def{\bbl@tempb*}{#2}%
2824 \in@{.1}{#1}%
2825 \ifin@
2826     \bbl@replace\bbl@tempc{.1}{}%
2827     \bbl@csarg\protected@xdef{cnt@{\bbl@tempc @\language}}{
2828         \noexpand\bbl@alphanumeric{\bbl@tempc}}%
2829 \fi
2830 \in@{.F.}{#1}%
2831 \ifin@else\in@{.S.}{#1}\fi
2832 \ifin@
2833     \bbl@csarg\protected@xdef{cnt@#1@\language}{\bbl@tempb*}%
2834 \else
2835     \toks@{}% Required by \bbl@buildifcase, which returns \bbl@tempa
2836     \expandafter\bbl@buildifcase\bbl@tempb* \ \ % Space after \
2837     \bbl@csarg{\global\expandafter\let}{cnt@#1@\language}\bbl@tempa
2838 \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.

```

2839 \ifcase\bbl@engine
2840     \bbl@csarg\def{inikv@captions.licr}#1#2{%
2841         \bbl@ini@captions@aux{#1}{#2}}
2842 \else
2843     \def\bbl@inikv@captions#1#2{%
2844         \bbl@ini@captions@aux{#1}{#2}}
2845 \fi

```

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

```

2846 \def\bbl@ini@captions@template#1#2{% string language tempa=capt-name
2847     \bbl@replace\bbl@tempa{.template}{}%
2848     \def\bbl@toreplace{#1}{}%
2849     \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace}%
2850     \bbl@replace\bbl@toreplace{[ ]}{\csname}%
2851     \bbl@replace\bbl@toreplace{[ ]}{\csname the}%
2852     \bbl@replace\bbl@toreplace{[ ]}{\name\endcsname}%
2853     \bbl@replace\bbl@toreplace{[ ]}{\endcsname}%
2854     \bbl@xin@{,\bbl@tempa,}{,chapter,appendix,part,}%
2855     \ifin@
2856         \@nameuse{\bbl@patch\bbl@tempa}%
2857     \global\bbl@csarg\let{\bbl@tempa fmt@#2}\bbl@toreplace

```

```

2858 \fi
2859 \bbl@xin@{,\bbl@tempa,}{,figure,table,}%
2860 \ifin@
2861 \global\bbl@csarg\let{\bbl@tempa fmt@#2}\bbl@toreplace
2862 \bbl@exp{\gdef\<fnum@\bbl@tempa>{%
2863 \\\bbl@ifunset{\bbl@tempa fmt@\\language}%
2864 {\fnum@\bbl@tempa}}%
2865 {\\\@nameuse{\bbl@tempa fmt@\\language}}}%
2866 \fi}
2867 \def\bbl@ini@captions@aux#1#2{%
2868 \bbl@trim@def\bbl@tempa{#1}%
2869 \bbl@xin@{.template}{\bbl@tempa}%
2870 \ifin@
2871 \bbl@ini@captions@template{#2}\language
2872 \else
2873 \bbl@ifblank{#2}%
2874 {\bbl@exp{%
2875 \toks@{\\bbl@nocaption{\bbl@tempa}{\language\bbl@tempa name}}}%
2876 {\bbl@trim\toks@{#2}}}%
2877 \bbl@exp{%
2878 \\\bbl@add\\bbl@savestrings{%
2879 \\\SetString\<\bbl@tempa name>{\the\toks@}}%
2880 \toks@expandafter{\bbl@captionslist}%
2881 \bbl@exp{\\in@{\<\bbl@tempa name>}{\the\toks@}}%
2882 \ifin@else
2883 \bbl@exp{%
2884 \\\bbl@add\<\bbl@extracaps@language>{\<\bbl@tempa name>}%
2885 \\\bbl@toglobal\<\bbl@extracaps@language>}%
2886 \fi
2887 \fi}

```

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

```

2888 \def\bbl@list@the{%
2889 part,chapter,section,subsection,subsubsection,paragraph,%
2890 subparagraph,enumi,enumii,enumiii,enumiv,equation,figure,%
2891 table,page,footnote,mpfootnote,mpfn}
2892 \def\bbl@map@cnt#1{% #1:roman,etc, // #2:enumi,etc
2893 \bbl@ifunset{\bbl@map@#1@language}%
2894 {\@nameuse{#1}}%
2895 {\@nameuse{\bbl@map@#1@language}}}
2896 \def\bbl@inikv@labels#1#2{%
2897 \in@{.map}{#1}%
2898 \ifin@
2899 \ifx\bbl@KVP@labels\@nnil\else
2900 \bbl@xin@{ map }{ \bbl@KVP@labels\space}%
2901 \ifin@
2902 \def\bbl@tempc{#1}%
2903 \bbl@replace\bbl@tempc{.map}{}%
2904 \in@{,#2,}{,arabic,roman,Roman,alph,Alph,fnsymbol,}%
2905 \bbl@exp{%
2906 \gdef\<\bbl@map@\bbl@tempc @language>%
2907 {\ifin@\<#2>\else\\localecounter{#2}\fi}}%
2908 \bbl@foreach\bbl@list@the{%
2909 \bbl@ifunset{the##1}{}%
2910 {\bbl@exp{\let\\bbl@tempd\<the##1>}%
2911 \bbl@exp{%
2912 \\\bbl@sreplace\<the##1>%
2913 {\<\bbl@tempc>{##1}}{\\bbl@map@cnt{\bbl@tempc}{##1}}%
2914 \\\bbl@sreplace\<the##1>%
2915 {\<\empty @\bbl@tempc>\<c@##1>}{\\bbl@map@cnt{\bbl@tempc}{##1}}}%
2916 \expandafter\ifx\csname the##1\endcsname\bbl@tempd\else
2917 \toks@\expandafter\expandafter\expandafter{%
2918 \csname the##1\endcsname}%

```

```

2919         \expandafter\xdef\csname the##1\endcsname{{\the\toks@}}%
2920     \fi}}%
2921     \fi
2922     \fi
2923     %
2924     \else
2925     %
2926     % The following code is still under study. You can test it and make
2927     % suggestions. Eg, enumerate.2 = ([enumi]).([enumii]). It's
2928     % language dependent.
2929     \in@{enumerate.}{#1}%
2930     \ifin@
2931         \def\bbl@tempa{#1}%
2932         \bbl@replace\bbl@tempa{enumerate.}{}%
2933         \def\bbl@toreplace{#2}%
2934         \bbl@replace\bbl@toreplace{[ ]}{\nobreakspace{}}%
2935         \bbl@replace\bbl@toreplace{[]}{\csname the}%
2936         \bbl@replace\bbl@toreplace{[]}{\endcsname{}}}%
2937         \toks@\expandafter{\bbl@toreplace}%
2938         % TODO. Execute only once:
2939         \bbl@exp{%
2940             \\bbl@add<extras\language>{%
2941                 \\babel@save<labelenum\romannumeral\bbl@tempa>%
2942                 \def<labelenum\romannumeral\bbl@tempa>{\the\toks@}}%
2943             \\bbl@tglobal<extras\language>}%
2944     \fi
2945     \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.

```

2946 \def\bbl@chapttype{chapter}
2947 \ifx\@makechapterhead\undefined
2948     \let\bbl@patchchapter\relax
2949 \else\ifx\thechapter\undefined
2950     \let\bbl@patchchapter\relax
2951 \else\ifx\ps@headings\undefined
2952     \let\bbl@patchchapter\relax
2953 \else
2954     \def\bbl@patchchapter{%
2955         \global\let\bbl@patchchapter\relax
2956         \gdef\bbl@chfmt{%
2957             \bbl@ifunset{\bbl@bbl@chapttype fmt@\language}%
2958             {\@chapapp\space\thechapter}{\bbl@chfmt}%
2959             {\@nameuse{\bbl@bbl@chapttype fmt@\language}}}%
2960         \bbl@add\appendix{\def\bbl@chapttype{appendix}}% Not harmful, I hope
2961         \bbl@sreplace\ps@headings{\@chapapp\ \thechapter}{\bbl@chfmt}%
2962         \bbl@sreplace\chaptermark{\@chapapp\ \thechapter}{\bbl@chfmt}%
2963         \bbl@sreplace\@makechapterhead{\@chapapp\space\thechapter}{\bbl@chfmt}%
2964         \bbl@tglobal\appendix
2965         \bbl@tglobal\ps@headings
2966         \bbl@tglobal\chaptermark
2967         \bbl@tglobal\@makechapterhead}
2968     \let\bbl@patchappendix\bbl@patchchapter
2969 \fi\fi\fi
2970 \ifx\@part\undefined
2971     \let\bbl@patchpart\relax
2972 \else
2973     \def\bbl@patchpart{%
2974         \global\let\bbl@patchpart\relax
2975         \gdef\bbl@partformat{%
2976             \bbl@ifunset{\bbl@partfmt@\language}%

```

```

2977         {\partname\nobreakspace\thepart}
2978         {\@nameuse{bbl@partfmt@\language name}}}}
2979         \bbl@replace\@part{\partname\nobreakspace\thepart}{\bbl@partformat}%
2980         \bbl@tglobal\@part}
2981 \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

```

2982 \let\bbl@calendar\@empty
2983 \DeclareRobustCommand\localedate[1][\bbl@localedate{#1}]
2984 \def\bbl@localedate#1#2#3#4{%
2985     \begingroup
2986     \edef\bbl@they{#2}%
2987     \edef\bbl@them{#3}%
2988     \edef\bbl@thed{#4}%
2989     \edef\bbl@tempe{%
2990         \bbl@ifunset{bbl@calpr@\language name}{\bbl@cl{calpr}},%
2991         #1}%
2992     \bbl@replace\bbl@tempe{ }{}%
2993     \bbl@replace\bbl@tempe{CONVERT}{convert=}% Hackish
2994     \bbl@replace\bbl@tempe{convert}{convert=}%
2995     \let\bbl@ld@calendar\@empty
2996     \let\bbl@ld@variant\@empty
2997     \let\bbl@ld@convert\relax
2998     \def\bbl@tempb##1=##2\@@{\@namedef{bbl@ld##1}{##2}}%
2999     \bbl@foreach\bbl@tempe{\bbl@tempb##1\@@}%
3000     \bbl@replace\bbl@ld@calendar{gregorian}{}%
3001     \ifx\bbl@ld@calendar\@empty\else
3002         \ifx\bbl@ld@convert\relax\else
3003             \babelcalendar[\bbl@they-\bbl@them-\bbl@thed]%
3004             {\bbl@ld@calendar}\bbl@they\bbl@them\bbl@thed
3005         \fi
3006     \fi
3007     \@nameuse{bbl@precalendar}% Remove, eg, +, -civil (-ca-islamic)
3008     \edef\bbl@calendar{% Used in \month..., too
3009         \bbl@ld@calendar
3010         \ifx\bbl@ld@variant\@empty\else
3011             .\bbl@ld@variant
3012         \fi}%
3013     \bbl@cased
3014         {\@nameuse{bbl@date@\language name @\bbl@calendar}%
3015         \bbl@they\bbl@them\bbl@thed}%
3016     \endgroup}
3017 % eg: 1=months, 2=wide, 3=1, 4=dummy, 5=value, 6=calendar
3018 \def\bbl@inidate#1.#2.#3.#4\relax#5#6{% TODO - ignore with 'captions'
3019     \bbl@trim@def\bbl@tempa{#1.#2}%
3020     \bbl@ifsamestring{\bbl@tempa}{months.wide}%           to savedate
3021     {\bbl@trim@def\bbl@tempa{#3}%
3022     \bbl@trim\toks@{#5}%
3023     \@temptokena\expandafter{\bbl@savestate}%
3024     \bbl@exp{% Reverse order - in ini last wins
3025         \def\\bbl@savestate{%
3026             \\SetString\<month\romannumeral\bbl@tempa#6name>{\the\toks@}%
3027             \the\@temptokena}}}%
3028     {\bbl@ifsamestring{\bbl@tempa}{date.long}%           defined now
3029     {\lowercase{\def\bbl@tempb{#6}}%
3030     \bbl@trim@def\bbl@toreplace{#5}%
3031     \bbl@TG@@date
3032     \global\bbl@csarg\let{date@\language name @\bbl@tempb}\bbl@toreplace
3033     \ifx\bbl@savetoday\@empty
3034         \bbl@exp{% TODO. Move to a better place.
3035             \\AfterBabelCommands{%
3036                 \gdef\<\language name date>{\\protect\<\language name date >}}%

```

```

3037         \gdef\<\language name date >{\bbl@printdate{\language name}}}%
3038     \def\bbl@savetoday{%
3039         \SetString\today{%
3040             \<\language name date>[convert]%
3041             {\the\year}{\the\month}{\the\day}}}%
3042     \fi}%
3043     }}}
3044 \def\bbl@printdate#1{%
3045     \ifnextchar[{\bbl@printdate@i{#1}}{\bbl@printdate@i{#1}[]}}
3046 \def\bbl@printdate@i#1[#2]#3#4#5{%
3047     \bbl@usedategrouptrue
3048     \@nameuse{bbl@ensure@#1}{\localedate[#2]{#3}{#4}{#5}}

```

4.21. French spacing (again)

For the following declarations, see issue #240. `\nonfrenchspacing` is set by document too early, so it's a hack.

```

3049 \AddToHook{begindocument/before}{%
3050     \let\bbl@normalsf\normalsfcodes
3051     \let\normalsfcodes\relax}
3052 \AtBeginDocument{%
3053     \ifx\bbl@normalsf\@empty
3054         \ifnum\sfcodes\@m
3055             \let\normalsfcodes\frenchspacing
3056         \else
3057             \let\normalsfcodes\nonfrenchspacing
3058         \fi
3059     \else
3060         \let\normalsfcodes\bbl@normalsf
3061     \fi}

```

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).

```

3062 \let\bbl@calendar\@empty
3063 \newcommand\babelcalendar[2][\the\year-\the\month-\the\day]{%
3064     \@nameuse{bbl@ca@#2}#1@@}
3065 \newcommand\BabelDateSpace{\nobreakspace}
3066 \newcommand\BabelDateDot{.\@} % TODO. \let instead of repeating
3067 \newcommand\BabelDated[1]{\number#1}
3068 \newcommand\BabelDatedd[1]{\ifnum#1<10 0\fi\number#1}
3069 \newcommand\BabelDateM[1]{\number#1}
3070 \newcommand\BabelDateMM[1]{\ifnum#1<10 0\fi\number#1}
3071 \newcommand\BabelDateMMM[1]{%
3072     \csname month\romannumeral#1\bbl@calendar name\endcsname}%
3073 \newcommand\BabelDatey[1]{\number#1}%
3074 \newcommand\BabelDateyy[1]{%
3075     \ifnum#1<10 0\number#1 %
3076     \else\ifnum#1<100 \number#1 %
3077     \else\ifnum#1<1000 \expandafter\@gobble\number#1 %
3078     \else\ifnum#1<10000 \expandafter\@gobbletwo\number#1 %
3079     \else
3080         \bbl@error{limit-two-digits}{}}}%
3081     \fi\fi\fi\fi}
3082 \newcommand\BabelDateyyyy[1]{\number#1} % TODO - add leading 0
3083 \newcommand\BabelDateU[1]{\number#1}%
3084 \def\bbl@replace@finish@iii#1{%
3085     \bbl@exp{\def\#1###1####2###3{\the\toks@}}
3086 \def\bbl@TG@date{%
3087     \bbl@replace\bbl@toreplace[ ]{\BabelDateSpace}}%
3088     \bbl@replace\bbl@toreplace[.]{\BabelDateDot}}%

```

```

3089 \bbl@replace\bbl@toreplace{[d]}\BabelDated{###3}%
3090 \bbl@replace\bbl@toreplace{[dd]}\BabelDatedd{###3}%
3091 \bbl@replace\bbl@toreplace{[M]}\BabelDateM{###2}%
3092 \bbl@replace\bbl@toreplace{[MM]}\BabelDateMM{###2}%
3093 \bbl@replace\bbl@toreplace{[MMMM]}\BabelDateMMMM{###2}%
3094 \bbl@replace\bbl@toreplace{[y]}\BabelDatey{###1}%
3095 \bbl@replace\bbl@toreplace{[yy]}\BabelDateyy{###1}%
3096 \bbl@replace\bbl@toreplace{[yyyy]}\BabelDateyyyy{###1}%
3097 \bbl@replace\bbl@toreplace{[U]}\BabelDateU{###1}%
3098 \bbl@replace\bbl@toreplace{[y]}\bbl@datecctr{###1}%
3099 \bbl@replace\bbl@toreplace{[U]}\bbl@datecctr{###1}%
3100 \bbl@replace\bbl@toreplace{[m]}\bbl@datecctr{###2}%
3101 \bbl@replace\bbl@toreplace{[d]}\bbl@datecctr{###3}%
3102 \bbl@replace@finish@iii\bbl@toreplace}
3103 \def\bbl@datecctr{\expandafter\bbl@xdatecctr\expandafter}
3104 \def\bbl@xdatecctr[#1#2]{\localenumeral{#2}{#1}}

```

Transforms.

```

3105 \bbl@csarg\let{inikv@transforms.prehyphenation}\bbl@inikv
3106 \bbl@csarg\let{inikv@transforms.posthyphenation}\bbl@inikv
3107 \def\bbl@transforms@aux#1#2#3#4,#5\relax{%
3108   #1#2}{#3}{#4}{#5}}
3109 \begingroup % A hack. TODO. Don't require a specific order
3110 \catcode\%=12
3111 \catcode\&=14
3112 \gdef\bbl@transforms#1#2#3{%&
3113   \directlua{
3114     local str = [=[#2]=]
3115     str = str:gsub('%.%d+%.%d+$', '')
3116     token.set_macro('babeltempa', str)
3117   }&%
3118   \def\babeltempc{}&%
3119   \bbl@xin@{,\babeltempa,}{,\bbl@KVP@transforms,}&%
3120   \ifin@else
3121     \bbl@xin@{:,\babeltempa,}{,\bbl@KVP@transforms,}&%
3122   \fi
3123   \ifin@
3124     \bbl@foreach\bbl@KVP@transforms{%&
3125       \bbl@xin@{:,\babeltempa,}{,##1,}&%
3126       \ifin@ &% font:font:transform syntax
3127         \directlua{
3128           local t = {}
3129           for m in string.gmatch('#1'..' ':'', '(.)') do
3130             table.insert(t, m)
3131           end
3132           table.remove(t)
3133           token.set_macro('babeltempc', ',font=' .. table.concat(t, ' '))
3134         }&%
3135       \fi}&%
3136   \in@{.0$}{#2$}&%
3137   \ifin@
3138     \directlua{% (\attribute) syntax
3139       local str = string.match([[ \bbl@KVP@transforms]],
3140         '%([^(%[-])^(%)]-\babeltempa)')
3141       if str == nil then
3142         token.set_macro('babeltempb', '')
3143       else
3144         token.set_macro('babeltempb', ',attribute=' .. str)
3145       end
3146     }&%
3147   \toks@{#3}&%
3148   \bbl@exp{%&
3149     \\g@addto@macro\\bbl@release@transforms{%&

```

```

3150      \relax &% Closes previous \bbl@transforms@aux
3151      \\bbl@transforms@aux
3152      \\\#1{label=\babeltempa\babeltempb\babeltempc}&%
3153      {\language\the\toks@}}&%
3154      \else
3155      \g@addto@macro\bbl@release@transforms{, {#3}}&%
3156      \fi
3157  \fi}
3158 \endgroup

```

4.22. Handle language system

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

```

3159 \def\bbl@provide@lsys#1{%
3160   \bbl@ifunset{bbl@lname@#1}%
3161     {\bbl@load@info{#1}}%
3162     {}%
3163   \bbl@csarg\let{lsys@#1}\empty
3164   \bbl@ifunset{bbl@sname@#1}{\bbl@csarg\gdef{sname@#1}{Default}}{}%
3165   \bbl@ifunset{bbl@sotf@#1}{\bbl@csarg\gdef{sotf@#1}{DFLT}}{}%
3166   \bbl@csarg\bbl@add@list{lsys@#1}{Script=\bbl@cs{sname@#1}}%
3167   \bbl@ifunset{bbl@lname@#1}{}%
3168     {\bbl@csarg\bbl@add@list{lsys@#1}{Language=\bbl@cs{lname@#1}}}%
3169   \ifcase\bbl@engine\or\or
3170     \bbl@ifunset{bbl@prehc@#1}{}%
3171     {\bbl@exp{\\bbl@ifblank{\bbl@cs{prehc@#1}}}%
3172     {}%
3173     {\ifx\bbl@xenohyph\undefined
3174       \global\let\bbl@xenohyph\bbl@xenohyph@d
3175       \ifx\AtBeginDocument\@notprerr
3176         \expandafter\@secondoftwo % to execute right now
3177         \fi
3178       \AtBeginDocument{%
3179         \bbl@patchfont{\bbl@xenohyph}%
3180         {\expandafter\select@language\expandafter{\language}}}%
3181       \fi}}%
3182   \fi
3183   \bbl@csarg\bbl@toglobal{lsys@#1}}
3184 \def\bbl@xenohyph@d{%
3185   \bbl@ifset{bbl@prehc@\language}%
3186     {\ifnum\hyphenchar\font=\defaultthyphenchar
3187       \iffontchar\font\bbl@c{prehc}\relax
3188       \hyphenchar\font\bbl@c{prehc}\relax
3189       \else\iffontchar\font"200B
3190       \hyphenchar\font"200B
3191       \else
3192         \bbl@warning
3193           {Neither 0 nor ZERO WIDTH SPACE are available\\%
3194           in the current font, and therefore the hyphen\\%
3195           will be printed. Try changing the fontspec's\\%
3196           'HyphenChar' to another value, but be aware\\%
3197           this setting is not safe (see the manual).\\%
3198           Reported}%
3199         \hyphenchar\font\defaultthyphenchar
3200       \fi\fi
3201     \fi}%
3202   {\hyphenchar\font\defaultthyphenchar}}
3203 % \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).

```

3204 \def\bbl@load@info#1{%
3205   \def\BabelBeforeIni##1##2{%
3206     \begingroup
3207       \bbl@read@ini{##1}0%
3208       \endinput           % babel- .tex may contain onlypreamble's
3209       \endgroup}%         boxed, to avoid extra spaces:
3210   {\bbl@input@texini{##1}}}
```

4.23. Numerals

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.

```

3211 \def\bbl@setdigits#1#2#3#4#5{%
3212   \bbl@exp{%
3213     \def<\language name digits>####1{%      ie, \langdigits
3214       \<bbl@digits@\language name>####1\\\@nil}%
3215       \let<bbl@cntr@digits@\language name>\<\language name digits>%
3216       \def<\language name counter>####1{%    ie, \langcounter
3217         \\\expandafter\<bbl@counter@\language name>%
3218         \\\csname c@####1\endcsname}%
3219       \def<bbl@counter@\language name>####1{% ie, \bbl@counter@lang
3220         \\\expandafter\<bbl@digits@\language name>%
3221         \\\number####1\\\@nil}}}%
3222 \def\bbl@tempa##1##2##3##4##5{%
3223   \bbl@exp{%    Wow, quite a lot of hashes! :- (
3224     \def<bbl@digits@\language name>#####1{%
3225       \\\ifx#####1\\\@nil           % ie, \bbl@digits@lang
3226       \\\else
3227         \\\ifx0#####1#1%
3228         \\\else\\\ifx1#####1#2%
3229         \\\else\\\ifx2#####1#3%
3230         \\\else\\\ifx3#####1#4%
3231         \\\else\\\ifx4#####1#5%
3232         \\\else\\\ifx5#####1#1%
3233         \\\else\\\ifx6#####1#2%
3234         \\\else\\\ifx7#####1#3%
3235         \\\else\\\ifx8#####1#4%
3236         \\\else\\\ifx9#####1#5%
3237         \\\else#####1%
3238         \\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi\\\fi
3239         \\\expandafter\<bbl@digits@\language name>%
3240         \\\fi}}}%
3241   \bbl@tempa}
```

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

```

3242 \def\bbl@buildifcase#1 {% Returns \bbl@tempa, requires \toks@={ }
3243   \ifx\\#1%           % \ before, in case #1 is multiletter
3244     \bbl@exp{%
3245       \def\\\bbl@tempa####1{%
3246         \<ifcase>####1\space\the\toks@\<else>\\\@ctrerr\<fi>}}%
3247     \else
3248       \toks@\expandafter{\the\toks@\or #1}%
3249       \expandafter\bbl@buildifcase
3250     \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 an special case, for a fixed form (see babel-he.ini, for example).

```

3251 \newcommand\locaenumerat[2]{\bbl@cs{cntr@#1@\language}\{#2}}
3252 \def\bbl@locaecnr#1#2{\locaenumerat{#2}{#1}}
3253 \newcommand\localecounter[2]{%
3254   \expandafter\bbl@locaecnr
3255   \expandafter{\number\csname c@#2\endcsname}\{#1}}
3256 \def\bbl@alphnumerat#1#2{%
3257   \expandafter\bbl@alphnumerat@i\number#2 76543210\@@{#1}}
3258 \def\bbl@alphnumerat@i#1#2#3#4#5#6#7#8\@@#9{%
3259   \ifcase\@car#8\@nil\or    % Currently <10000, but prepared for bigger
3260     \bbl@alphnumerat@ii{#9}000000#1\or
3261     \bbl@alphnumerat@ii{#9}00000#1#2\or
3262     \bbl@alphnumerat@ii{#9}0000#1#2#3\or
3263     \bbl@alphnumerat@ii{#9}000#1#2#3#4\else
3264     \bbl@alphnum@invalid{>9999}%
3265   \fi}
3266 \def\bbl@alphnumerat@ii#1#2#3#4#5#6#7#8{%
3267   \bbl@ifunset{bbl@cntr@#1.F.\number#5#6#7#8@\language}%
3268     {\bbl@cs{cntr@#1.4@\language}\{#5}%
3269     \bbl@cs{cntr@#1.3@\language}\{#6}%
3270     \bbl@cs{cntr@#1.2@\language}\{#7}%
3271     \bbl@cs{cntr@#1.1@\language}\{#8}%
3272     \ifnum#6#7#8>\z@ % TODO. An ad hoc rule for Greek. Ugly.
3273       \bbl@ifunset{bbl@cntr@#1.S.321@\language}\{}}%
3274     {\bbl@cs{cntr@#1.S.321@\language}\{}}%
3275   \fi}%
3276   {\bbl@cs{cntr@#1.F.\number#5#6#7#8@\language}\{}}
3277 \def\bbl@alphnum@invalid#1{%
3278   \bbl@error{alphabetic-too-large}{#1}\{}}

```

4.24. Casing

```

3279 \newcommand\BabelUppercaseMapping[3]{%
3280   \DeclareUppercaseMapping[\@nameuse{bbl@casing@#1}]{#2}{#3}}
3281 \newcommand\BabelTitlecaseMapping[3]{%
3282   \DeclareTitlecaseMapping[\@nameuse{bbl@casing@#1}]{#2}{#3}}
3283 \newcommand\BabelLowercaseMapping[3]{%
3284   \DeclareLowercaseMapping[\@nameuse{bbl@casing@#1}]{#2}{#3}}

  The parser for casing and casing. (variant).
3285 \ifcase\bbl@engine % Converts utf8 to its code (expandable)
3286   \def\bbl@utftocode#1{\the\numexpr\decode@UTFviii#1\relax}
3287 \else
3288   \def\bbl@utftocode#1{\expandafter\string#1}
3289 \fi
3290 \def\bbl@casemapping#1#2#3{% 1:variant
3291   \def\bbl@tempa##1 ##2{% Loop
3292     \bbl@casemapping@i{##1}%
3293     \ifx\@empty##2\else\bbl@afterfi\bbl@tempa##2\fi}%
3294   \edef\bbl@templ{\@nameuse{bbl@casing@#2}#1}% Language code
3295   \def\bbl@tempe{0}% Mode (upper/lower...)
3296   \def\bbl@tempc{#3}% Casing list
3297   \expandafter\bbl@tempa\bbl@tempc\@empty}
3298 \def\bbl@casemapping@i#1{%
3299   \def\bbl@tempb{#1}%
3300   \ifcase\bbl@engine % Handle utf8 in pdftex, by surrounding chars with {}
3301     \@nameuse{regex_replace_all:nnN}%
3302     {[{\x{c0}-\x{ff}}][{\x{80}-\x{bf}}]*}{\{\0}\}\bbl@tempb
3303   \else
3304     \@nameuse{regex_replace_all:nnN}{.}{\{\0}\}\bbl@tempb % TODO. needed?
3305   \fi
3306   \expandafter\bbl@casemapping@ii\bbl@tempb\@@}
3307 \def\bbl@casemapping@ii#1#2#3\@@{%
3308   \in@{#1#3}{<>}% ie, if <u>, <l>, <t>
3309   \ifin@

```

```

3310 \edef\bbl@tempe{%
3311 \if#2u1 \else\if#2l2 \else\if#2t3 \fi\fi\fi}%
3312 \else
3313 \ifcase\bbl@tempe\relax
3314 \DeclareUppercaseMapping[\bbl@templ]{\bbl@uftocode{#1}}{#2}%
3315 \DeclareLowercaseMapping[\bbl@templ]{\bbl@uftocode{#2}}{#1}%
3316 \or
3317 \DeclareUppercaseMapping[\bbl@templ]{\bbl@uftocode{#1}}{#2}%
3318 \or
3319 \DeclareLowercaseMapping[\bbl@templ]{\bbl@uftocode{#1}}{#2}%
3320 \or
3321 \DeclareTitlecaseMapping[\bbl@templ]{\bbl@uftocode{#1}}{#2}%
3322 \fi
3323 \fi}

```

4.25. Getting info

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

```

3324 \def\bbl@localeinfo#1#2{%
3325 \bbl@ifunset{\bbl@info@#2}{#1}%
3326 {\bbl@ifunset{\bbl@csname \bbl@info@#2\endcsname @\languagename}{#1}%
3327 {\bbl@cs{\csname \bbl@info@#2\endcsname @\languagename}}}%
3328 \newcommand\localeinfo[1]{%
3329 \ifx*#1\@empty % TODO. A bit hackish to make it expandable.
3330 \bbl@afterelse\bbl@localeinfo}%
3331 \else
3332 \bbl@localeinfo
3333 {\bbl@error{no-ini-info}{}}}%
3334 {#1}%
3335 \fi}
3336 % \@namedef{\bbl@info@name.locale}{lname}
3337 \@namedef{\bbl@info@tag.ini}{lini}
3338 \@namedef{\bbl@info@name.english}{elname}
3339 \@namedef{\bbl@info@name.opentype}{lname}
3340 \@namedef{\bbl@info@tag.bcp47}{tbcpl}
3341 \@namedef{\bbl@info@language.tag.bcp47}{lbcpl}
3342 \@namedef{\bbl@info@tag.opentype}{lotf}
3343 \@namedef{\bbl@info@script.name}{esname}
3344 \@namedef{\bbl@info@script.name.opentype}{sname}
3345 \@namedef{\bbl@info@script.tag.bcp47}{sbcpl}
3346 \@namedef{\bbl@info@script.tag.opentype}{sotf}
3347 \@namedef{\bbl@info@region.tag.bcp47}{rbcp}
3348 \@namedef{\bbl@info@variant.tag.bcp47}{vbcp}
3349 \@namedef{\bbl@info@extension.t.tag.bcp47}{extt}
3350 \@namedef{\bbl@info@extension.u.tag.bcp47}{extu}
3351 \@namedef{\bbl@info@extension.x.tag.bcp47}{extx}

```

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

```

3352 <<*More package options>> ≡
3353 \DeclareOption{ensureinfo=off}{}
3354 <</More package options>>
3355 \let\bbl@ensureinfo\@gobble
3356 \newcommand\BabelEnsureInfo{%
3357 \ifx\InputIfFileExists\@undefined\else
3358 \def\bbl@ensureinfo##1{%
3359 \bbl@ifunset{\bbl@lname@##1}{\bbl@load@info{##1}}}%
3360 \fi
3361 \bbl@foreach\bbl@loaded{%
3362 \let\bbl@ensuring\@empty % Flag used in a couple of babel-*.tex files
3363 \def\languagename{##1}%
3364 \bbl@ensureinfo{##1}}}%
3365 \@ifpackagewith{babel}{ensureinfo=off}{}%
3366 {\AtEndOfPackage{% Test for plain.

```

```
3367 \ifx\@undefined\bbl@loaded\else\BabelEnsureInfo\fi}}
```

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

```
3368 \newcommand\getlocaleproperty{%
3369 \ifstar\bbl@getproperty@s\bbl@getproperty@x}
3370 \def\bbl@getproperty@s#1#2#3{%
3371 \let#1\relax
3372 \def\bbl@elt##1##2##3{%
3373 \bbl@ifsamestring{##1/##2}{#3}%
3374 {\providecommand#1{##3}%
3375 \def\bbl@elt###1####2####3{}}}%
3376 {}}%
3377 \bbl@cs{inidata@#2}}%
3378 \def\bbl@getproperty@x#1#2#3{%
3379 \bbl@getproperty@s{#1}{#2}{#3}%
3380 \ifx#1\relax
3381 \bbl@error{unknown-locale-key}{#1}{#2}{#3}%
3382 \fi}
3383 \let\bbl@ini@loaded\@empty
3384 \newcommand\LocaleForEach{\bbl@foreach\bbl@ini@loaded}
3385 \def\ShowLocaleProperties#1{%
3386 \typeout{}}%
3387 \typeout{*** Properties for language '#1' ***}
3388 \def\bbl@elt##1##2##3{\typeout{##1/##2 = ##3}}%
3389 \@nameuse{bbl@inidata@#1}%
3390 \typeout{*****}}
```

4.26. BCP-47 related commands

```
3391 \newif\ifbbl@bcpallowed
3392 \bbl@bcpallowedfalse
3393 \def\bbl@provide@locale{%
3394 \ifx\babelprovide\@undefined
3395 \bbl@error{base-on-the-fly}{}}}%
3396 \fi
3397 \let\bbl@auxname\language\name % Still necessary. %^^A TODO
3398 \bbl@ifunset{bbl@bcp@map@\language\name}{}}% Move uplevel??
3399 {\edef\language{\@nameuse{bbl@bcp@map@\language\name}}}%
3400 \ifbbl@bcpallowed
3401 \expandafter\ifx\csname date\language\endcsname\relax
3402 \expandafter
3403 \bbl@bcplookup\language-\@empty-\@empty-\@empty@@
3404 \ifx\bbl@bcp\relax\else % Returned by \bbl@bcplookup
3405 \edef\language{\bbl@bcp@prefix\bbl@bcp}%
3406 \edef\localname{\bbl@bcp@prefix\bbl@bcp}%
3407 \expandafter\ifx\csname date\language\endcsname\relax
3408 \let\bbl@initoload\bbl@bcp
3409 \bbl@exp{\\babelprovide[\bbl@autoload@bcptoptions]{\language}}%
3410 \let\bbl@initoload\relax
3411 \fi
3412 \bbl@csarg\xdef{bcp@map@\bbl@bcp}{\localname}%
3413 \fi
3414 \fi
3415 \fi
3416 \expandafter\ifx\csname date\language\endcsname\relax
3417 \IfFileExists{babel-\language.tex}%
3418 {\bbl@exp{\\babelprovide[\bbl@autoload@options]{\language}}}%
3419 {}%
3420 \fi}
```

\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.

Still somewhat hackish. WIP. Note `\str_if_eq:nnTF` is fully expandable (`\bbl@ifsamestring` isn't). The argument is the prefix to `tag.bcp47`. Can be prece

```
3421 \providecommand\BCPdata{}
3422 \ifx\renewcommand\undefined\else % For plain. TODO. It's a quick fix
3423   \renewcommand\BCPdata[1]{\bbl@bcpdata@i#1\@empty}
3424   \def\bbl@bcpdata@i#1#2#3#4#5#6\@empty{%
3425     \@nameuse{str_if_eq:nnTF}{#1#2#3#4#5}{main.}%
3426     {\bbl@bcpdata@ii{#6}\bbl@main@language}%
3427     {\bbl@bcpdata@ii{#1#2#3#4#5#6}\language}}%
3428   \def\bbl@bcpdata@ii#1#2{%
3429     \bbl@ifunset{bbl@info@#1.tag.bcp47}%
3430     {\bbl@error{unknown-ini-field}{#1}{}}%
3431     {\bbl@ifunset{bbl@csname bbl@info@#1.tag.bcp47\endcsname @#2}{}%
3432     {\bbl@cs{csname bbl@info@#1.tag.bcp47\endcsname @#2}}}%
3433 \fi
3434 \@namedef{bbl@info@casing.tag.bcp47}{casing}
```

5. Adjusting the Babel behavior

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

```
3435 \newcommand\babeladjust[1]{% TODO. Error handling.
3436   \bbl@forkv{#1}{%
3437     \bbl@ifunset{bbl@ADJ@##1@##2}%
3438     {\bbl@cs{ADJ@##1}{##2}}%
3439     {\bbl@cs{ADJ@##1@##2}}}
3440 %
3441 \def\bbl@adjust@lua#1#2{%
3442   \ifvmode
3443     \ifnum\currentgrouplevel=\z@
3444       \directlua{ Babel.#2 }%
3445       \expandafter\expandafter\expandafter\@gobble
3446     \fi
3447   \fi
3448   {\bbl@error{adjust-only-vertical}{#1}{}}% Gobbled if everything went ok.
3449 \@namedef{bbl@ADJ@bidi.mirroring@on}{%
3450   \bbl@adjust@lua{bidi}{mirroring_enabled=true}}
3451 \@namedef{bbl@ADJ@bidi.mirroring@off}{%
3452   \bbl@adjust@lua{bidi}{mirroring_enabled=false}}
3453 \@namedef{bbl@ADJ@bidi.text@on}{%
3454   \bbl@adjust@lua{bidi}{bidi_enabled=true}}
3455 \@namedef{bbl@ADJ@bidi.text@off}{%
3456   \bbl@adjust@lua{bidi}{bidi_enabled=false}}
3457 \@namedef{bbl@ADJ@bidi.math@on}{%
3458   \let\bbl@noamsmath\@empty}
3459 \@namedef{bbl@ADJ@bidi.math@off}{%
3460   \let\bbl@noamsmath\relax}
3461 %
3462 \@namedef{bbl@ADJ@bidi.mapdigits@on}{%
3463   \bbl@adjust@lua{bidi}{digits_mapped=true}}
3464 \@namedef{bbl@ADJ@bidi.mapdigits@off}{%
3465   \bbl@adjust@lua{bidi}{digits_mapped=false}}
3466 %
3467 \@namedef{bbl@ADJ@linebreak.sea@on}{%
3468   \bbl@adjust@lua{linebreak}{sea_enabled=true}}
3469 \@namedef{bbl@ADJ@linebreak.sea@off}{%
3470   \bbl@adjust@lua{linebreak}{sea_enabled=false}}
3471 \@namedef{bbl@ADJ@linebreak.cjk@on}{%
3472   \bbl@adjust@lua{linebreak}{cjk_enabled=true}}
3473 \@namedef{bbl@ADJ@linebreak.cjk@off}{%
3474   \bbl@adjust@lua{linebreak}{cjk_enabled=false}}
3475 \@namedef{bbl@ADJ@justify.arabic@on}{%
3476   \bbl@adjust@lua{linebreak}{arabic.justify_enabled=true}}
```

```

3477 \@namedef{bbl@ADJ@justify.arabic@off}{%
3478   \bbl@adjust@lua{linebreak}{arabic.justify_enabled=false}}
3479 %
3480 \def\bbl@adjust@layout#1{%
3481   \ifvmode
3482     #1%
3483     \expandafter\@gobble
3484   \fi
3485   {\bbl@error{layout-only-vertical}}{}}}% Gobbled if everything went ok.
3486 \@namedef{bbl@ADJ@layout.tabular@on}{%
3487   \ifnum\bbl@tabular@mode=\tw@
3488     \bbl@adjust@layout{\let\@tabular\bbl@NL@tabular}%
3489   \else
3490     \chardef\bbl@tabular@mode\@ne
3491   \fi}
3492 \@namedef{bbl@ADJ@layout.tabular@off}{%
3493   \ifnum\bbl@tabular@mode=\tw@
3494     \bbl@adjust@layout{\let\@tabular\bbl@OL@tabular}%
3495   \else
3496     \chardef\bbl@tabular@mode\z@
3497   \fi}
3498 \@namedef{bbl@ADJ@layout.lists@on}{%
3499   \bbl@adjust@layout{\let\list\bbl@NL@list}}
3500 \@namedef{bbl@ADJ@layout.lists@off}{%
3501   \bbl@adjust@layout{\let\list\bbl@OL@list}}
3502 %
3503 \@namedef{bbl@ADJ@autoload.bcp47@on}{%
3504   \bbl@bcppallowedtrue}
3505 \@namedef{bbl@ADJ@autoload.bcp47@off}{%
3506   \bbl@bcppallowedfalse}
3507 \@namedef{bbl@ADJ@autoload.bcp47.prefix}#1{%
3508   \def\bbl@bcp@prefix{#1}}
3509 \def\bbl@bcp@prefix{bcp47-}
3510 \@namedef{bbl@ADJ@autoload.options}#1{%
3511   \def\bbl@autoload@options{#1}}
3512 \let\bbl@autoload@bcptoptions\@empty
3513 \@namedef{bbl@ADJ@autoload.bcp47.options}#1{%
3514   \def\bbl@autoload@bcptoptions{#1}}
3515 \newif\ifbbl@bcptoname
3516 \@namedef{bbl@ADJ@bcp47.toname@on}{%
3517   \bbl@bcptonametrue
3518   \BabelEnsureInfo}
3519 \@namedef{bbl@ADJ@bcp47.toname@off}{%
3520   \bbl@bcptonamefalse}
3521 \@namedef{bbl@ADJ@prehyphenation.disable@nohyphenation}{%
3522   \directlua{ Babel.ignore_pre_char = function(node)
3523     return (node.lang == \the\csname l@nohyphenation\endcsname)
3524   end }}
3525 \@namedef{bbl@ADJ@prehyphenation.disable@off}{%
3526   \directlua{ Babel.ignore_pre_char = function(node)
3527     return false
3528   end }}
3529 \@namedef{bbl@ADJ@interchar.disable@nohyphenation}{%
3530   \def\bbl@ignoreinterchar{%
3531     \ifnum\language=\l@nohyphenation
3532       \expandafter\@gobble
3533     \else
3534       \expandafter\@firstofone
3535     \fi}}
3536 \@namedef{bbl@ADJ@interchar.disable@off}{%
3537   \let\bbl@ignoreinterchar\@firstofone}
3538 \@namedef{bbl@ADJ@select.write@shift}{%
3539   \let\bbl@restorelastskip\relax

```

```

3540 \def\bbl@savelastskip{%
3541   \let\bbl@restorelastskip\relax
3542   \ifvmode
3543     \ifdim\lastskip=\z@
3544       \let\bbl@restorelastskip\nobreak
3545     \else
3546       \bbl@exp{%
3547         \def\\bbl@restorelastskip{%
3548           \skip@=\the\lastskip
3549           \\nobreak \vskip-\skip@ \vskip\skip@}}%
3550       \fi
3551   \fi}}
3552 \@namedef{bbl@ADJ@select.write@keep}{%
3553   \let\bbl@restorelastskip\relax
3554   \let\bbl@savelastskip\relax}
3555 \@namedef{bbl@ADJ@select.write@omit}{%
3556   \AddBabelHook{babel-select}{beforestart}{%
3557     \expandafter\babel@aux\expandafter{\bbl@main@language}{}}%
3558   \let\bbl@restorelastskip\relax
3559   \def\bbl@savelastskip##1\bbl@restorelastskip{}}
3560 \@namedef{bbl@ADJ@select.encoding@off}{%
3561   \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.

```

3562 << *More package options >> ≡
3563 \DeclareOption{safe=none}{\let\bbl@opt@safe\@empty}
3564 \DeclareOption{safe=bib}{\def\bbl@opt@safe{B}}
3565 \DeclareOption{safe=ref}{\def\bbl@opt@safe{R}}
3566 \DeclareOption{safe=refbib}{\def\bbl@opt@safe{BR}}
3567 \DeclareOption{safe=bibref}{\def\bbl@opt@safe{BR}}
3568 << /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.

```

3569 \bbl@trace{Cross referencing macros}
3570 \ifx\bbl@opt@safe\@empty\else % ie, if 'ref' and/or 'bib'
3571   \def\@newl@bel#1#2#3{%
3572     {\@safe@activetrue
3573       \bbl@ifunset{#1@#2}%
3574       \relax
3575       {\gdef\@multiplelabels{%
3576         \@latex@warning@no@line{There were multiply-defined labels}}%
3577       \@latex@warning@no@line{Label `#2' multiply defined}}%
3578     \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.

```

3579 \CheckCommand*\@testdef[3]{%
3580   \def\reserved@a{#3}%
3581   \expandafter\ifx\c@name#1@#2\endcsname\reserved@a

```

```

3582 \else
3583 \@tempwattrue
3584 \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.

```

3585 \def\@testdef#1#2#3{% TODO. With @samestring?
3586 \@safe@activestrue
3587 \expandafter\let\expandafter\bbl@tempa\csname #1@#2\endcsname
3588 \def\bbl@tempb{#3}%
3589 \@safe@activestrue
3590 \ifx\bbl@tempa\relax
3591 \else
3592 \edef\bbl@tempa{\expandafter\strip@prefix\meaning\bbl@tempa}%
3593 \fi
3594 \edef\bbl@tempb{\expandafter\strip@prefix\meaning\bbl@tempb}%
3595 \ifx\bbl@tempa\bbl@tempb
3596 \else
3597 \@tempwattrue
3598 \fi}
3599 \fi

```

\ref

\pageref 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.

```

3600 \bbl@xin@{R}\bbl@opt@safe
3601 \ifin@
3602 \edef\bbl@tempc{\expandafter\string\csname ref code\endcsname}%
3603 \bbl@xin@{\expandafter\strip@prefix\meaning\bbl@tempc}%
3604 {\expandafter\strip@prefix\meaning\ref}%
3605 \ifin@
3606 \bbl@redefine\@kernel@ref#1{%
3607 \@safe@activestrue\org@@kernel@ref{#1}\@safe@activestrue}
3608 \bbl@redefine\@kernel@pageref#1{%
3609 \@safe@activestrue\org@@kernel@pageref{#1}\@safe@activestrue}
3610 \bbl@redefine\@kernel@sref#1{%
3611 \@safe@activestrue\org@@kernel@sref{#1}\@safe@activestrue}
3612 \bbl@redefine\@kernel@spageref#1{%
3613 \@safe@activestrue\org@@kernel@spageref{#1}\@safe@activestrue}
3614 \else
3615 \bbl@redefineroobust\ref#1{%
3616 \@safe@activestrue\org@ref{#1}\@safe@activestrue}
3617 \bbl@redefineroobust\pageref#1{%
3618 \@safe@activestrue\org@pageref{#1}\@safe@activestrue}
3619 \fi
3620 \else
3621 \let\org@ref\ref
3622 \let\org@pageref\pageref
3623 \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.

```

3624 \bbl@xin@{B}\bbl@opt@safe
3625 \ifin@
3626 \bbl@redefine\@citex[#1]#2{%
3627 \@safe@activestrue\edef\bbl@tempa{#2}\@safe@activestrue}

```



```
3628 \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.

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.)

```
3629 \AtBeginDocument{%
3630 \ifpackageloaded{natbib}{%
3631 \def\@citex[#1][#2]#3{%
3632 \if@safe@activestrue\edef\bbl@tempa{#3}\if@safe@activestrue
3633 \org@citex[#1][#2]{\bbl@tempa}}%
3634 }{}}
```

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

```
3635 \AtBeginDocument{%
3636 \ifpackageloaded{cite}{%
3637 \def\@citex[#1]#2{%
3638 \if@safe@activestrue\org@citex[#1]{#2}\if@safe@activestrue
3639 }{}}
```

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

```
3640 \bbl@redefine\nocite#1{%
3641 \if@safe@activestrue\org@nocite{#1}\if@safe@activestrue}
```

\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@activestrue` 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.

```
3642 \bbl@redefine\bibcite{%
3643 \bbl@cite@choice
3644 \bibcite}
```

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

```
3645 \def\bbl@bibcite#1#2{%
3646 \org@bibcite{#1}{\if@safe@activestrue#2}}
```

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

```
3647 \def\bbl@cite@choice{%
3648 \global\let\bibcite\bbl@bibcite
3649 \ifpackageloaded{natbib}{\global\let\bibcite\org@bibcite}}%
3650 \ifpackageloaded{cite}{\global\let\bibcite\org@bibcite}}%
3651 \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.

```
3652 \AtBeginDocument{\bbl@cite@choice}
```

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

```

3653 \bbl@redefine\@bibitem#1{%
3654   \safe@activetrue\org@bibitem{#1}\safe@activesfalse}
3655 \else
3656   \let\org@nocite\nocite
3657   \let\org@@citex@citex
3658   \let\org@bibcite\bibcite
3659   \let\org@bibitem\@bibitem
3660 \fi

```

5.2. Layout

```

3661 \newcommand\BabelPatchSection[1]{%
3662   \@ifundefined{#1}{}{%
3663     \bbl@exp{\let<bbl@ss@#1><#1>}%
3664     \@namedef{#1}{%
3665       \@ifstar{\bbl@presec@#1}%
3666       {\@dblarg{\bbl@presec@x{#1}}}}%
3667 \def\bbl@presec@x#1[#2]#3{%
3668   \bbl@exp{%
3669     \\\select@language@x{\bbl@main@language}%
3670     \\\bbl@cs{sspre@#1}%
3671     \\\bbl@cs{ss@#1}%
3672     [\\foreignlanguage{\language}{\unexpanded{#2}}}%
3673     {\\foreignlanguage{\language}{\unexpanded{#3}}}%
3674     \\\select@language@x{\language}}%
3675 \def\bbl@presec@#1#2{%
3676   \bbl@exp{%
3677     \\\select@language@x{\bbl@main@language}%
3678     \\\bbl@cs{sspre@#1}%
3679     \\\bbl@cs{ss@#1}%
3680     {\\foreignlanguage{\language}{\unexpanded{#2}}}%
3681     \\\select@language@x{\language}}%
3682 \IfBabelLayout{sectioning}%
3683   {\BabelPatchSection{part}%
3684    \BabelPatchSection{chapter}%
3685    \BabelPatchSection{section}%
3686    \BabelPatchSection{subsection}%
3687    \BabelPatchSection{subsubsection}%
3688    \BabelPatchSection{paragraph}%
3689    \BabelPatchSection{subparagraph}%
3690    \def\babel@toc#1{%
3691      \select@language@x{\bbl@main@language}}}%
3692 \IfBabelLayout{captions}%
3693   {\BabelPatchSection{caption}}}%

```

5.3. 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.

```

3694 \bbl@trace{Marks}
3695 \IfBabelLayout{sectioning}
3696   {\ifx\bbl@opt@headfoot\@nnil
3697     \g@addto@macro\@resetactivechars{%
3698       \set@typeset@protect
3699       \expandafter\select@language@x\expandafter{\bbl@main@language}%
3700       \let\protect\noexpand
3701       \ifcase\bbl@bidimode\else % Only with bidi. See also above

```

```

3702         \edef\thepage{%
3703             \noexpand\babelsublr{\unexpanded\expandafter{\thepage}}}%
3704         \fi}%
3705     \fi}
3706     {\ifbbl@single\else
3707         \bbl@ifunset{markright }{\bbl@redefine\bbl@redefineroobust
3708             \markright#1{%
3709                 \bbl@ifblank{#1}%
3710                 {\org@markright{}}}%
3711                 {\toks@{#1}%
3712                 \bbl@exp{%
3713                     \\org@markright{\\protect\\foreignlanguage{\language}%
3714                         {\protect\\bbl@restore@actives\the\toks@}}}%

```

\markboth

\@mkboth 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, `MTX` stores the definition in an intermediate macro, so it's not necessary anymore, but it's preserved for older versions.)

```

3715     \ifx\@mkboth\markboth
3716         \def\bbl@tempc{\let\@mkboth\markboth}%
3717     \else
3718         \def\bbl@tempc{%
3719             \fi
3720             \bbl@ifunset{markboth }{\bbl@redefine\bbl@redefineroobust
3721                 \markboth#1#2{%
3722                     \protected@edef\bbl@tempb##1{%
3723                         \protect\foreignlanguage
3724                             {\language}{\protect\bbl@restore@actives##1}}%
3725                     \bbl@ifblank{#1}%
3726                     {\toks@{}}%
3727                     {\toks@\expandafter{\bbl@tempb{#1}}}%
3728                     \bbl@ifblank{#2}%
3729                     {\@temptokena{}}%
3730                     {\@temptokena\expandafter{\bbl@tempb{#2}}}%
3731                     \bbl@exp{\\org@markboth{\the\toks@}{\the\@temptokena}}}%
3732                     \bbl@tempc
3733             \fi} % end ifbbl@single, end \IfBabelLayout

```

5.4. Other packages

5.4.1. `ifthen`

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

```

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

```

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

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.

```

3734 \bbl@trace{Preventing clashes with other packages}

```

```

3735 \ifx\org@ref\@undefined\else
3736 \bbl@xin@{R}\bbl@opt@safe
3737 \ifin@
3738 \AtBeginDocument{%
3739 \ifpackageloaded{ifthen}{%
3740 \bbl@redefine@long\ifthenelse#1#2#3{%
3741 \let\bbl@temp@pref\pageref
3742 \let\pageref\org@pageref
3743 \let\bbl@temp@ref\ref
3744 \let\ref\org@ref
3745 \@safe@activestrue
3746 \org@ifthenelse{#1}%
3747 {\let\pageref\bbl@temp@pref
3748 \let\ref\bbl@temp@ref
3749 \@safe@activesfalse
3750 #2}%
3751 {\let\pageref\bbl@temp@pref
3752 \let\ref\bbl@temp@ref
3753 \@safe@activesfalse
3754 #3}%
3755 }%
3756 }{}%
3757 }
3758 \fi

```

5.4.2. varioref

\@@vpageref

\vrefpagenum

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

```

3759 \AtBeginDocument{%
3760 \ifpackageloaded{varioref}{%
3761 \bbl@redefine\@@vpageref#1[#2]#3{%
3762 \@safe@activestrue
3763 \org@@@vpageref{#1}[#2]#3}%
3764 \@safe@activesfalse}%
3765 \bbl@redefine\vrefpagenum#1#2{%
3766 \@safe@activestrue
3767 \org@vrefpagenum{#1}#2}%
3768 \@safe@activesfalse}%

```

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

```

3769 \expandafter\def\csname Ref \endcsname#1{%
3770 \protected@edef\@tempa{\org@ref{#1}}\expandafter\MakeUppercase\@tempa}
3771 }{}%
3772 }
3773 \fi

```

5.4.3. hhlline

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

```

3774 \AtEndOfPackage{%

```

```

3775 \AtBeginDocument{%
3776   \@ifpackageloaded{hhline}%
3777   {\expandafter\ifx\cename normal@char\string:\endcsname\relax
3778   \else
3779   \makeatletter
3780   \def\@currname{hhline}\input{hhline.sty}\makeatother
3781   \fi}%
3782   {}}

```

\substitutefontfamily *Deprecated.* It creates an .fd file on the fly. The first argument is an encoding mnemonic, the second and third arguments are font family names. Use the tools provided by \LaTeX ($\text{\DeclareFontFamilySubstitution}$).

```

3783 \def\substitutefontfamily#1#2#3{%
3784   \lowercase{\immediate\openout15=#1#2.fd\relax}%
3785   \immediate\write15{%
3786     \string\ProvidesFile{#1#2.fd}%
3787     [\the\year/\two@digits{\the\month}/\two@digits{\the\day}
3788     \space generated font description file]^J
3789     \string\DeclareFontFamily{#1}{#2}{}}^J
3790     \string\DeclareFontShape{#1}{#2}{m}{n}{<->ssub * #3/m/n}{}}^J
3791     \string\DeclareFontShape{#1}{#2}{m}{it}{<->ssub * #3/m/it}{}}^J
3792     \string\DeclareFontShape{#1}{#2}{m}{sl}{<->ssub * #3/m/sl}{}}^J
3793     \string\DeclareFontShape{#1}{#2}{m}{sc}{<->ssub * #3/m/sc}{}}^J
3794     \string\DeclareFontShape{#1}{#2}{b}{n}{<->ssub * #3/bx/n}{}}^J
3795     \string\DeclareFontShape{#1}{#2}{b}{it}{<->ssub * #3/bx/it}{}}^J
3796     \string\DeclareFontShape{#1}{#2}{b}{sl}{<->ssub * #3/bx/sl}{}}^J
3797     \string\DeclareFontShape{#1}{#2}{b}{sc}{<->ssub * #3/bx/sc}{}}^J
3798   }%
3799   \closeout15
3800 }
3801 \onlypreamble\substitutefontfamily

```

5.5. Encoding and fonts

Because documents may use non-ASCII font encodings, we make sure that the logos of \TeX and \LaTeX always come out in the right encoding. There is a list of non-ASCII encodings. Requested encodings are currently stored in $\text{\@fontenc@load@list}$. 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

```

3802 \bbl@trace{Encoding and fonts}
3803 \newcommand\BabelNonASCII{LGR,LGI,X2,OT2,OT3,OT6,LHE,LWN,LMA,LMC,LMS,LMU}
3804 \newcommand\BabelNonText{TS1,T3,TS3}
3805 \let\org@TeX\TeX
3806 \let\org@LaTeX\LaTeX
3807 \let\ensureascii@firstofone
3808 \let\asciiencoding\@empty
3809 \AtBeginDocument{%
3810   \def\@elt#1{, #1,}%
3811   \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
3812   \let\@elt\relax
3813   \let\bbl@tempb\@empty
3814   \def\bbl@tempc{OT1}%
3815   \bbl@foreach\BabelNonASCII{% LGR loaded in a non-standard way
3816     \bbl@ifunset{T@#1}{\def\bbl@tempb{#1}}}%
3817   \bbl@foreach\bbl@tempa{%
3818     \bbl@xin@{, #1,}{, \BabelNonASCII,}%
3819     \ifin@
3820       \def\bbl@tempb{#1}% Store last non-ascii
3821     \else\bbl@xin@{, #1,}{, \BabelNonText,}% Pass
3822     \ifin@else

```

```

3823     \def\bbl@tempc{#1}% Store last ascii
3824     \fi
3825     \fi}%
3826     \ifx\bbl@tempb\@empty\else
3827     \bbl@xin@{,\cf@encoding,}{,\BabelNonASCII,\BabelNonText,}%
3828     \ifin@else
3829     \edef\bbl@tempc{\cf@encoding}% The default if ascii wins
3830     \fi
3831     \let\asciientcoding\bbl@tempc
3832     \renewcommand\ensureascii[1]{%
3833     {\fontencoding{\asciientcoding}\selectfont#1}}%
3834     \DeclareTextCommandDefault{\TeX}{\ensureascii{\org@TeX}}%
3835     \DeclareTextCommandDefault{\LaTeX}{\ensureascii{\org@LaTeX}}%
3836     \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.

```

3837 \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.

```

3838 \AtBeginDocument{%
3839   \@ifpackageloaded{fontspec}%
3840   {\xdef\latinencoding{%
3841     \ifx\UTFencname\@undefined
3842     EU\ifcase\bbl@engine\or2\or1\fi
3843     \else
3844     \UTFencname
3845     \fi}}%
3846   {\gdef\latinencoding{OT1}%
3847     \ifx\cf@encoding\bbl@t@one
3848     \xdef\latinencoding{\bbl@t@one}%
3849     \else
3850     \def\@elt#1{,#1,}%
3851     \edef\bbl@tempa{\expandafter\@gobbletwo\@fontenc@load@list}%
3852     \let\@elt\relax
3853     \bbl@xin@{,T1,}\bbl@tempa
3854     \ifin@
3855     \xdef\latinencoding{\bbl@t@one}%
3856     \fi
3857     \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.

```

3858 \DeclareRobustCommand{\latintext}{%
3859   \fontencoding{\latinencoding}\selectfont
3860   \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.

```

3861 \ifx\@undefined\DeclareTextFontCommand
3862   \DeclareRobustCommand{\textlatin}[1]{\leavevmode{\latintext #1}}
3863 \else
3864   \DeclareTextFontCommand{\textlatin}{\latintext}
3865 \fi

```

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

```
3866 \def\bbbl@patchfont#1{\AddToHook{selectfont}{#1}}
```

5.6. Basic bidi support

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

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

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

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

```
3867 \bbbl@trace{Loading basic (internal) bidi support}
3868 \ifodd\bbbl@engine
3869 \else % TODO. Move to txtbabel. Any xe+lua bidi
3870   \ifnum\bbbl@bidimode>100 \ifnum\bbbl@bidimode<200
3871     \bbbl@error{bidi-only-lua}{\}\}\}\}%
3872     \let\bbbl@beforeforeign\leavevmode
3873     \AtEndOfPackage{%
3874       \EnableBabelHook{babel-bidi}%
3875       \bbbl@xebidipar}
3876 \fi\fi
3877 \def\bbbl@loadxebidi#1{%
3878   \ifx\RTLfootnotetext\@undefined
3879     \AtEndOfPackage{%
3880       \EnableBabelHook{babel-bidi}%
3881       \ifx\fontspec\@undefined
3882         \usepackage{fontspec}% bidi needs fontspec
3883       \fi
3884       \usepackage#1{bidi}%
3885       \let\bbbl@digitsdotdash\DigitsDotDashInterCharToks
3886       \def\DigitsDotDashInterCharToks{% See the 'bidi' package
3887         \ifnum\@nameuse{bbbl@wdir@languagename}=\tw@ % 'AL' bidi
3888           \bbbl@digitsdotdash % So ignore in 'R' bidi
3889         \fi}}%
3890   \fi}
3891 \ifnum\bbbl@bidimode>200 % Any xe bidi=
3892   \ifcase\expandafter\@gobbletwo\the\bbbl@bidimode\or
3893     \bbbl@tentative{bidi=bidi}
3894     \bbbl@loadxebidi{}
3895   \or
3896     \bbbl@loadxebidi{[rldocument]}
3897   \or
3898     \bbbl@loadxebidi{}
3899 \fi
3900 \fi
3901 \fi
3902 % TODO? Separate:
```

```

3903 \ifnum\bbbl@bidimode=\@ne % bidi=default
3904 \let\bbbl@beforeforeign\leavevmode
3905 \ifodd\bbbl@engine % lua
3906 \newattribute\bbbl@attr@dir
3907 \directlua{ Babel.attr_dir = luatexbase.registernumber'bbbl@attr@dir' }
3908 \bbbl@exp{\output{\bodydir\pagedir\the\output}}
3909 \fi
3910 \AtEndOfPackage{%
3911 \EnableBabelHook{babel-bidi}% pdf/lua/xe
3912 \ifodd\bbbl@engine\else % pdf/xe
3913 \bbbl@xebidipar
3914 \fi}
3915 \fi

```

Now come the macros used to set the direction when a language is switched. Testing are based on script names, because it's the user interface (including language and script in \babelprovide. First the (mostly) common macros.

```

3916 \bbbl@trace{Macros to switch the text direction}
3917 \def\bbbl@alscripts{,Arabic,Syriac,Thaana,}
3918 \def\bbbl@rscripts{%
3919 ,Garay,Todhri,Imperial Aramaic,Avestan,Cypriot,Elymaic,Hatran,Hebrew,%
3920 Old Hungarian,Kharoshthi,Lydian,Mandaean,Manichaeen,Mende Kikakui,%
3921 Meroitic Cursive,Meroitic,Old North Arabian,Nabataean,N'Ko,%
3922 Old Turkic,Orkhon,Palmyrene,Inscriptional Pahlavi,Psalter Pahlavi,%
3923 Phoenician,Inscriptional Parthian,Hanifi,Samaritan,Old Sogdian,%
3924 Old South Arabian,Yezidi,}%
3925 \def\bbbl@provide@dirs#1{%
3926 \bbbl@xin@{\csname bbbl@sname@#1\endcsname}{\bbbl@alscripts\bbbl@rscripts}%
3927 \ifin@
3928 \global\bbbl@csarg\chardef{wdir@#1}\@ne
3929 \bbbl@xin@{\csname bbbl@sname@#1\endcsname}{\bbbl@alscripts}%
3930 \ifin@
3931 \global\bbbl@csarg\chardef{wdir@#1}\tw@
3932 \fi
3933 \else
3934 \global\bbbl@csarg\chardef{wdir@#1}\z@
3935 \fi
3936 \ifodd\bbbl@engine
3937 \bbbl@csarg\ifcase{wdir@#1}%
3938 \directlua{ Babel.locale_props[\the\localeid].textdir = 'l' }%
3939 \or
3940 \directlua{ Babel.locale_props[\the\localeid].textdir = 'r' }%
3941 \or
3942 \directlua{ Babel.locale_props[\the\localeid].textdir = 'al' }%
3943 \fi
3944 \fi}
3945 \def\bbbl@switchdir{%
3946 \bbbl@ifunset{bbbl@sys@\language name}{\bbbl@provide@sys@\language name}}}%
3947 \bbbl@ifunset{bbbl@wdir@\language name}{\bbbl@provide@dirs@\language name}}}%
3948 \bbbl@exp{\bbbl@setdirs\bbbl@cl{wdir}}}%
3949 \def\bbbl@setdirs#1{% TODO - math
3950 \ifcase\bbbl@select@type % TODO - strictly, not the right test
3951 \bbbl@bodydir{#1}%
3952 \bbbl@pardir{#1}% <- Must precede \bbbl@textdir
3953 \fi
3954 \bbbl@textdir{#1}}
3955 \ifnum\bbbl@bidimode>\z@
3956 \AddBabelHook{babel-bidi}{afterextras}{\bbbl@switchdir}
3957 \DisableBabelHook{babel-bidi}
3958 \fi

```

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

```

3959 \ifodd\bbbl@engine % luatex=1
3960 \else % pdftex=0, xetex=2

```



```

3961 \newcount\bbl@dirlevel
3962 \chardef\bbl@thetextdir\z@
3963 \chardef\bbl@thepardir\z@
3964 \def\bbl@textdir#1{%
3965   \ifcase#1\relax
3966     \chardef\bbl@thetextdir\z@
3967     \@nameuse{setlatin}%
3968     \bbl@textdir@i\beginL\endL
3969   \else
3970     \chardef\bbl@thetextdir\@ne
3971     \@nameuse{setnonlatin}%
3972     \bbl@textdir@i\beginR\endR
3973   \fi}
3974 \def\bbl@textdir@i#1#2{%
3975   \ifhmode
3976     \ifnum\currentgrouplevel>\z@
3977       \ifnum\currentgrouplevel=\bbl@dirlevel
3978         \bbl@error{multiple-bidi}{\}\}%
3979         \bgroup\aftergroup#2\aftergroup\egroup
3980       \else
3981         \ifcase\currentgrouptype\or % 0 bottom
3982           \aftergroup#2% 1 simple {}
3983         \or
3984           \bgroup\aftergroup#2\aftergroup\egroup % 2 hbox
3985         \or
3986           \bgroup\aftergroup#2\aftergroup\egroup % 3 adj hbox
3987         \or\or\or % vbox vtop align
3988         \or
3989           \bgroup\aftergroup#2\aftergroup\egroup % 7 noalign
3990         \or\or\or\or\or\or % output math disc insert vcent mathchoice
3991         \or
3992           \aftergroup#2% 14 \begingroup
3993         \else
3994           \bgroup\aftergroup#2\aftergroup\egroup % 15 adj
3995         \fi
3996       \fi
3997       \bbl@dirlevel\currentgrouplevel
3998     \fi
3999     #1%
4000   \fi}
4001 \def\bbl@pardir#1{\chardef\bbl@thepardir#1\relax}
4002 \let\bbl@bodydir@gobble
4003 \let\bbl@pagedir@gobble
4004 \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).

```

4005 \def\bbl@xebidipar{%
4006   \let\bbl@xebidipar\relax
4007   \TeXeTstate\@ne
4008   \def\bbl@xeeverypar{%
4009     \ifcase\bbl@thepardir
4010       \ifcase\bbl@thetextdir\else\beginR\fi
4011     \else
4012       {\setbox\z@\lastbox\beginR\box\z@}%
4013     \fi}%
4014   \AddToHook{para/begin}{\bbl@xeeverypar}}
4015 \ifnum\bbl@bidimode>200 % Any xe bidi=
4016   \let\bbl@textdir@i@gobbletwo
4017   \let\bbl@xebidipar\empty
4018   \AddBabelHook{bidi}{foreign}{%
4019     \ifcase\bbl@thetextdir

```

```

4020     \BabelWrapText{\LR{##1}}%
4021     \else
4022     \BabelWrapText{\RL{##1}}%
4023     \fi}
4024     \def\bbl@pardir#1{\ifcase#1\relax\setLR\else\setRL\fi}
4025   \fi
4026 \fi

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

4027 \DeclareRobustCommand\babelsublr[1]{\leavevmode{\bbl@textdir\z@#1}}
4028 \AtBeginDocument{%
4029   \ifx\pdfstringdefDisableCommands@undefined\else
4030   \ifx\pdfstringdefDisableCommands\relax\else
4031   \pdfstringdefDisableCommands{\let\babelsublr\@firstofone}%
4032   \fi
4033 \fi}

```

5.7. Local Language Configuration

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

```

4034 \bbl@trace{Local Language Configuration}
4035 \ifx\loadlocalcfg\undefined
4036   \ifpackagewith{babel}{noconfigs}%
4037   {\let\loadlocalcfg\@gobble}%
4038   {\def\loadlocalcfg#1{%
4039     \InputIfFileExists{#1.cfg}%
4040     {\typeout{*****^}%
4041              * Local config file #1.cfg used^^}%
4042              *}}%
4043   \@empty}}
4044 \fi

```

5.8. 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).

```

4045 \bbl@trace{Language options}
4046 \let\bbl@afterlang\relax
4047 \let\babelmodifiers\relax
4048 \let\bbl@loaded\@empty
4049 \def\bbl@load@language#1{%
4050   \InputIfFileExists{#1.ldf}%
4051   {\edef\bbl@loaded{\CurrentOption
4052     \ifx\bbl@loaded\@empty\else,\bbl@loaded\fi}%
4053     \expandafter\let\expandafter\bbl@afterlang
4054       \csname\CurrentOption.ldf-h@k\endcsname
4055     \expandafter\let\expandafter\babelmodifiers
4056       \csname bbl@mod@\CurrentOption\endcsname
4057     \bbl@exp{\AtBeginDocument{%
4058       \bbl@usehooks@lang{\CurrentOption}{begindocument}{\CurrentOption}}}%
4059   {\IfFileExists{babel-#1.tex}%
4060     {\def\bbl@tempa{%
4061       .\There is a locale ini file for this language.\%
4062       If it's the main language, try adding `provide=*'\%
4063       to the babel package options}}%
4064     {\let\bbl@tempa\empty}%
4065     \bbl@error{unknown-package-option}{}}{}}

```

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.

```

4066 \def\bbl@try@load@lang#1#2#3{%
4067   \IfFileExists{\CurrentOption.lda}%
4068     {\bbl@load@language{\CurrentOption}}%
4069     {#1\bbl@load@language{#2}#3}}
4070 %
4071 \DeclareOption{friulian}{\bbl@try@load@lang{}{friulan}}
4072 \DeclareOption{hebrew}{%
4073   \ifcase\bbl@engine\or
4074     \bbl@error{only-pdftex-lang}{hebrew}{luatex}}%
4075   \fi
4076   \input{rlbabel.def}%
4077   \bbl@load@language{hebrew}}
4078 \DeclareOption{hungarian}{\bbl@try@load@lang{}{magyar}}
4079 \DeclareOption{lowersorbian}{\bbl@try@load@lang{}{lsorbian}}
4080 % \DeclareOption{nothernkurdish}{\bbl@try@load@lang{}{kurmanji}}
4081 \DeclareOption{polutonikogreek}{%
4082   \bbl@try@load@lang{}{greek}{\languageattribute{greek}{polutoniko}}}
4083 \DeclareOption{russian}{\bbl@try@load@lang{}{russianb}}
4084 \DeclareOption{ukrainian}{\bbl@try@load@lang{}{ukraineb}}
4085 \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 .lda 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.

```

4086 \ifx\bbl@opt@config\@nnil
4087   \ifpackagewith{babel}{noconfigs}{%
4088     {\InputIfFileExists{bblopts.cfg}%
4089       {\typeout{*****^J%
4090         * Local config file bblopts.cfg used^^J%
4091         *}}%
4092     }}%
4093 \else
4094   \InputIfFileExists{\bbl@opt@config.cfg}%
4095   {\typeout{*****^J%
4096     * Local config file \bbl@opt@config.cfg used^^J%
4097     *}}%
4098   {\bbl@error{config-not-found}}}%
4099 \fi

```

Recognizing global options in packages not having a closed set of them is not trivial, as for them to be processed they must be defined explicitly. So, package options not yet taken into account and stored in `bbl@language@opts` are assumed to be languages. 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 lda *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.

For efficiency, first preprocess the class options to remove those with =, which are becoming increasingly frequent (no language should contain this character).

```

4100 \def\bbl@tempf{,}
4101 \bbl@foreach\@raw@classoptionslist{%
4102   \in@{=}{#1}%
4103   \ifin@else
4104     \edef\bbl@tempf{\bbl@tempf\zap@space#1 \@empty}%
4105   \fi}
4106 \ifx\bbl@opt@main\@nnil
4107   \ifnum\bbl@iniflag>\z@ % if all lda's: set implicitly, no main pass
4108     \let\bbl@tempb\@empty
4109     \edef\bbl@tempa{\bbl@tempf,\bbl@language@opts}%
4110     \bbl@foreach\bbl@tempa{\edef\bbl@tempb{#1,\bbl@tempb}}%

```

```

4111 \bbl@foreach\bbl@tempb{% \bbl@tempb is a reversed list
4112 \ifx\bbl@opt@main\@nnil % ie, if not yet assigned
4113 \ifodd\bbl@iniflag % = *=
4114 \IfFileExists{babel-#1.tex}{\def\bbl@opt@main{#1}}{}%
4115 \else % n +=
4116 \IfFileExists{#1.ldf}{\def\bbl@opt@main{#1}}{}%
4117 \fi
4118 \fi}%
4119 \fi
4120 \else
4121 \bbl@info{Main language set with 'main='. Except if you have\\%
4122 problems, prefer the default mechanism for setting\\%
4123 the main language, ie, as the last declared.\\%
4124 Reported}
4125 \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`).

```

4126 \ifx\bbl@opt@main\@nnil\else
4127 \bbl@ncarg\let\bbl@loadmain{ds@\bbl@opt@main}%
4128 \expandafter\let\csname ds@\bbl@opt@main\endcsname\relax
4129 \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.

```

4130 \bbl@foreach\bbl@language@opts{%
4131 \def\bbl@tempa{#1}%
4132 \ifx\bbl@tempa\bbl@opt@main\else
4133 \ifnum\bbl@iniflag<\tw@ % 0 0 (other = ldf)
4134 \bbl@ifunset{ds@#1}%
4135 {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4136 {}%
4137 \else % + * (other = ini)
4138 \DeclareOption{#1}{%
4139 \bbl@ldfinit
4140 \babelprovide[@import]{#1}% %%%
4141 \bbl@afterldf{}}%
4142 \fi
4143 \fi}
4144 \bbl@foreach\bbl@tempf{%
4145 \def\bbl@tempa{#1}%
4146 \ifx\bbl@tempa\bbl@opt@main\else
4147 \ifnum\bbl@iniflag<\tw@ % 0 0 (other = ldf)
4148 \bbl@ifunset{ds@#1}%
4149 {\IfFileExists{#1.ldf}%
4150 {\DeclareOption{#1}{\bbl@load@language{#1}}}%
4151 {}}%
4152 {}%
4153 \else % + * (other = ini)
4154 \IfFileExists{babel-#1.tex}%
4155 {\DeclareOption{#1}{%
4156 \bbl@ldfinit
4157 \babelprovide[@import]{#1}% %%%
4158 \bbl@afterldf{}}}%
4159 {}%
4160 \fi
4161 \fi}

```

And we are done, because all options for this pass has been declared. Those already processed in the first pass are just ignored. There is still room for last minute changes with a `\TeX` hook (not a Babel one).

The options have to be processed in the order in which the user specified them (but remember class options are processed before):

```

4162 \NewHook{babel/presets}

```

```

4163 \UseHook{babel/presets}
4164 \def\AfterBabelLanguage#1{%
4165   \bbl@ifsamestring\CurrentOption{#1}{\global\bbl@add\bbl@afterlang}{}}
4166 \DeclareOption*{}
4167 \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.

```

4168 \bbl@trace{Option 'main'}
4169 \ifx\bbl@opt@main\@nnil
4170   \edef\bbl@tempa{\bbl@tempf,\bbl@language@opts}
4171   \let\bbl@tempc\@empty
4172   \edef\bbl@templ{\,\bbl@loaded,}
4173   \edef\bbl@templ{\expandafter\strip@prefix\meaning\bbl@templ}
4174   \bbl@for\bbl@tempb\bbl@tempa{%
4175     \edef\bbl@tempd{\,\bbl@tempb,}%
4176     \edef\bbl@tempd{\expandafter\strip@prefix\meaning\bbl@tempd}%
4177     \bbl@xin{\bbl@tempd}{\bbl@templ}%
4178     \ifin\edef\bbl@tempc{\bbl@tempb}\fi}
4179   \def\bbl@tempa#1,#2\@nnil{\def\bbl@tempb{#1}}
4180   \expandafter\bbl@tempa\bbl@loaded,\@nnil
4181   \ifx\bbl@tempb\bbl@tempc\else
4182     \bbl@warning{%
4183       Last declared language option is '\bbl@tempc',\%
4184       but the last processed one was '\bbl@tempb'.\%
4185       The main language can't be set as both a global\%
4186       and a package option. Use 'main=\bbl@tempc' as\%
4187       option. Reported}
4188   \fi
4189 \else
4190   \ifodd\bbl@iniflag % case 1,3 (main is ini)
4191     \bbl@ldfinit
4192     \let\CurrentOption\bbl@opt@main
4193     \bbl@exp{% \bbl@opt@provide = empty if *
4194       \\ \babelprovide
4195         [\bbl@opt@provide,@import,main]% %%%
4196         {\bbl@opt@main}}%
4197     \bbl@afterldf{}
4198     \DeclareOption{\bbl@opt@main}{}
4199   \else % case 0,2 (main is ldf)
4200     \ifx\bbl@loadmain\relax
4201       \DeclareOption{\bbl@opt@main}{\bbl@load@language{\bbl@opt@main}}
4202     \else
4203       \DeclareOption{\bbl@opt@main}{\bbl@loadmain}
4204     \fi
4205     \ExecuteOptions{\bbl@opt@main}
4206     \@namedef{ds@\bbl@opt@main}{}%
4207   \fi
4208   \DeclareOption*{}
4209   \ProcessOptions*
4210 \fi
4211 \bbl@exp{%
4212   \\ \AtBeginDocument{\\ \bbl@usehooks@lang{/}{\begindocument}{}}}%
4213 \def\AfterBabelLanguage{\bbl@error{late-after-babel}}{}{}

```

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

```

4214 \ifx\bbl@main@language\@undefined
4215   \bbl@info{%
4216     You haven't specified a language as a class or package\%

```

```

4217 option. I'll load 'nil'. Reported}
4218 \bbl@load@language{nil}
4219 \fi
4220 </package>

```

6. The kernel of Babel

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`

```

4221 <{*kernel}
4222 \let\bbl@onlyswitch\@empty
4223 \input babel.def
4224 \let\bbl@onlyswitch\@undefined
4225 </kernel>

```

7. Error messages

They are loaded when `\bbl@error` is first called. To save space, the main code just identifies them with a tag, and messages are stored in a separate file. Since it can be loaded anywhere, you make sure some catcodes have the right value, although those for `\`, ```, `^`, `M`, `%` and `=` are reset before loading the file.

```

4226 <{*errors}
4227 \catcode`\{=1 \catcode`\}=2 \catcode`\#=6
4228 \catcode`\:=12 \catcode`\,=12 \catcode`\.=12 \catcode`\-=12
4229 \catcode`\'=12 \catcode`\(=12 \catcode`\)=12
4230 \catcode`\@=11 \catcode`\^=7
4231 %
4232 \ifx\MessageBreak\@undefined
4233 \gdef\bbl@error@i#1#2{%
4234 \begingroup
4235 \newlinechar=^^J
4236 \def\{^J(babel) }%
4237 \errhelp{#2}\errmessage{\{#1}%
4238 \endgroup}
4239 \else
4240 \gdef\bbl@error@i#1#2{%
4241 \begingroup
4242 \def\{\MessageBreak}%
4243 \PackageError{babel}{#1}{#2}%
4244 \endgroup}
4245 \fi
4246 \def\bbl@errmessage#1#2#3{%
4247 \expandafter\gdef\csname bbl@err@#1\endcsname##1##2##3{%
4248 \bbl@error@i{#2}{#3}}
4249 % Implicit #2#3#4:
4250 \gdef\bbl@error#1{\csname bbl@err@#1\endcsname}
4251 %
4252 \bbl@errmessage{not-yet-available}
4253 {Not yet available}%
4254 {Find an armchair, sit down and wait}
4255 \bbl@errmessage{bad-package-option}%
4256 {Bad option '#1=#2'. Either you have misspelled the\%

```

```

4257     key or there is a previous setting of '#1'. Valid\\%
4258     keys are, among others, 'shorthands', 'main', 'bidi',\\%
4259     'strings', 'config', 'headfoot', 'safe', 'math'.}%
4260     {See the manual for further details.}
4261 \bbl@errmessage{base-on-the-fly}
4262     {For a language to be defined on the fly 'base'\\%
4263     is not enough, and the whole package must be\\%
4264     loaded. Either delete the 'base' option or\\%
4265     request the languages explicitly}%
4266     {See the manual for further details.}
4267 \bbl@errmessage{undefined-language}
4268     {You haven't defined the language '#1' yet.\\%
4269     Perhaps you misspelled it or your installation\\%
4270     is not complete}%
4271     {Your command will be ignored, type <return> to proceed}
4272 \bbl@errmessage{shorthand-is-off}
4273     {I can't declare a shorthand turned off (\string#2)}
4274     {Sorry, but you can't use shorthands which have been\\%
4275     turned off in the package options}
4276 \bbl@errmessage{not-a-shorthand}
4277     {The character '\string #1' should be made a shorthand character;\\%
4278     add the command \string\usesshorthands\string{#1\string} to
4279     the preamble.\\%
4280     I will ignore your instruction}%
4281     {You may proceed, but expect unexpected results}
4282 \bbl@errmessage{not-a-shorthand-b}
4283     {I can't switch '\string#2' on or off--not a shorthand}%
4284     {This character is not a shorthand. Maybe you made\\%
4285     a typing mistake? I will ignore your instruction.}
4286 \bbl@errmessage{unknown-attribute}
4287     {The attribute #2 is unknown for language #1.}%
4288     {Your command will be ignored, type <return> to proceed}
4289 \bbl@errmessage{missing-group}
4290     {Missing group for string \string#1}%
4291     {You must assign strings to some category, typically\\%
4292     captions or extras, but you set none}
4293 \bbl@errmessage{only-lua-xe}
4294     {This macro is available only in LuaLaTeX and XeLaTeX.}%
4295     {Consider switching to these engines.}
4296 \bbl@errmessage{only-lua}
4297     {This macro is available only in LuaLaTeX}%
4298     {Consider switching to that engine.}
4299 \bbl@errmessage{unknown-provide-key}
4300     {Unknown key '#1' in \string\babelprovide}%
4301     {See the manual for valid keys}%
4302 \bbl@errmessage{unknown-mapfont}
4303     {Option '\bbl@KVP@mapfont' unknown for\\%
4304     mapfont. Use 'direction'}%
4305     {See the manual for details.}
4306 \bbl@errmessage{no-ini-file}
4307     {There is no ini file for the requested language\\%
4308     (#1: \language). Perhaps you misspelled it or your\\%
4309     installation is not complete}%
4310     {Fix the name or reinstall babel.}
4311 \bbl@errmessage{digits-is-reserved}
4312     {The counter name 'digits' is reserved for mapping\\%
4313     decimal digits}%
4314     {Use another name.}
4315 \bbl@errmessage{limit-two-digits}
4316     {Currently two-digit years are restricted to the\\%
4317     range 0-9999}%
4318     {There is little you can do. Sorry.}
4319 \bbl@errmessage{alphabetic-too-large}

```

```

4320 {Alphabetic numeral too large (#1)}%
4321 {Currently this is the limit.}
4322 \bbl@errmessage{no-ini-info}
4323 {I've found no info for the current locale.\\%
4324   The corresponding ini file has not been loaded\\%
4325   Perhaps it doesn't exist}%
4326 {See the manual for details.}
4327 \bbl@errmessage{unknown-ini-field}
4328 {Unknown field '#1' in \string\BCPdata.\\%
4329   Perhaps you misspelled it}%
4330 {See the manual for details.}
4331 \bbl@errmessage{unknown-locale-key}
4332 {Unknown key for locale '#2':\\%
4333   #3\\%
4334   \string#1 will be set to \string\relax}%
4335 {Perhaps you misspelled it.}%
4336 \bbl@errmessage{adjust-only-vertical}
4337 {Currently, #1 related features can be adjusted only\\%
4338   in the main vertical list}%
4339 {Maybe things change in the future, but this is what it is.}
4340 \bbl@errmessage{layout-only-vertical}
4341 {Currently, layout related features can be adjusted only\\%
4342   in vertical mode}%
4343 {Maybe things change in the future, but this is what it is.}
4344 \bbl@errmessage{bidi-only-lua}
4345 {The bidi method 'basic' is available only in\\%
4346   luatex. I'll continue with 'bidi=default', so\\%
4347   expect wrong results}%
4348 {See the manual for further details.}
4349 \bbl@errmessage{multiple-bidi}
4350 {Multiple bidi settings inside a group}%
4351 {I'll insert a new group, but expect wrong results.}
4352 \bbl@errmessage{unknown-package-option}
4353 {Unknown option '\CurrentOption'. Either you misspelled it\\%
4354   or the language definition file \CurrentOption.ldf\\%
4355   was not found%
4356   \bbl@tempa}
4357 {Valid options are, among others: shorthands=, KeepShorthandsActive,\\%
4358   activeacute, activegrave, noconfigs, safe=, main=, math=\\%
4359   headfoot=, strings=, config=, hyphenmap=, or a language name.}
4360 \bbl@errmessage{config-not-found}
4361 {Local config file '\bbl@opt@config.cfg' not found}%
4362 {Perhaps you misspelled it.}
4363 \bbl@errmessage{late-after-babel}
4364 {Too late for \string\AfterBabelLanguage}%
4365 {Languages have been loaded, so I can do nothing}
4366 \bbl@errmessage{double-hyphens-class}
4367 {Double hyphens aren't allowed in \string\babelcharclass\\%
4368   because it's potentially ambiguous}%
4369 {See the manual for further info}
4370 \bbl@errmessage{unknown-interchar}
4371 {'#1' for '\language' cannot be enabled.\\%
4372   Maybe there is a typo}%
4373 {See the manual for further details.}
4374 \bbl@errmessage{unknown-interchar-b}
4375 {'#1' for '\language' cannot be disabled.\\%
4376   Maybe there is a typo}%
4377 {See the manual for further details.}
4378 \bbl@errmessage{charproperty-only-vertical}
4379 {\string\babelcharproperty\space can be used only in\\%
4380   vertical mode (preamble or between paragraphs)}%
4381 {See the manual for further info}
4382 \bbl@errmessage{unknown-char-property}

```



```

4383 {No property named '#2'. Allowed values are\\%
4384 direction (bc), mirror (bmg), and linebreak (lb)}%
4385 {See the manual for further info}
4386 \bbl@errmessage{bad-transform-option}
4387 {Bad option '#1' in a transform.\\%
4388 I'll ignore it but expect more errors}%
4389 {See the manual for further info.}
4390 \bbl@errmessage{font-conflict-transforms}
4391 {Transforms cannot be re-assigned to different\\%
4392 fonts. The conflict is in '\bbl@kv@label'.\\%
4393 Apply the same fonts or use a different label}%
4394 {See the manual for further details.}
4395 \bbl@errmessage{transform-not-available}
4396 {'#1' for '\language' cannot be enabled.\\%
4397 Maybe there is a typo or it's a font-dependent transform}%
4398 {See the manual for further details.}
4399 \bbl@errmessage{transform-not-available-b}
4400 {'#1' for '\language' cannot be disabled.\\%
4401 Maybe there is a typo or it's a font-dependent transform}%
4402 {See the manual for further details.}
4403 \bbl@errmessage{year-out-range}
4404 {Year out of range.\\%
4405 The allowed range is #1}%
4406 {See the manual for further details.}
4407 \bbl@errmessage{only-pdftex-lang}
4408 {The '#1' ldf style doesn't work with #2,\\%
4409 but you can use the ini locale instead.\\%
4410 Try adding 'provide=*' to the option list. You may\\%
4411 also want to set 'bidi=' to some value}%
4412 {See the manual for further details.}
4413 \bbl@errmessage{hyphenmins-args}
4414 {\string\babelhyphenmins\ accepts either the optional\\%
4415 argument or the star, but not both at the same time}%
4416 {See the manual for further details.}
4417 </errors>
4418 <*patterns>

```

8. 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.

```

4419 <@Make sure ProvidesFile is defined@>
4420 \ProvidesFile{hyphen.cfg}[<@date@> v<@version@> Babel hyphens]
4421 \xdef\bbl@format{\jobname}
4422 \def\bbl@version{<@version@>}
4423 \def\bbl@date{<@date@>}
4424 \ifx\AtBeginDocument\undefined
4425 \def\@empty{}
4426 \fi
4427 <@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.

```

4428 \def\process@line#1#2 #3 #4 {%
4429 \ifx=#1%
4430 \process@synonym{#2}%
4431 \else
4432 \process@language{#1#2}{#3}{#4}%
4433 \fi

```

4434 \ignorespaces}

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

```
4435 \toks@{}
4436 \def\bbl@languages{}
```

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

Otherwise the name will be a synonym for the language loaded last.

We also need to copy the hyphenmin parameters for the synonym.

```
4437 \def\process@synonym#1{%
4438   \ifnum\last@language=\m@ne
4439     \toks@\expandafter{\the\toks@\relax\process@synonym{#1}}%
4440   \else
4441     \expandafter\chardef\csname l@#1\endcsname\last@language
4442     \wlog{\string\l@#1=\string\language\the\last@language}%
4443     \expandafter\let\csname #1hyphenmins\expandafter\endcsname
4444       \csname\language\hyphenmins\endcsname
4445     \let\bbl@elt\relax
4446     \edef\bbl@languages{\bbl@languages\bbl@elt{#1}{\the\last@language}}}%
4447   \fi}
```

\process@language The macro \process@language is used to process a non-empty line from the ‘configuration file’. It has three arguments, each delimited by white space. The first argument is the ‘name’ of a language; the second is the name of the file that contains the patterns. The optional third argument is the name of a file containing hyphenation exceptions.

The first thing to do is call \addlanguage to allocate a pattern register and to make that register ‘active’. Then the pattern file is read.

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

Pattern files may contain assignments to \lefthyphenmin and \righthyphenmin. T_EX does not keep track of these assignments. Therefore we try to detect such assignments and store them in the \<language>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.

```
4448 \def\process@language#1#2#3{%
4449   \expandafter\addlanguage\csname l@#1\endcsname
4450   \expandafter\language\csname l@#1\endcsname
4451   \edef\language\language{#1}%
4452   \bbl@hook@everylanguage{#1}%
4453   % > luatex
4454   \bbl@get@enc#1:.\@@@
4455   \begingroup
4456     \lefthyphenmin\m@ne
4457     \bbl@hook@loadpatterns{#2}%
4458     % > luatex
```

```

4459 \ifnum\lefthyphenmin=\m@ne
4460 \else
4461 \expandafter\xdef\csname #1hyphenmins\endcsname{%
4462 \the\lefthyphenmin\the\righthyphenmin}%
4463 \fi
4464 \endgroup
4465 \def\bbl@tempa{#3}%
4466 \ifx\bbl@tempa\@empty\else
4467 \bbl@hook@loadexceptions{#3}%
4468 % > luatex
4469 \fi
4470 \let\bbl@elt\relax
4471 \edef\bbl@languages{%
4472 \bbl@languages\bbl@elt{#1}\the\language}{#2}\bbl@tempa}%
4473 \ifnum\the\language=\z@
4474 \expandafter\ifx\csname #1hyphenmins\endcsname\relax
4475 \set@hyphenmins\tw@thr@@\relax
4476 \else
4477 \expandafter\expandafter\expandafter\set@hyphenmins
4478 \csname #1hyphenmins\endcsname
4479 \fi
4480 \the\toks@
4481 \toks@{}%
4482 \fi}

```

\bbl@get@enc

\bbl@hyph@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.

```

4483 \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.

```

4484 \def\bbl@hook@everylanguage#1{}
4485 \def\bbl@hook@loadpatterns#1{\input #1\relax}
4486 \let\bbl@hook@loadexceptions\bbl@hook@loadpatterns
4487 \def\bbl@hook@loadkernel#1{%
4488 \def\addlanguage{\csname newlanguage\endcsname}%
4489 \def\adddialect##1##2{%
4490 \global\chardef##1##2\relax
4491 \wlog{\string##1 = a dialect from \string\language##2}}%
4492 \def\iflanguage##1{%
4493 \expandafter\ifx\csname l@##1\endcsname\relax
4494 \@nolanerr{##1}%
4495 \else
4496 \ifnum\csname l@##1\endcsname=\language
4497 \expandafter\expandafter\expandafter\@firstoftwo
4498 \else
4499 \expandafter\expandafter\expandafter\@secondoftwo
4500 \fi
4501 \fi}%
4502 \def\providehyphenmins##1##2{%
4503 \expandafter\ifx\csname ##1hyphenmins\endcsname\relax
4504 \@namedef{##1hyphenmins}{##2}%
4505 \fi}%
4506 \def\set@hyphenmins##1##2{%
4507 \lefthyphenmin##1\relax
4508 \righthyphenmin##2\relax}%
4509 \def\selectlanguage{%
4510 \errhelp{Selecting a language requires a package supporting it}%
4511 \errmessage{Not loaded}}%
4512 \let\foreignlanguage\selectlanguage
4513 \let\otherlanguage\selectlanguage

```

```

4514 \expandafter\let\csname otherlanguage*\endcsname\selectlanguage
4515 \def\bbl@usehooks##1##2{% TODO. Temporary!!
4516 \def\setlocale{%
4517   \errhelp{Find an armchair, sit down and wait}%
4518   \errmessage{(babel) Not yet available}}%
4519 \let\uselocale\setlocale
4520 \let\locale\setlocale
4521 \let\selectlocale\setlocale
4522 \let\localename\setlocale
4523 \let\textlocale\setlocale
4524 \let\textlanguage\setlocale
4525 \let\languagetext\setlocale}
4526 \begingroup
4527 \def\AddBabelHook#1#2{%
4528   \expandafter\ifx\csname bbl@hook@#2\endcsname\relax
4529     \def\next{\toks1}%
4530     \else
4531       \def\next{\expandafter\gdef\csname bbl@hook@#2\endcsname###1}%
4532     \fi
4533     \next}
4534 \ifx\directlua@undefined
4535   \ifx\XeTeXinputencoding@undefined\else
4536     \input xebabel.def
4537   \fi
4538   \else
4539     \input luababel.def
4540   \fi
4541   \openin1 = babel-\bbl@format.cfg
4542   \ifeof1
4543   \else
4544     \input babel-\bbl@format.cfg\relax
4545   \fi
4546   \closein1
4547 \endgroup
4548 \bbl@hook@loadkernel{switch.def}

```

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

```

4549 \openin1 = language.dat

```

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

```

4550 \def\language{english}%
4551 \ifeof1
4552   \message{I couldn't find the file language.dat,\space
4553     I will try the file hyphen.tex}
4554   \input hyphen.tex\relax
4555   \chardef\l@english\z@
4556 \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`.

```

4557 \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.

```

4558 \loop
4559   \endlinechar@m@ne
4560   \read1 to \bbl@line
4561   \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.

```
4562 \if T\ifeoflF\fi T\relax
4563 \ifx\bbl@line\empty\else
4564 \edef\bbl@line{\bbl@line\space\space\space}%
4565 \expandafter\process@line\bbl@line\relax
4566 \fi
4567 \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.

```
4568 \begingroup
4569 \def\bbl@elt#1#2#3#4{%
4570 \global\language=#2\relax
4571 \gdef\language#1}%
4572 \def\bbl@elt##1##2##3##4{}}%
4573 \bbl@languages
4574 \endgroup
4575 \fi
4576 \closeinl
```

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

```
4577 \if/\the\toks@/\else
4578 \errhelp{language.dat loads no language, only synonyms}
4579 \errmessage{Orphan language synonym}
4580 \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.

```
4581 \let\bbl@line\undefined
4582 \let\process@line\undefined
4583 \let\process@synonym\undefined
4584 \let\process@language\undefined
4585 \let\bbl@get@enc\undefined
4586 \let\bbl@hyph@enc\undefined
4587 \let\bbl@tempa\undefined
4588 \let\bbl@hook@loadkernel\undefined
4589 \let\bbl@hook@everylanguage\undefined
4590 \let\bbl@hook@loadpatterns\undefined
4591 \let\bbl@hook@loadexceptions\undefined
4592 </patterns>
```

Here the code for `iniTEX` ends.

9. xetex + luatex: common stuff

Add the bidi handler just before `luaotfload`, which is loaded by default by LaTeX. Just in case, consider the possibility it has not been loaded. First, a couple of definitions related to bidi (although default also applies to `pdftex`).

```
4593 <<*More package options>> ≡
4594 \chardef\bbl@bidimode\z@
4595 \DeclareOption{bidi=default}{\chardef\bbl@bidimode=\@ne}
4596 \DeclareOption{bidi=basic}{\chardef\bbl@bidimode=101 }
4597 \DeclareOption{bidi=basic-r}{\chardef\bbl@bidimode=102 }
4598 \DeclareOption{bidi=bidi}{\chardef\bbl@bidimode=201 }
4599 \DeclareOption{bidi=bidi-r}{\chardef\bbl@bidimode=202 }
4600 \DeclareOption{bidi=bidi-l}{\chardef\bbl@bidimode=203 }
4601 <</More package options>>
```

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

```

4602 <<{*Font selection}>> ≡
4603 \bbl@trace{Font handling with fontspec}
4604 \AddBabelHook{babel-fontspec}{afterextras}{\bbl@switchfont}
4605 \AddBabelHook{babel-fontspec}{beforestart}{\bbl@cckstdfonts}
4606 \DisableBabelHook{babel-fontspec}
4607 \@onlypreamble\babelfont
4608 \newcommand\babelfont[2][{}]{% 1=langs/scripts 2=fam
4609   \bbl@foreach{#1}{%
4610     \expandafter\ifx\csname date##1\endcsname\relax
4611       \IfFileExists{babel-##1.tex}{%
4612         {\babelprovide{##1}}%
4613       }%
4614     \fi}%
4615   \edef\bbl@tempa{#1}%
4616   \def\bbl@tempb{#2}% Used by \bbl@bblfont
4617   \ifx\fontspec\undefined
4618     \usepackage{fontspec}%
4619   \fi
4620   \EnableBabelHook{babel-fontspec}%
4621   \bbl@bblfont}
4622 \newcommand\bbl@bblfont[2][{}]{% 1=features 2=fontname, @font=rm|sf|tt
4623   \bbl@ifunset{\bbl@tempb family}%
4624     {\bbl@providefam{\bbl@tempb}}%
4625   }%
4626   % For the default font, just in case:
4627   \bbl@ifunset{\bbl@lsys@language}{\bbl@provide@lsys@language}%
4628   \expandafter\bbl@ifblank\expandafter{\bbl@tempa}%
4629   {\bbl@csarg\edef{\bbl@tempb dflt@}{<{#1}{#2}}% save \bbl@rmdflt@
4630     \bbl@exp{%
4631       \let<\bbl@tempb dflt@\language>\<\bbl@tempb dflt@>%
4632       \<\bbl@font@set<\bbl@tempb dflt@\language>%
4633         \<\bbl@tempb default>\<\bbl@tempb family>}}%
4634     {\bbl@foreach\bbl@tempa{% ie \bbl@rmdflt@lang / *scrt
4635       \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:

```

4636 \def\bbl@providefam#1{%
4637   \bbl@exp{%
4638     \<\newcommand<#1default>{}% Just define it
4639     \<\bbl@add@list\<\bbl@font@fams{#1}%
4640     \<\DeclareRobustCommand<#1family>{}%
4641       \<\not@math@alphabet<#1family>\relax
4642       % \<\prepare@family@series@update{#1}<#1default>% TODO. Fails
4643       \<\fontfamily<#1default>%
4644       \<\ifx>\<\UseHooks\<\undefined<else>\<\UseHook{#1family}<\fi>%
4645       \<\selectfont>%
4646       \<\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.

```

4647 \def\bbl@nostdfont#1{%
4648   \bbl@ifunset{\bbl@WFF@f@family}%
4649     {\bbl@csarg\gdef{WFF@f@family}{% Flag, to avoid dupl warns
4650       \bbl@infowarn{The current font is not a babel standard family:\%
4651         #1%
4652         \fontname\font\%
4653         There is nothing intrinsically wrong with this warning, and\%
4654         you can ignore it altogether if you do not need these\%
4655         families. But if they are used in the document, you should be\%
4656         aware 'babel' will not set Script and Language for them, so\%

```

```

4657     you may consider defining a new family with \string\babelfont.\%
4658     See the manual for further details about \string\babelfont.\%
4659     Reported}}
4660   }}%
4661 \gdef\babel@switchfont{%
4662   \babel@ifunset{\babel@sys@\language\name}{\babel@provide@sys@\language\name}}}%
4663   \babel@exp{% eg Arabic -> arabic
4664     \lowercase{\edef\\babel@tempa{\babel@cl{sname}}}}}%
4665   \babel@foreach\babel@font@fams{%
4666     \babel@ifunset{\babel@##1dflt@\language\name}% (1) language?
4667     {\babel@ifunset{\babel@##1dflt*\\babel@tempa}% (2) from script?
4668       {\babel@ifunset{\babel@##1dflt@}% 2=F - (3) from generic?
4669         {}% 123=F - nothing!
4670         {\babel@exp{% 3=T - from generic
4671           \global\let<\babel@##1dflt@\language\name>%
4672           <\babel@##1dflt@>}}}%
4673         {\babel@exp{% 2=T - from script
4674           \global\let<\babel@##1dflt@\language\name>%
4675           <\babel@##1dflt*\\babel@tempa>}}}%
4676         {}}% 1=T - language, already defined
4677   \def\babel@tempa{\babel@nostdfont{}}% TODO. Don't use \babel@tempa
4678   \babel@foreach\babel@font@fams{% don't gather with prev for
4679     \babel@ifunset{\babel@##1dflt@\language\name}%
4680     {\babel@cs{famrst@##1}%
4681       \global\babel@csarg\let{famrst@##1}\relax}%
4682     {\babel@exp{% order is relevant. TODO: but sometimes wrong!
4683       \\babel@add\\originalTeX{%
4684         \\babel@font@rst{\babel@cl{##1dflt}}}%
4685         <##1default><##1family>{##1}}}%
4686       \\babel@font@set<\babel@##1dflt@\language\name>% the main part!
4687       <##1default><##1family>}}}%
4688   \babel@ifrestoring{\\babel@tempa}}%

```

The following is executed at the beginning of the aux file or the document to warn about fonts not defined with \babelfont.

```

4689 \ifx\f@family\undefined\else % if latex
4690 \ifcase\babel@engine % if pdftex
4691 \let\babel@ckeckstdfonts\relax
4692 \else
4693 \def\babel@ckeckstdfonts{%
4694   \begingroup
4695   \global\let\babel@ckeckstdfonts\relax
4696   \let\babel@tempa\empty
4697   \babel@foreach\babel@font@fams{%
4698     \babel@ifunset{\babel@##1dflt@}%
4699     {\@nameuse{##1family}%
4700       \babel@csarg\gdef{WFF@f@family}{}% Flag
4701       \babel@exp{\\babel@add\\babel@tempa{* <##1family>= \f@family\\}%
4702         \space\space\fontname\font\\}%
4703       \babel@csarg\xdef{##1dflt@}{\f@family}%
4704       \expandafter\xdef\csname ##1default\endcsname{\f@family}}%
4705     {}}%
4706   \ifx\babel@tempa\empty\else
4707     \babel@info{The following font families will use the default\\%
4708       settings for all or some languages:\\%
4709       \babel@tempa
4710       There is nothing intrinsically wrong with it, but\\%
4711       'babel' will no set Script and Language, which could\\%
4712       be relevant in some languages. If your document uses\\%
4713       these families, consider redefining them with \string\babelfont.\\%
4714       Reported}%
4715     \fi
4716   \endgroup}

```

```

4717 \fi
4718 \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, \LaTeX 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*`).

```

4719 \def\bbl@font@set#1#2#3{% eg \bbl@rmdflt@lang \rmdefault \rmfamily
4720 \bbl@xin@{<>}{#1}%
4721 \ifin@
4722 \bbl@exp{\bbl@fontspec@set\#1\expandafter\@gobbletwo#1\#3}%
4723 \fi
4724 \bbl@exp{% 'Unprotected' macros return prev values
4725 \def\#2#1{% eg, \rmdefault{\bbl@rmdflt@lang}
4726 \bbl@ifsamestring{#2}{\f@family}%
4727 {\#3
4728 \bbl@ifsamestring{\f@series}{\bfdefault}{\bfseries}}%
4729 \let\bbl@tempa\relax}%
4730 }}}
4731 % TODO - next should be global?, but even local does its job. I'm
4732 % still not sure -- must investigate:
4733 \def\bbl@fontspec@set#1#2#3#4{% eg \bbl@rmdflt@lang fnt-opt fnt-nme \xxfamily
4734 \let\bbl@tempe\bbl@mapselect
4735 \edef\bbl@tempb{\bbl@stripslash#4/}% Catcodes hack (better pass it).
4736 \bbl@exp{\bbl@replace\bbl@tempb{\bbl@stripslash\family/}}}%
4737 \let\bbl@mapselect\relax
4738 \let\bbl@temp@fam#4% eg, '\rmfamily', to be restored below
4739 \let#4@empty % Make sure \renewfontfamily is valid
4740 \bbl@exp{%
4741 \let\bbl@temp@pfam<\bbl@stripslash#4\space> eg, '\rmfamily '
4742 \<keys_if_exist:nnF>{fontspec-opentype}{Script/\bbl@cl{sname}}}%
4743 {\newfontscript{\bbl@cl{sname}}{\bbl@cl{sotf}}}%
4744 \<keys_if_exist:nnF>{fontspec-opentype}{Language/\bbl@cl{lname}}}%
4745 {\newfontlanguage{\bbl@cl{lname}}{\bbl@cl{lotf}}}%
4746 \renewfontfamily\#4%
4747 [\bbl@cl{sys},% xetex removes unknown features :-(
4748 \ifcase\bbl@engine\or RawFeature={family=\bbl@tempb},\fi
4749 #2}}{#3}% ie \bbl@exp{..}{#3}
4750 \begingroup
4751 #4%
4752 \xdef#1{\f@family}% eg, \bbl@rmdflt@lang{FreeSerif(0)}
4753 \endgroup % TODO. Find better tests:
4754 \bbl@xin@{\string>\string s\string s\string u\string b\string*}%
4755 {\expandafter\meaning\csname TU/#1/bx/sc\endcsname}%
4756 \ifin@
4757 \global\bbl@ccarg\let{TU/#1/bx/sc}{TU/#1/b/sc}%
4758 \fi
4759 \bbl@xin@{\string>\string s\string s\string u\string b\string*}%
4760 {\expandafter\meaning\csname TU/#1/bx/scit\endcsname}%
4761 \ifin@
4762 \global\bbl@ccarg\let{TU/#1/bx/scit}{TU/#1/b/scit}%
4763 \fi
4764 \let#4\bbl@temp@fam
4765 \bbl@exp{\let<\bbl@stripslash#4\space>\bbl@temp@pfam
4766 \let\bbl@mapselect\bbl@tempe}%

```

`font@rst` and `famrst` are only used when there is no global settings, to save and restore the previous families. Not really necessary, but done for optimization.


```

4767 \def\bbl@font@rst#1#2#3#4{%
4768   \bbl@csarg\def{famrst@#4}{\bbl@font@set{#1}#2#3}}

```

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

```

4769 \def\bbl@font@fams{rm,sf,tt}
4770 <</Font selection>>

```

\BabelFootnote Footnotes.

```

4771 <<*Footnote changes>> ≡
4772 \bbl@trace{Bidi footnotes}
4773 \ifnum\bbl@bidimode>\z@ % Any bidi=
4774   \def\bbl@footnote#1#2#3{%
4775     \@ifnextchar[%
4776       {\bbl@footnote@o{#1}{#2}{#3}}%
4777       {\bbl@footnote@x{#1}{#2}{#3}}}
4778   \long\def\bbl@footnote@x#1#2#3#4{%
4779     \bgroup
4780     \select@language@x{\bbl@main@language}%
4781     \bbl@fn@footnote{#2#1{\ignorespaces#4}#3}%
4782     \egroup}
4783   \long\def\bbl@footnote@o#1#2#3[#4]#5{%
4784     \bgroup
4785     \select@language@x{\bbl@main@language}%
4786     \bbl@fn@footnote[#4]{#2#1{\ignorespaces#5}#3}%
4787     \egroup}
4788   \def\bbl@footnotetext#1#2#3{%
4789     \@ifnextchar[%
4790       {\bbl@footnotetext@o{#1}{#2}{#3}}%
4791       {\bbl@footnotetext@x{#1}{#2}{#3}}}
4792   \long\def\bbl@footnotetext@x#1#2#3#4{%
4793     \bgroup
4794     \select@language@x{\bbl@main@language}%
4795     \bbl@fn@footnotetext{#2#1{\ignorespaces#4}#3}%
4796     \egroup}
4797   \long\def\bbl@footnotetext@o#1#2#3[#4]#5{%
4798     \bgroup
4799     \select@language@x{\bbl@main@language}%
4800     \bbl@fn@footnotetext[#4]{#2#1{\ignorespaces#5}#3}%
4801     \egroup}
4802   \def\BabelFootnote#1#2#3#4{%
4803     \ifx\bbl@fn@footnote\undefined
4804       \let\bbl@fn@footnote\footnote
4805     \fi
4806     \ifx\bbl@fn@footnotetext\undefined
4807       \let\bbl@fn@footnotetext\footnotetext
4808     \fi
4809     \bbl@ifblank{#2}%
4810     {\def#1{\bbl@footnote{\@firstofone}{#3}{#4}}
4811      \namedef{\bbl@stripslash#1text}%
4812      {\bbl@footnotetext{\@firstofone}{#3}{#4}}}%
4813     {\def#1{\bbl@exp{\bbl@footnote{\foreignlanguage{#2}}}{#3}{#4}}%
4814      \namedef{\bbl@stripslash#1text}%
4815      {\bbl@exp{\bbl@footnotetext{\foreignlanguage{#2}}}{#3}{#4}}}%
4816   \fi
4817 <</Footnote changes>>

```

10. Hooks for XeTeX and LuaTeX

10.1. XeTeX

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

Now, the code.

```
4818 < *xetex >
4819 \def\BabelStringsDefault{unicode}
4820 \let\xebbl@stop\relax
4821 \AddBabelHook{xetex}{encodedcommands}{%
4822   \def\bbl@tempa{#1}%
4823   \ifx\bbl@tempa\@empty
4824     \XeTeXinputencoding"bytes"%
4825   \else
4826     \XeTeXinputencoding"#1"%
4827   \fi
4828   \def\xebbl@stop{\XeTeXinputencoding"utf8"}}
4829 \AddBabelHook{xetex}{stopcommands}{%
4830   \xebbl@stop
4831   \let\xebbl@stop\relax}
4832 \def\bbl@input@classes{% Used in CJK intraspaces
4833   \input{load-unicode-xetex-classes.tex}%
4834   \let\bbl@input@classes\relax}
4835 \def\bbl@intraspace#1 #2 #3\@@{%
4836   \bbl@csarg\gdef{xeisp@\languagename}%
4837     {\XeTeXlinebreakskip #1em plus #2em minus #3em\relax}}
4838 \def\bbl@intrapenalty#1\@@{%
4839   \bbl@csarg\gdef{xeipn@\languagename}%
4840     {\XeTeXlinebreakpenalty #1\relax}}
4841 \def\bbl@provide@intraspace{%
4842   \bbl@xin@{/s}{/\bbl@cl{lnbrk}}}%
4843   \ifin@ \else \bbl@xin@{/c}{/\bbl@cl{lnbrk}} \fi
4844   \ifin@
4845     \bbl@ifunset{bbl@intsp@\languagename}{%
4846       {\expandafter\ifx\csname bbl@intsp@\languagename\endcsname\@empty\else
4847         \ifx\bbl@KVP@intraspace\@nnil
4848           \bbl@exp{%
4849             \\ \bbl@intraspace\bbl@cl{intsp} \\ \@@}%
4850           \fi
4851           \ifx\bbl@KVP@intrapenalty\@nnil
4852             \bbl@intrapenalty0\@@
4853           \fi
4854         \fi
4855         \ifx\bbl@KVP@intraspace\@nnil\else % We may override the ini
4856           \expandafter\bbl@intraspace\bbl@KVP@intraspace\@@
4857         \fi
4858         \ifx\bbl@KVP@intrapenalty\@nnil\else
4859           \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
4860         \fi
4861         \bbl@exp{%
4862           % TODO. Execute only once (but redundant):
4863           \\ \bbl@add<extras\languagename>{%
4864             \XeTeXlinebreaklocale "\bbl@cl{tbcpr}"%
4865             \<bbl@xeisp@\languagename>%
4866             \<bbl@xeipn@\languagename>%
4867             \\ \bbl@tglobal\<extras\languagename>%
4868             \\ \bbl@add<noextras\languagename>{%
4869               \XeTeXlinebreaklocale ""}%
4870             \\ \bbl@tglobal\<noextras\languagename>%
4871             \ifx\bbl@ispacesize\undefined
4872               \gdef\bbl@ispacesize{\bbl@cl{xeisp}}%
4873             \ifx\AtBeginDocument\@notprerr
```

```

4874         \expandafter\@secondoftwo % to execute right now
4875         \fi
4876         \AtBeginDocument{\bbl@patchfont{\bbl@ispace}}%
4877         \fi}%
4878     \fi}
4879 \ifx\DisableBabelHook\undefined\endinput\fi %%%% TODO: why
4880 <@Font selection>
4881 \def\bbl@provide@extra#1{}

```

10.2. 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.

```

4882 \ifnum\xe@alloc@intercharclass<\thr@@
4883     \xe@alloc@intercharclass\thr@@
4884 \fi
4885 \chardef\bbl@xe@class@default@=\z@
4886 \chardef\bbl@xe@class@cjkideogram@=\@ne
4887 \chardef\bbl@xe@class@cjkleftpunctuation@=\tw@
4888 \chardef\bbl@xe@class@cjkrightpunctuation@=\thr@@
4889 \chardef\bbl@xe@class@boundary@=4095
4890 \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@usingxe@class`, 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.

```

4891 \AddBabelHook{babel-interchar}{beforeextras}{%
4892     \nameuse{bbl@xechars@\language@}}
4893 \DisableBabelHook{babel-interchar}
4894 \protected\def\bbl@charclass#1{%
4895     \ifnum\count@<\z@
4896         \count@=-\count@
4897         \loop
4898             \bbl@exp{%
4899                 \\babel@savevariable{\XeTeXcharclass`\Uchar\count@}}%
4900                 \XeTeXcharclass\count@ \bbl@tempc
4901                 \ifnum\count@<`#1\relax
4902                     \advance\count@\@ne
4903                 \repeat
4904     \else
4905         \babel@savevariable{\XeTeXcharclass`#1}%
4906         \XeTeXcharclass`#1 \bbl@tempc
4907     \fi
4908     \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@usingxe@class\bbl@xe@class@punct@english\bbl@charclass{.}` `\bbl@charclass{,}` (etc.), where `\bbl@usingxe@class` 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.

```

4909 \newcommand\bbl@ifinterchar[1]{%
4910     \let\bbl@tempa\@gobble % Assume to ignore
4911     \edef\bbl@tempb{\zap@space#1 \@empty}%
4912     \ifx\bbl@KVP@interchar\@nnil\else
4913         \bbl@replace\bbl@KVP@interchar{ }{,}%
4914         \bbl@foreach\bbl@tempb{%
4915             \bbl@xin@{,##1,}{, \bbl@KVP@interchar,}%
4916         \ifin@
4917             \let\bbl@tempa\@firstofone
4918         \fi}%
4919     \fi

```

```

4920 \bbl@tempa}
4921 \newcommand\IfBabelIntercharT[2]{%
4922 \bbl@carg\bbl@add{bbl@icsave@\CurrentOption}{\bbl@ifinterchar{#1}{#2}}}%
4923 \newcommand\babelcharclass[3]{%
4924 \EnableBabelHook{babel-interchar}%
4925 \bbl@csarg\newXeTeXintercharclass{xeclass@#2@#1}%
4926 \def\bbl@tempb##1{%
4927 \ifx##1\@empty\else
4928 \ifx##1-%
4929 \bbl@upto
4930 \else
4931 \bbl@charclass{%
4932 \ifcat\noexpand##1\relax\bbl@stripslash##1\else\string##1\fi}%
4933 \fi
4934 \expandafter\bbl@tempb
4935 \fi}%
4936 \bbl@ifunset{bbl@xechars@#1}%
4937 {\toks@{%
4938 \babel@savevariable\XeTeXinterchartokenstate
4939 \XeTeXinterchartokenstate\@ne
4940 }}%
4941 {\toks@\expandafter\expandafter\expandafter{%
4942 \csname bbl@xechars@#1\endcsname}}%
4943 \bbl@csarg\edef{xechars@#1}{%
4944 \the\toks@
4945 \bbl@usingxeclass\csname bbl@xeclass@#2@#1\endcsname
4946 \bbl@tempb#3\@empty}}
4947 \protected\def\bbl@usingxeclass#1{\count@\z@ \let\bbl@tempc#1}
4948 \protected\def\bbl@upto{%
4949 \ifnum\count@>\z@
4950 \advance\count@\@ne
4951 \count@-\count@
4952 \else\ifnum\count@=\z@
4953 \bbl@charclass{-}%
4954 \else
4955 \bbl@error{double-hyphens-class}{\count@}{\count@}%
4956 \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>@<language>`.

```

4957 \def\bbl@ignoreinterchar{%
4958 \ifnum\language=\l@nohyphenation
4959 \expandafter\@gobble
4960 \else
4961 \expandafter\@firstofone
4962 \fi}
4963 \newcommand\babelinterchar[5][{}]{%
4964 \let\bbl@kv@label\@empty
4965 \bbl@forkv{#1}{\bbl@csarg\edef{kv@##1}{##2}}%
4966 \@namedef{\zap@space bbl@xeinter@\bbl@kv@label @#3@#4@#2 \@empty}%
4967 {\bbl@ignoreinterchar{#5}}%
4968 \bbl@csarg\let{ic@\bbl@kv@label @#2}\@firstofone
4969 \bbl@exp{\bbl@for{\bbl@tempa{\zap@space#3 \@empty}}}%
4970 \bbl@exp{\bbl@for{\bbl@tempb{\zap@space#4 \@empty}}}%
4971 \XeTeXinterchartoks
4972 \@nameuse{bbl@xeclass@\bbl@tempa @#2}
4973 \bbl@ifunset{bbl@xeclass@\bbl@tempa @#2}{\bbl@tempa @#2} %
4974 \@nameuse{bbl@xeclass@\bbl@tempb @#2}
4975 \bbl@ifunset{bbl@xeclass@\bbl@tempb @#2}{\bbl@tempb @#2} %
4976 = \expandafter{%
4977 \csname bbl@ic@\bbl@kv@label @#2\expandafter\endcsname
4978 \csname\zap@space bbl@xeinter@\bbl@kv@label

```

```

4979      @#3@#4@#2 \@empty\endcsname}}}}
4980 \DeclareRobustCommand\enablelocaleinterchar[1]{%
4981   \bbl@ifunset{bbl@ic@#1@language}%
4982   {\bbl@error{unknown-interchar}{#1}{}}}%
4983   {\bbl@csarg\let{ic@#1@language}\@firstofone}}
4984 \DeclareRobustCommand\disablelocaleinterchar[1]{%
4985   \bbl@ifunset{bbl@ic@#1@language}%
4986   {\bbl@error{unknown-interchar-b}{#1}{}}}%
4987   {\bbl@csarg\let{ic@#1@language}\@gobble}}
4988 </xetex>

```

10.3. Layout

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

\bbl@startskip and \bbl@endskip are available to package authors. Thanks to the T_EX expansion mechanism the following constructs are valid: \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.

```

4989 < *xetex | texxet >
4990 \providecommand\bbl@provide@intraspace{}
4991 \bbl@trace{Redefinitions for bidi layout}
4992 \def\bbl@sspre@caption{% TODO: Unused!
4993   \bbl@expf\everyhbox{\bbl@textdir\bbl@cs{wdir@bbl@main@language}}}}
4994 \ifx\bbl@opt@layout\@nnil\else % if layout=..
4995 \def\bbl@startskip{\ifcase\bbl@thepardir\leftskip\else\rightskip\fi}
4996 \def\bbl@endskip{\ifcase\bbl@thepardir\rightskip\else\leftskip\fi}
4997 \ifnum\bbl@bidimode>\z@ % TODO: always?
4998   \def\@hangfrom#1{%
4999     \setbox\@tempboxa\hbox{#1}%
5000     \hangindent\ifcase\bbl@thepardir\wd\@tempboxa\else-\wd\@tempboxa\fi
5001     \noindent\box\@tempboxa}
5002 \def\raggedright{%
5003   \let\@centercr
5004   \bbl@startskip\z@skip
5005   \@rightskip\@flushglue
5006   \bbl@endskip\@rightskip
5007   \parindent\z@
5008   \parfillskip\bbl@startskip}
5009 \def\raggedleft{%
5010   \let\@centercr
5011   \bbl@startskip\@flushglue
5012   \bbl@endskip\z@skip
5013   \parindent\z@
5014   \parfillskip\bbl@endskip}
5015 \fi
5016 \IfBabelLayout{lists}
5017 {\bbl@sreplace\list
5018   {\@totalleftmargin\leftmargin}{\@totalleftmargin\bbl@listleftmargin}%
5019   \def\bbl@listleftmargin{%
5020     \ifcase\bbl@thepardir\leftmargin\else\rightmargin\fi}%
5021   \ifcase\bbl@engine
5022     \def\labelenumii{}\theenumii{}% pdftex doesn't reverse ()
5023     \def\p@enumiii{\p@enumii}\theenumii{}%
5024   \fi
5025   \bbl@sreplace\@verbatim
5026   {\leftskip\@totalleftmargin}%
5027   {\bbl@startskip\textwidth
5028     \advance\bbl@startskip-\linewidth}%
5029   \bbl@sreplace\@verbatim
5030   {\rightskip\z@skip}%
5031   {\bbl@endskip\z@skip}}%

```

```

5032 {}
5033 \IfBabelLayout{contents}
5034 {\bbl@sreplace\@dottedtocline{\leftskip}{\bbl@startskip}%
5035 \bbl@sreplace\@dottedtocline{\rightskip}{\bbl@endskip}}
5036 {}
5037 \IfBabelLayout{columns}
5038 {\bbl@sreplace\@outputdblcol{\hb@xt@\textwidth}{\bbl@outputbox}%
5039 \def\bbl@outputbox#1{%
5040 \hb@xt@\textwidth{%
5041 \hskip\columnwidth
5042 \hfil
5043 {\normalcolor\vrule \@width\columnseprule}%
5044 \hfil
5045 \hb@xt@\columnwidth{\box\@leftcolumn \hss}%
5046 \hskip-\textwidth
5047 \hb@xt@\columnwidth{\box\@outputbox \hss}%
5048 \hskip\columnsep
5049 \hskip\columnwidth}}}%
5050 {}
5051 <@Footnote changes>
5052 \IfBabelLayout{footnotes}%
5053 {\BabelFootnote\footnote\languagename{}}{}%
5054 \BabelFootnote\localfootnote\languagename{}}{}%
5055 \BabelFootnote\mainfootnote{}}{}%
5056 {}

```

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.

```

5057 \IfBabelLayout{counters*}%
5058 {\bbl@add\bbl@opt@layout{.counters.}%
5059 \AddToHook{shipout/before}{%
5060 \let\bbl@tempa\babelsublr
5061 \let\babelsublr\@firstofone
5062 \let\bbl@save@thepage\thepage
5063 \protected@edef\thepage{\thepage}%
5064 \let\babelsublr\bbl@tempa}%
5065 \AddToHook{shipout/after}{%
5066 \let\thepage\bbl@save@thepage}}{}
5067 \IfBabelLayout{counters}%
5068 {\let\bbl@latinarabic=\@arabic
5069 \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
5070 \let\bbl@asciroman=\@roman
5071 \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%
5072 \let\bbl@asciiRoman=\@Roman
5073 \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}}{}
5074 \fi % end if layout
5075 </xetex | texxet>

```

10.4. 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).

```

5076 <*texxet>
5077 \def\bbl@provide@extra#1{%
5078 % == auto-select encoding ==
5079 \ifx\bbl@encoding@select@off\@empty\else
5080 \bbl@ifunset{\bbl@encoding@#1}%
5081 {\def\@elt##1{,##1,}%
5082 \edef\bbl@tempe{\expandafter\@gobbletwo\@fontenc@load@list}%
5083 \count@\z@
5084 \bbl@foreach\bbl@tempe{%
5085 \def\bbl@tempd{##1}% Save last declared
5086 \advance\count@\@ne}%

```

```

5087 \ifnum\count@>\@ne % (1)
5088 \getlocaleproperty*\bbl@tempa{#1}{identification/encodings}%
5089 \ifx\bbl@tempa\relax \let\bbl@tempa\empty \fi
5090 \bbl@replace\bbl@tempa{ }{,}%
5091 \global\bbl@csarg\let{encoding@#1}\empty
5092 \bbl@xin@{,\bbl@tempd,}{,\bbl@tempa,}%
5093 \ifin@else % if main encoding included in ini, do nothing
5094 \let\bbl@tempb\relax
5095 \bbl@foreach\bbl@tempa{%
5096 \ifx\bbl@tempb\relax
5097 \bbl@xin@{,##1,}{,\bbl@tempe,}%
5098 \ifin@def\bbl@tempb{##1}\fi
5099 \fi}%
5100 \ifx\bbl@tempb\relax\else
5101 \bbl@exp{%
5102 \global\<bbl@add>\<bbl@preextras@#1>\<bbl@encoding@#1>}%
5103 \gdef\<bbl@encoding@#1>{%
5104 \\\babel@save\\f@encoding
5105 \\\bbl@add\\originalTeX\\selectfont}%
5106 \\\fontencoding{\bbl@tempb}%
5107 \\\selectfont}}%
5108 \fi
5109 \fi
5110 \fi}%
5111 }%
5112 \fi}
5113 </texxet>

```

10.5. 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`).

```
5114 <*\luatex>
```

```

5115 \directlua{ Babel = Babel or {} } % DL2
5116 \ifx\AddBabelHook\undefined % When plain.def, babel.sty starts
5117 \bbl@trace{Read language.dat}
5118 \ifx\bbl@readstream\undefined
5119 \csname newread\endcsname\bbl@readstream
5120 \fi
5121 \beginingroup
5122 \toks@{}
5123 \count@ \z@ % 0=start, 1=0th, 2=normal
5124 \def\bbl@process@line#1#2 #3 #4 {%
5125 \ifx=#1%
5126 \bbl@process@synonym{#2}%
5127 \else
5128 \bbl@process@language{#1#2}{#3}{#4}%
5129 \fi
5130 \ignorespaces}
5131 \def\bbl@manylang{%
5132 \ifnum\bbl@last>\@ne
5133 \bbl@info{Non-standard hyphenation setup}%
5134 \fi
5135 \let\bbl@manylang\relax}
5136 \def\bbl@process@language#1#2#3{%
5137 \ifcase\count@
5138 \@ifundefined{zth@#1}{\count@\tw@}{\count@\@ne}%
5139 \or
5140 \count@\tw@
5141 \fi
5142 \ifnum\count@=\tw@
5143 \expandafter\addlanguage\csname l@#1\endcsname
5144 \language\allocationnumber
5145 \chardef\bbl@last\allocationnumber
5146 \bbl@manylang
5147 \let\bbl@elt\relax
5148 \xdef\bbl@languages{%
5149 \bbl@languages\bbl@elt{#1}{\the\language}{#2}{#3}}%
5150 \fi
5151 \the\toks@
5152 \toks@{}}
5153 \def\bbl@process@synonym@aux#1#2{%
5154 \global\expandafter\chardef\csname l@#1\endcsname#2\relax
5155 \let\bbl@elt\relax
5156 \xdef\bbl@languages{%
5157 \bbl@languages\bbl@elt{#1}{#2}{}}}%
5158 \def\bbl@process@synonym#1{%
5159 \ifcase\count@
5160 \toks@\expandafter{\the\toks@\relax\bbl@process@synonym{#1}}%
5161 \or
5162 \@ifundefined{zth@#1}{\bbl@process@synonym@aux{#1}{0}}{%
5163 \else
5164 \bbl@process@synonym@aux{#1}{\the\bbl@last}%
5165 \fi}
5166 \ifx\bbl@languages\undefined % Just a (sensible?) guess
5167 \chardef\l@english\z@
5168 \chardef\l@USenglish\z@
5169 \chardef\bbl@last\z@
5170 \global\@namedef{bbl@hyphendata@0}{{hyphen.tex}}
5171 \gdef\bbl@languages{%
5172 \bbl@elt{english}{0}{hyphen.tex}}%
5173 \bbl@elt{USenglish}{0}{}}
5174 \else
5175 \global\let\bbl@languages@format\bbl@languages
5176 \def\bbl@elt#1#2#3#4{% Remove all except language 0
5177 \ifnum#2>\z@ \else

```



```

5178     \noexpand\bbl@elt{#1}{#2}{#3}{#4}%
5179     \fi}%
5180     \xdef\bbl@languages{\bbl@languages}%
5181 \fi
5182 \def\bbl@elt#1#2#3#4{\@namedef{zth@#1}{}} % Define flags
5183 \bbl@languages
5184 \openin\bbl@readstream=language.dat
5185 \ifeof\bbl@readstream
5186     \bbl@warning{I couldn't find language.dat. No additional\\%
5187                 patterns loaded. Reported}%
5188 \else
5189     \loop
5190     \endlinechar\m@ne
5191     \read\bbl@readstream to \bbl@line
5192     \endlinechar\^^M
5193     \if T\ifeof\bbl@readstream F\fi T\relax
5194     \ifx\bbl@line\@empty\else
5195         \edef\bbl@line{\bbl@line\space\space\space}%
5196         \expandafter\bbl@process@line\bbl@line\relax
5197     \fi
5198     \repeat
5199 \fi
5200 \closein\bbl@readstream
5201 \endgroup
5202 \bbl@trace{Macros for reading patterns files}
5203 \def\bbl@get@enc#1:#2:#3\@@{\def\bbl@hyph@enc{#2}}
5204 \ifx\babelcatcodetablenum\undefined
5205     \ifx\newcatcodetable\undefined
5206         \def\babelcatcodetablenum{5211}
5207         \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
5208     \else
5209         \newcatcodetable\babelcatcodetablenum
5210         \newcatcodetable\bbl@pattcodes
5211     \fi
5212 \else
5213     \def\bbl@pattcodes{\numexpr\babelcatcodetablenum+1\relax}
5214 \fi
5215 \def\bbl@luapatterns#1#2{%
5216     \bbl@get@enc#1:.\@@@
5217     \setbox\z@\hbox\bgroup
5218     \begingroup
5219         \savecatcodetable\babelcatcodetablenum\relax
5220         \initcatcodetable\bbl@pattcodes\relax
5221         \catcodetable\bbl@pattcodes\relax
5222         \catcode\#=6 \catcode\$=3 \catcode\&=4 \catcode\^=7
5223         \catcode\_ =8 \catcode\{=1 \catcode\}=2 \catcode\~=13
5224         \catcode\@=11 \catcode\^^I=10 \catcode\^^J=12
5225         \catcode\<=12 \catcode\>=12 \catcode\*=12 \catcode\.=12
5226         \catcode\-=12 \catcode\/=12 \catcode\[=12 \catcode\]=12
5227         \catcode\`=12 \catcode\'=12 \catcode\"=12
5228         \input #1\relax
5229         \catcodetable\babelcatcodetablenum\relax
5230     \endgroup
5231     \def\bbl@tempa{#2}%
5232     \ifx\bbl@tempa\@empty\else
5233         \input #2\relax
5234     \fi
5235 \egroup}%
5236 \def\bbl@patterns@lua#1{%
5237     \language=\expandafter\ifx\csname l@#1:f@encoding\endcsname\relax
5238         \csname l@#1\endcsname
5239         \edef\bbl@tempa{#1}%
5240     \else

```

```

5241 \csname l@#1:f@encoding\endcsname
5242 \edef\bbl@tempa{#1:f@encoding}%
5243 \fi\relax
5244 \@namedef{lu@texhyphen@loaded@the\language}{}% Temp
5245 \@ifundefined{bbl@hyphendata@the\language}%
5246 {\def\bbl@elt##1##2##3##4{%
5247 \ifnum##2=\csname l@bbl@tempa\endcsname % #2=spanish, dutch:OT1...
5248 \def\bbl@tempb{##3}%
5249 \ifx\bbl@tempb\empty\else % if not a synonymous
5250 \def\bbl@tempc{##3}{##4}%
5251 \fi
5252 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
5253 \fi}%
5254 \bbl@languages
5255 \@ifundefined{bbl@hyphendata@the\language}%
5256 {\bbl@info{No hyphenation patterns were set for\%
5257 language '\bbl@tempa'. Reported}}%
5258 {\expandafter\expandafter\expandafter\bbl@luapatterns
5259 \csname bbl@hyphendata@the\language\endcsname}}}%
5260 \endinput\fi

```

Here ends \ifx\AddBabelHook\@undefined. A few lines are only read by HYPHEN.CFG.

```

5261 \ifx\DisableBabelHook\@undefined
5262 \AddBabelHook{luatex}{everylanguage}{%
5263 \def\process@language##1##2##3{%
5264 \def\process@line####1####2 ####3 ####4 {}}
5265 \AddBabelHook{luatex}{loadpatterns}{%
5266 \input #1\relax
5267 \expandafter\gdef\csname bbl@hyphendata@the\language\endcsname
5268 {{#1}}}%
5269 \AddBabelHook{luatex}{loadexceptions}{%
5270 \input #1\relax
5271 \def\bbl@tempb##1##2{{#1}{#1}}%
5272 \expandafter\xdef\csname bbl@hyphendata@the\language\endcsname
5273 {\expandafter\expandafter\expandafter\bbl@tempb
5274 \csname bbl@hyphendata@the\language\endcsname}}
5275 \endinput\fi

```

Here stops reading code for HYPHEN.CFG. The following is read the 2nd time it's loaded. First, global declarations for lua.

```

5276 \beginingroup % TODO - to a lua file % DL3
5277 \catcode`\%=12
5278 \catcode`\'=12
5279 \catcode`\|=12
5280 \catcode`\:=12
5281 \directlua{
5282 Babel.locale_props = Babel.locale_props or {}
5283 function Babel.lua_error(e, a)
5284 tex.print([[noexpand\csname bbl@error\endcsname]] ..
5285 e .. '{' .. (a or '') .. '}{}{}')
5286 end
5287 function Babel.bytes(line)
5288 return line:gsub(".",
5289 function (chr) return unicode.utf8.char(string.byte(chr)) end)
5290 end
5291 function Babel.begin_process_input()
5292 if luatexbase and luatexbase.add_to_callback then
5293 luatexbase.add_to_callback('process_input_buffer',
5294 Babel.bytes, 'Babel.bytes')
5295 else
5296 Babel.callback = callback.find('process_input_buffer')
5297 callback.register('process_input_buffer', Babel.bytes)
5298 end
5299 end

```

```

5300 function Babel.end_process_input ()
5301   if luatexbase and luatexbase.remove_from_callback then
5302     luatexbase.remove_from_callback('process_input_buffer','Babel.bytes')
5303   else
5304     callback.register('process_input_buffer',Babel.callback)
5305   end
5306 end
5307 function Babel.str_to_nodes(fn, matches, base)
5308   local n, head, last
5309   if fn == nil then return nil end
5310   for s in string.utfvalues(fn(matches)) do
5311     if base.id == 7 then
5312       base = base.replace
5313     end
5314     n = node.copy(base)
5315     n.char = s
5316     if not head then
5317       head = n
5318     else
5319       last.next = n
5320     end
5321     last = n
5322   end
5323   return head
5324 end
5325 Babel.linebreaking = Babel.linebreaking or {}
5326 Babel.linebreaking.before = {}
5327 Babel.linebreaking.after = {}
5328 Babel.locale = {}
5329 function Babel.linebreaking.add_before(func, pos)
5330   tex.print([[\\noexpand\\csname bbl@luahyphenate\\endcsname]])
5331   if pos == nil then
5332     table.insert(Babel.linebreaking.before, func)
5333   else
5334     table.insert(Babel.linebreaking.before, pos, func)
5335   end
5336 end
5337 function Babel.linebreaking.add_after(func)
5338   tex.print([[\\noexpand\\csname bbl@luahyphenate\\endcsname]])
5339   table.insert(Babel.linebreaking.after, func)
5340 end
5341 function Babel.addpatterns(pp, lg)
5342   local lg = lang.new(lg)
5343   local pats = lang.patterns(lg) or ''
5344   lang.clear_patterns(lg)
5345   for p in pp:gmatch('[^%s]+') do
5346     ss = ''
5347     for i in string.utfcharacters(p:gsub('%d', '')) do
5348       ss = ss .. '%d?' .. i
5349     end
5350     ss = ss:gsub('^%d%?%.','%.') .. '%d?'
5351     ss = ss:gsub('%.%d%?$', '%%.')
5352     pats, n = pats:gsub('%s' .. ss .. '%s', ' ' .. p .. ' ')
5353     if n == 0 then
5354       tex.sprint(
5355         [[\\string\\csname\\space bbl@info\\endcsname{New pattern: }]]
5356         .. p .. [[{ }]])
5357       pats = pats .. ' ' .. p
5358     else
5359       tex.sprint(
5360         [[\\string\\csname\\space bbl@info\\endcsname{Renew pattern: }]]
5361         .. p .. [[{ }]])
5362     end
5363   end

```

```

5363     end
5364     lang.patterns(lg, pats)
5365 end
5366 Babel.characters = Babel.characters or {}
5367 Babel.ranges = Babel.ranges or {}
5368 function Babel.hlist_has_bidi(head)
5369     local has_bidi = false
5370     local ranges = Babel.ranges
5371     for item in node.traverse(head) do
5372         if item.id == node.id'glyph' then
5373             local itemchar = item.char
5374             local chardata = Babel.characters[itemchar]
5375             local dir = chardata and chardata.d or nil
5376             if not dir then
5377                 for nn, et in ipairs(ranges) do
5378                     if itemchar < et[1] then
5379                         break
5380                     elseif itemchar <= et[2] then
5381                         dir = et[3]
5382                         break
5383                     end
5384                 end
5385             end
5386             if dir and (dir == 'al' or dir == 'r') then
5387                 has_bidi = true
5388             end
5389         end
5390     end
5391     return has_bidi
5392 end
5393 function Babel.set_chranges_b (script, chrng)
5394     if chrng == '' then return end
5395     texio.write('Replacing ' .. script .. ' script ranges')
5396     Babel.script_blocks[script] = {}
5397     for s, e in string.gmatch(chrng..' ', '(.-)%.(.-)%s') do
5398         table.insert(
5399             Babel.script_blocks[script], {tonumber(s,16), tonumber(e,16)})
5400     end
5401 end
5402 function Babel.discard_sublr(str)
5403     if str:find( [[\string\indexentry]] ) and
5404         str:find( [[\string\babelsublr]] ) then
5405         str = str:gsub( [[\string\babelsublr%s*(%b{})]],
5406             function(m) return m:sub(2,-2) end )
5407     end
5408     return str
5409 end
5410 }
5411 \endgroup
5412 \ifx\newattribute\@undefined\else % Test for plain
5413     \newattribute\bbl@attr@locale % DL4
5414     \directlua{ Babel.attr_locale = luatexbase.registernumber'bbl@attr@locale' }
5415     \AddBabelHook{luatex}{beforeextras}{%
5416         \setattribute\bbl@attr@locale\localeid}
5417 \fi
5418 \def\BabelStringsDefault{unicode}
5419 \let\luabbbl@stop\relax
5420 \AddBabelHook{luatex}{encodedcommands}{%
5421     \def\bbl@tempa{utf8}\def\bbl@tempb{#1}%
5422     \ifx\bbl@tempa\bbl@tempb\else
5423         \directlua{Babel.begin_process_input()}%
5424         \def\luabbbl@stop{%
5425             \directlua{Babel.end_process_input()}}%

```

```

5426 \fi}%
5427 \AddBabelHook{luatex}{stopcommands}{%
5428 \luabbl@stop
5429 \let\luabbl@stop\relax}
5430 \AddBabelHook{luatex}{patterns}{%
5431 \@ifundefined{bbl@hyphendata@the\language}%
5432 {\def\bbl@elt##1##2##3##4{%
5433 \ifnum##2=\csname l@##2\endcsname % #2=spanish, dutch:OT1...
5434 \def\bbl@tempb{##3}%
5435 \ifx\bbl@tempb\@empty\else % if not a synonymous
5436 \def\bbl@tempc{##3}{##4}}%
5437 \fi
5438 \bbl@csarg\xdef{hyphendata@##2}{\bbl@tempc}%
5439 \fi}%
5440 \bbl@languages
5441 \@ifundefined{bbl@hyphendata@the\language}%
5442 {\bbl@info{No hyphenation patterns were set for\%
5443 language '#2'. Reported}}%
5444 {\expandafter\expandafter\expandafter\bbl@luapatterns
5445 \csname bbl@hyphendata@the\language\endcsname}}}%
5446 \@ifundefined{bbl@patterns@}{}%
5447 \begingroup
5448 \bbl@xin@{,\number\language,}{,\bbl@pttnlist}%
5449 \ifin@else
5450 \ifx\bbl@patterns@\@empty\else
5451 \directlua{ Babel.addpatterns(
5452 [[\bbl@patterns@]], \number\language) }%
5453 \fi
5454 \@ifundefined{bbl@patterns@#1}%
5455 \@empty
5456 {\directlua{ Babel.addpatterns(
5457 [[\space\csname bbl@patterns@#1\endcsname]],
5458 \number\language) }}%
5459 \xdef\bbl@pttnlist{\bbl@pttnlist\number\language,}%
5460 \fi
5461 \endgroup}%
5462 \bbl@exp{%
5463 \bbl@ifunset{bbl@prehc@languagename}}}%
5464 {\bbl@ifblank{\bbl@cs{prehc@languagename}}}%
5465 {\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@(*language*) for language ones. We make sure there is a space between words when multiple commands are used.

```

5466 \@onlypreamble\babelpatterns
5467 \AtEndOfPackage{%
5468 \newcommand\babelpatterns[2][\@empty]{%
5469 \ifx\bbl@patterns@\relax
5470 \let\bbl@patterns@\@empty
5471 \fi
5472 \ifx\bbl@pttnlist@\@empty\else
5473 \bbl@warning{%
5474 You must not intermingle \string\selectlanguage\space and\%
5475 \string\babelpatterns\space or some patterns will not\%
5476 be taken into account. Reported}%
5477 \fi
5478 \ifx@empty#1%
5479 \protected@edef\bbl@patterns@{\bbl@patterns@\space#2}%
5480 \else
5481 \edef\bbl@tempb{\zap@space#1 \@empty}%
5482 \bbl@for\bbl@tempa\bbl@tempb{%
5483 \bbl@fixname\bbl@tempa
5484 \bbl@iflanguage\bbl@tempa{%

```

```

5485 \bbl@csarg\protected@edef{patterns@{bbl@tempa}}{%
5486 \@ifundefined{bbl@patterns@{bbl@tempa}}{%
5487 \@empty
5488 {\csname bbl@patterns@{bbl@tempa}\endcsname\space}%
5489 #2}}}%
5490 \fi}}

```

10.6. 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.

```

5491 \def\bbl@intraspace#1 #2 #3\@{
5492 \directlua{
5493   Babel.intraspaces = Babel.intraspaces or {}
5494   Babel.intraspaces['\csname bbl@sbc@{language}\endcsname'] = %
5495     {b = #1, p = #2, m = #3}
5496   Babel.locale_props[\the\localeid].intraspace = %
5497     {b = #1, p = #2, m = #3}
5498 }}
5499 \def\bbl@intrapenalty#1\@{
5500 \directlua{
5501   Babel.intrapenalties = Babel.intrapenalties or {}
5502   Babel.intrapenalties['\csname bbl@sbc@{language}\endcsname'] = #1
5503   Babel.locale_props[\the\localeid].intrapenalty = #1
5504 }}
5505 \begingroup
5506 \catcode`\%=12
5507 \catcode`\&=14
5508 \catcode`\'=12
5509 \catcode`\~ =12
5510 \gdef\bbl@seaintraspace{
5511 \let\bbl@seaintraspace\relax
5512 \directlua{
5513   Babel.sea_enabled = true
5514   Babel.sea_ranges = Babel.sea_ranges or {}
5515   function Babel.set_chranges (script, chrng)
5516     local c = 0
5517     for s, e in string.gmatch(chrng..' ', '(.-%.(-)%s') do
5518       Babel.sea_ranges[script..c]={tonumber(s,16), tonumber(e,16)}
5519       c = c + 1
5520     end
5521   end
5522   function Babel.sea_disc_to_space (head)
5523     local sea_ranges = Babel.sea_ranges
5524     local last_char = nil
5525     local quad = 655360 & 10 pt = 655360 = 10 * 65536
5526     for item in node.traverse(head) do
5527       local i = item.id
5528       if i == node.id'glyph' then
5529         last_char = item
5530       elseif i == 7 and item.subtype == 3 and last_char
5531         and last_char.char > 0x0C99 then
5532         quad = font.getfont(last_char.font).size
5533         for lg, rg in pairs(sea_ranges) do
5534           if last_char.char > rg[1] and last_char.char < rg[2] then
5535             lg = lg:sub(1, 4) & Remove trailing number of, eg, Cyril1
5536             local intraspace = Babel.intraspaces[lg]
5537             local intrapenalty = Babel.intrapenalties[lg]
5538             local n
5539             if intrapenalty ~= 0 then
5540               n = node.new(14, 0) & penalty

```

```

5541         n.penalty = intrapenalty
5542         node.insert_before(head, item, n)
5543     end
5544     n = node.new(12, 13)      &% (glue, spaceskip)
5545     node.setglue(n, intraspace.b * quad,
5546                 intraspace.p * quad,
5547                 intraspace.m * quad)
5548     node.insert_before(head, item, n)
5549     node.remove(head, item)
5550 end
5551 end
5552 end
5553 end
5554 end
5555 }&
5556 \bbl@luahyphenate}

```

10.7. 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.

```

5557 \catcode`\%=14
5558 \gdef\bbl@cjkintraspacespace{%
5559   \let\bbl@cjkintraspacespace\relax
5560   \directlua{
5561     require('babel-data-cjk.lua')
5562     Babel.cjk_enabled = true
5563     function Babel.cjk_linebreak(head)
5564       local GLYPH = node.id'glyph'
5565       local last_char = nil
5566       local quad = 655360      % 10 pt = 655360 = 10 * 65536
5567       local last_class = nil
5568       local last_lang = nil
5569
5570       for item in node.traverse(head) do
5571         if item.id == GLYPH then
5572
5573           local lang = item.lang
5574
5575           local LOCALE = node.get_attribute(item,
5576                                             Babel.attr_locale)
5577           local props = Babel.locale_props[LOCALE]
5578
5579           local class = Babel.cjk_class[item.char].c
5580
5581           if props.cjk_quotes and props.cjk_quotes[item.char] then
5582             class = props.cjk_quotes[item.char]
5583           end
5584
5585           if class == 'cp' then class = 'cl' % ]] as CL
5586           elseif class == 'id' then class = 'I'
5587           elseif class == 'cj' then class = 'I' % loose
5588           end
5589
5590           local br = 0
5591           if class and last_class and Babel.cjk_breaks[last_class][class] then
5592             br = Babel.cjk_breaks[last_class][class]
5593           end
5594

```

```

5595         if br == 1 and props.linebreak == 'c' and
5596             lang ~= \the\l@nohyphenation\space and
5597             last_lang ~= \the\l@nohyphenation then
5598             local intrapenalty = props.intrapenalty
5599             if intrapenalty ~= 0 then
5600                 local n = node.new(14, 0)      % penalty
5601                 n.penalty = intrapenalty
5602                 node.insert_before(head, item, n)
5603             end
5604             local intraspace = props.intraspace
5605             local n = node.new(12, 13)        % (glue, spaceskip)
5606             node.setglue(n, intraspace.b * quad,
5607                 intraspace.p * quad,
5608                 intraspace.m * quad)
5609             node.insert_before(head, item, n)
5610         end
5611
5612         if font.getfont(item.font) then
5613             quad = font.getfont(item.font).size
5614         end
5615         last_class = class
5616         last_lang = lang
5617     else % if penalty, glue or anything else
5618         last_class = nil
5619     end
5620 end
5621 lang.hyphenate(head)
5622 end
5623 }%
5624 \bbl@lua hyphenate}
5625 \gdef\bbl@lua hyphenate{%
5626 \let\bbl@lua hyphenate\relax
5627 \directlua{
5628     luatexbase.add_to_callback('hyphenate',
5629     function (head, tail)
5630         if Babel.linebreaking.before then
5631             for k, func in ipairs(Babel.linebreaking.before) do
5632                 func(head)
5633             end
5634         end
5635         lang.hyphenate(head)
5636         if Babel.cjk_enabled then
5637             Babel.cjk_linebreak(head)
5638         end
5639         if Babel.linebreaking.after then
5640             for k, func in ipairs(Babel.linebreaking.after) do
5641                 func(head)
5642             end
5643         end
5644         if Babel.sea_enabled then
5645             Babel.sea_disc_to_space(head)
5646         end
5647     end,
5648     'Babel.hyphenate')
5649 }
5650 }
5651 \endgroup
5652 \def\bbl@provide@intraspace{%
5653     \bbl@ifunset\bbl@intsp@\languagename}{}%
5654     {\expandafter\ifx\csname bbl@intsp@\languagename\endcsname\@empty\else
5655         \bbl@xin@{/c}{\bbl@cl{lnbrk}}}%
5656     \ifin@          % cjk
5657         \bbl@cjk intraspace

```



```

5658 \directlua{
5659     Babel.locale_props = Babel.locale_props or {}
5660     Babel.locale_props[\the\localeid].linebreak = 'c'
5661 }%
5662 \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}\@%
5663 \ifx\bbl@KVP@intrapenalty\@nnil
5664     \bbl@intrapenalty0\@@
5665 \fi
5666 \else % sea
5667     \bbl@seaintraspace
5668     \bbl@exp{\bbl@intraspace\bbl@cl{intsp}}\@%
5669 \directlua{
5670     Babel.sea_ranges = Babel.sea_ranges or {}
5671     Babel.set_chranges('\bbl@cl{sbc}p',
5672                       '\bbl@cl{chrng}')
5673 }%
5674 \ifx\bbl@KVP@intrapenalty\@nnil
5675     \bbl@intrapenalty0\@@
5676 \fi
5677 \fi
5678 \fi
5679 \ifx\bbl@KVP@intrapenalty\@nnil\else
5680     \expandafter\bbl@intrapenalty\bbl@KVP@intrapenalty\@@
5681 \fi}}

```

10.8. 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-

```

5682 \ifnum\bbl@bidimode>100 \ifnum\bbl@bidimode<200
5683 \def\bblar@chars{%
5684     0628,0629,062A,062B,062C,062D,062E,062F,0630,0631,0632,0633,%
5685     0634,0635,0636,0637,0638,0639,063A,063B,063C,063D,063E,063F,%
5686     0640,0641,0642,0643,0644,0645,0646,0647,0649}
5687 \def\bblar@elongated{%
5688     0626,0628,062A,062B,0633,0634,0635,0636,063B,%
5689     063C,063D,063E,063F,0641,0642,0643,0644,0646,%
5690     0649,064A}
5691 \begin{group}
5692 \catcode\_:=11 \catcode\`:=11
5693 \gdef\bblar@nofswarn{\gdef\msg_warning:nx##1##2##3{}}
5694 \end{group}
5695 \gdef\bbl@arabicjust{% TODO. Allow for several locales.
5696 \let\bbl@arabicjust\relax
5697 \newattribute\bblar@kashida
5698 \directlua{ Babel.attr_kashida = luatexbase.registernumber'bblar@kashida' }%
5699 \bblar@kashida=\z@
5700 \bbl@patchfont{\bbl@parsejalt}}%
5701 \directlua{
5702     Babel.arabic.elong_map = Babel.arabic.elong_map or {}
5703     Babel.arabic.elong_map[\the\localeid] = {}
5704     luatexbase.add_to_callback('post_linebreak_filter',
5705                               Babel.arabic.justify, 'Babel.arabic.justify')
5706     luatexbase.add_to_callback('hpack_filter',
5707                               Babel.arabic.justify_hbox, 'Babel.arabic.justify_hbox')
5708 }%

```

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

```

5709 \def\bblar@fetchjalt#1#2#3#4{%
5710 \bbl@exp{\bbl@foreach{#1}}{%
5711 \bbl@ifunset\bblar@JE@##1}%
5712 {\setbox\z@\hbox{\textdir TRT ^^^200d\char"##1#2}}%
5713 {\setbox\z@\hbox{\textdir TRT ^^^200d\char"\@nameuse\bblar@JE@##1#2}}%

```

```

5714 \directlua{%
5715     local last = nil
5716     for item in node.traverse(tex.box[0].head) do
5717         if item.id == node.id'glyph' and item.char > 0x600 and
5718             not (item.char == 0x200D) then
5719             last = item
5720         end
5721     end
5722     Babel.arabic.#3['##1#4'] = last.char
5723 }}}
```

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

```

5724 \gdef\bbl@parsejalt{%
5725     \ifx\addfontfeature\undefined\else
5726         \bbl@xin@{/e}{/\bbl@cl{lnbrk}}}%
5727     \ifin@
5728         \directlua{%
5729             if Babel.arabic.elong_map[\the\localeid][\fontid\font] == nil then
5730                 Babel.arabic.elong_map[\the\localeid][\fontid\font] = {}
5731                 tex.print([[string\curname\space bbl@parsejalti\endcurname]])
5732             end
5733         }%
5734     \fi
5735 \fi}
5736 \gdef\bbl@parsejalti{%
5737     \beginngroup
5738     \let\bbl@parsejalt\relax % To avoid infinite loop
5739     \edef\bbl@tempb{\fontid\font}%
5740     \bblar@nofswarn
5741     \bblar@fetchjalt\bblar@elongated{}{from}{}%
5742     \bblar@fetchjalt\bblar@chars{^^^064a}{from}{a}% Alef maksura
5743     \bblar@fetchjalt\bblar@chars{^^^0649}{from}{y}% Yeh
5744     \addfontfeature{RawFeature+=jalt}%
5745     % \@namedef{bblar@JE@0643}{06AA}% todo: catch medial kaf
5746     \bblar@fetchjalt\bblar@elongated{}{dest}{}%
5747     \bblar@fetchjalt\bblar@chars{^^^064a}{dest}{a}%
5748     \bblar@fetchjalt\bblar@chars{^^^0649}{dest}{y}%
5749     \directlua{%
5750         for k, v in pairs(Babel.arabic.from) do
5751             if Babel.arabic.dest[k] and
5752                 not (Babel.arabic.from[k] == Babel.arabic.dest[k]) then
5753                 Babel.arabic.elong_map[\the\localeid][\bbl@tempb]
5754                 [Babel.arabic.from[k]] = Babel.arabic.dest[k]
5755             end
5756         end
5757     }%
5758 \endgroup}
```

The actual justification (inspired by CHICKENIZE).

```

5759 \beginngroup
5760 \catcode`#=11
5761 \catcode`~=11
5762 \directlua{
5763
5764 Babel.arabic = Babel.arabic or {}
5765 Babel.arabic.from = {}
5766 Babel.arabic.dest = {}
5767 Babel.arabic.justify_factor = 0.95
5768 Babel.arabic.justify_enabled = true
5769 Babel.arabic.kashida_limit = -1
5770
5771 function Babel.arabic.justify(head)
5772     if not Babel.arabic.justify_enabled then return head end
```

```

5773 for line in node.traverse_id(node.id'hlist', head) do
5774     Babel.arabic.justify_hlist(head, line)
5775 end
5776 return head
5777 end
5778
5779 function Babel.arabic.justify_hbox(head, gc, size, pack)
5780     local has_inf = false
5781     if Babel.arabic.justify_enabled and pack == 'exactly' then
5782         for n in node.traverse_id(12, head) do
5783             if n.stretch_order > 0 then has_inf = true end
5784         end
5785         if not has_inf then
5786             Babel.arabic.justify_hlist(head, nil, gc, size, pack)
5787         end
5788     end
5789     return head
5790 end
5791
5792 function Babel.arabic.justify_hlist(head, line, gc, size, pack)
5793     local d, new
5794     local k_list, k_item, pos_inline
5795     local width, width_new, full, k_curr, wt_pos, goal, shift
5796     local subst_done = false
5797     local elong_map = Babel.arabic.elong_map
5798     local cnt
5799     local last_line
5800     local GLYPH = node.id'glyph'
5801     local KASHIDA = Babel.attr_kashida
5802     local LOCALE = Babel.attr_locale
5803
5804     if line == nil then
5805         line = {}
5806         line.glue_sign = 1
5807         line.glue_order = 0
5808         line.head = head
5809         line.shift = 0
5810         line.width = size
5811     end
5812
5813     % Exclude last line. todo. But-- it discards one-word lines, too!
5814     % ? Look for glue = 12:15
5815     if (line.glue_sign == 1 and line.glue_order == 0) then
5816         elongs = {} % Stores elongated candidates of each line
5817         k_list = {} % And all letters with kashida
5818         pos_inline = 0 % Not yet used
5819
5820         for n in node.traverse_id(GLYPH, line.head) do
5821             pos_inline = pos_inline + 1 % To find where it is. Not used.
5822
5823             % Elongated glyphs
5824             if elong_map then
5825                 local locale = node.get_attribute(n, LOCALE)
5826                 if elong_map[locale] and elong_map[locale][n.font] and
5827                     elong_map[locale][n.font][n.char] then
5828                     table.insert(elongs, {node = n, locale = locale} )
5829                     node.set_attribute(n.prev, KASHIDA, 0)
5830                 end
5831             end
5832
5833             % Tatwil
5834             if Babel.kashida_wts then
5835                 local k_wt = node.get_attribute(n, KASHIDA)

```

```

5836         if k_wt > 0 then % todo. parameter for multi inserts
5837             table.insert(k_list, {node = n, weight = k_wt, pos = pos_inline})
5838         end
5839     end
5840
5841 end % of node.traverse_id
5842
5843 if #elongs == 0 and #k_list == 0 then goto next_line end
5844 full = line.width
5845 shift = line.shift
5846 goal = full * Babel.arabic.justify_factor % A bit crude
5847 width = node.dimensions(line.head) % The 'natural' width
5848
5849 % == Elongated ==
5850 % Original idea taken from 'chickenize'
5851 while (#elongs > 0 and width < goal) do
5852     subst_done = true
5853     local x = #elongs
5854     local curr = elongs[x].node
5855     local oldchar = curr.char
5856     curr.char = elong_map[elongs[x].locale][curr.font][curr.char]
5857     width = node.dimensions(line.head) % Check if the line is too wide
5858     % Substitute back if the line would be too wide and break:
5859     if width > goal then
5860         curr.char = oldchar
5861         break
5862     end
5863     % If continue, pop the just substituted node from the list:
5864     table.remove(elongs, x)
5865 end
5866
5867 % == Tatwil ==
5868 if #k_list == 0 then goto next_line end
5869
5870 width = node.dimensions(line.head) % The 'natural' width
5871 k_curr = #k_list % Traverse backwards, from the end
5872 wt_pos = 1
5873
5874 while width < goal do
5875     subst_done = true
5876     k_item = k_list[k_curr].node
5877     if k_list[k_curr].weight == Babel.kashida_wts[wt_pos] then
5878         d = node.copy(k_item)
5879         d.char = 0x0640
5880         d.yoffset = 0 % TODO. From the prev char. But 0 seems safe.
5881         d.xoffset = 0
5882         line.head, new = node.insert_after(line.head, k_item, d)
5883         width_new = node.dimensions(line.head)
5884         if width > goal or width == width_new then
5885             node.remove(line.head, new) % Better compute before
5886             break
5887         end
5888         if Babel.fix_diacr then
5889             Babel.fix_diacr(k_item.next)
5890         end
5891         width = width_new
5892     end
5893     if k_curr == 1 then
5894         k_curr = #k_list
5895         wt_pos = (wt_pos >= table.getn(Babel.kashida_wts)) and 1 or wt_pos+1
5896     else
5897         k_curr = k_curr - 1
5898     end

```

```

5899     end
5900
5901     % Limit the number of tatweel by removing them. Not very efficient,
5902     % but it does the job in a quite predictable way.
5903     if Babel.arabic.kashida_limit > -1 then
5904         cnt = 0
5905         for n in node.traverse_id(GLYPH, line.head) do
5906             if n.char == 0x0640 then
5907                 cnt = cnt + 1
5908                 if cnt > Babel.arabic.kashida_limit then
5909                     node.remove(line.head, n)
5910                 end
5911             else
5912                 cnt = 0
5913             end
5914         end
5915     end
5916
5917     ::next_line::
5918
5919     % Must take into account marks and ins, see luatex manual.
5920     % Have to be executed only if there are changes. Investigate
5921     % what's going on exactly.
5922     if subst_done and not gc then
5923         d = node.hpack(line.head, full, 'exactly')
5924         d.shift = shift
5925         node.insert_before(head, line, d)
5926         node.remove(head, line)
5927     end
5928 end % if process line
5929 end
5930 }
5931 \endgroup
5932 \fi\fi % ends Arabic just block: \ifnum\bbl@bidimode>100...

```

10.9. Common stuff

```
5933 <@Font selection@>
```

10.10. 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.

```

5934 % TODO - to a lua file
5935 \directlua{% DL6
5936 Babel.script_blocks = {
5937   ['dflt'] = {},
5938   ['Arab'] = {{0x0600, 0x06FF}, {0x08A0, 0x08FF}, {0x0750, 0x077F},
5939               {0xFE70, 0xFEFF}, {0xFB50, 0xFDFF}, {0x1EE00, 0x1EEFF}},
5940   ['Armn'] = {{0x0530, 0x058F}},
5941   ['Beng'] = {{0x0980, 0x09FF}},
5942   ['Cher'] = {{0x13A0, 0x13FF}, {0xAB70, 0xABBF}},
5943   ['Copt'] = {{0x03E2, 0x03EF}, {0x2C80, 0x2CFF}, {0x102E0, 0x102FF}},
5944   ['Cyr'] = {{0x0400, 0x04FF}, {0x0500, 0x052F}, {0x1C80, 0x1C8F},
5945              {0x2DE0, 0x2DFF}, {0xA640, 0xA69F}},
5946   ['Deva'] = {{0x0900, 0x097F}, {0xA8E0, 0xA8FF}},
5947   ['Ethi'] = {{0x1200, 0x137F}, {0x1380, 0x139F}, {0x2D80, 0x2DDF},

```

```

5948         {0xAB00, 0xAB2F}},
5949 ['Geor'] = {{0x10A0, 0x10FF}, {0x2D00, 0x2D2F}},
5950 % Don't follow strictly Unicode, which places some Coptic letters in
5951 % the 'Greek and Coptic' block
5952 ['Grek'] = {{0x0370, 0x03E1}, {0x03F0, 0x03FF}, {0x1F00, 0x1FFF}},
5953 ['Hans'] = {{0x2E80, 0x2EFF}, {0x3000, 0x303F}, {0x31C0, 0x31EF},
5954             {0x3300, 0x33FF}, {0x3400, 0x4DBF}, {0x4E00, 0x9FFF},
5955             {0xF900, 0xFAFF}, {0xFE30, 0xFE4F}, {0xFF00, 0xFFEF},
5956             {0x20000, 0x2A6DF}, {0x2A700, 0x2B73F},
5957             {0x2B740, 0x2B81F}, {0x2B820, 0x2CEAF},
5958             {0x2CEB0, 0x2EBEF}, {0x2F800, 0x2FA1F}},
5959 ['Hebr'] = {{0x0590, 0x05FF}},
5960 ['Jpan'] = {{0x3000, 0x303F}, {0x3040, 0x309F}, {0x30A0, 0x30FF},
5961             {0x4E00, 0x9FAF}, {0xFF00, 0xFFEF}},
5962 ['Khmr'] = {{0x1780, 0x17FF}, {0x19E0, 0x19FF}},
5963 ['Knda'] = {{0x0C80, 0x0CFF}},
5964 ['Kore'] = {{0x1100, 0x11FF}, {0x3000, 0x303F}, {0x3130, 0x318F},
5965             {0x4E00, 0x9FAF}, {0xA960, 0xA97F}, {0xAC00, 0xD7AF},
5966             {0xD7B0, 0xD7FF}, {0xFF00, 0xFFEF}},
5967 ['Lao'] = {{0x0E80, 0x0EFF}},
5968 ['Latn'] = {{0x0000, 0x007F}, {0x0080, 0x00FF}, {0x0100, 0x017F},
5969             {0x0180, 0x024F}, {0x1E00, 0x1EFF}, {0x2C60, 0x2C7F},
5970             {0xA720, 0xA7FF}, {0xAB30, 0xAB6F}},
5971 ['Mahj'] = {{0x11150, 0x1117F}},
5972 ['Mlym'] = {{0x0D00, 0x0D7F}},
5973 ['Mymr'] = {{0x1000, 0x109F}, {0xAA60, 0xAA7F}, {0xA9E0, 0xA9FF}},
5974 ['Orya'] = {{0x0B00, 0x0B7F}},
5975 ['Sinh'] = {{0x0D80, 0x0DFF}, {0x111E0, 0x111FF}},
5976 ['Syrc'] = {{0x0700, 0x074F}, {0x0860, 0x086F}},
5977 ['Taml'] = {{0x0B80, 0x0BFF}},
5978 ['Telu'] = {{0x0C00, 0x0C7F}},
5979 ['Tfng'] = {{0x2D30, 0x2D7F}},
5980 ['Thai'] = {{0x0E00, 0x0E7F}},
5981 ['Tibt'] = {{0x0F00, 0x0FFF}},
5982 ['Vaii'] = {{0xA500, 0xA63F}},
5983 ['Yiii'] = {{0xA000, 0xA48F}, {0xA490, 0xA4CF}}
5984 }
5985
5986 Babel.script_blocks.Cyrs = Babel.script_blocks.Cyrl
5987 Babel.script_blocks.Hant = Babel.script_blocks.Hans
5988 Babel.script_blocks.Kana = Babel.script_blocks.Jpan
5989
5990 function Babel.locale_map(head)
5991   if not Babel.locale_mapped then return head end
5992
5993   local LOCALE = Babel.attr_locale
5994   local GLYPH = node.id('glyph')
5995   local inmath = false
5996   local toloc_save
5997   for item in node.traverse(head) do
5998     local toloc
5999     if not inmath and item.id == GLYPH then
6000       % Optimization: build a table with the chars found
6001       if Babel.chr_to_loc[item.char] then
6002         toloc = Babel.chr_to_loc[item.char]
6003       else
6004         for lc, maps in pairs(Babel.loc_to_scr) do
6005           for _, rg in pairs(maps) do
6006             if item.char >= rg[1] and item.char <= rg[2] then
6007               Babel.chr_to_loc[item.char] = lc
6008               toloc = lc
6009               break
6010             end
6011           end
6012         end
6013       end
6014     end
6015     toloc_save = toloc
6016     item[LOCALE] = toloc
6017     if toloc == nil then
6018       item[LOCALE] = ' '
6019     end
6020     if item.inmath == true then
6021       inmath = true
6022     end
6023   end
6024   Babel.locale_mapped = true
6025 end

```

```

6011         end
6012     end
6013     % Treat composite chars in a different fashion, because they
6014     % 'inherit' the previous locale.
6015     if (item.char >= 0x0300 and item.char <= 0x036F) or
6016        (item.char >= 0x1AB0 and item.char <= 0x1AFF) or
6017        (item.char >= 0x1DC0 and item.char <= 0x1DFF) then
6018         Babel.chr_to_loc[item.char] = -2000
6019         toloc = -2000
6020     end
6021     if not toloc then
6022         Babel.chr_to_loc[item.char] = -1000
6023     end
6024     end
6025     if toloc == -2000 then
6026         toloc = toloc_save
6027     elseif toloc == -1000 then
6028         toloc = nil
6029     end
6030     if toloc and Babel.locale_props[toloc] and
6031        Babel.locale_props[toloc].letters and
6032        tex.getcatcode(item.char) \string~= 11 then
6033         toloc = nil
6034     end
6035     if toloc and Babel.locale_props[toloc].script
6036        and Babel.locale_props[node.get_attribute(item, LOCALE)].script
6037        and Babel.locale_props[toloc].script ==
6038        Babel.locale_props[node.get_attribute(item, LOCALE)].script then
6039         toloc = nil
6040     end
6041     if toloc then
6042         if Babel.locale_props[toloc].lg then
6043             item.lang = Babel.locale_props[toloc].lg
6044             node.set_attribute(item, LOCALE, toloc)
6045         end
6046         if Babel.locale_props[toloc]['/'..item.font] then
6047             item.font = Babel.locale_props[toloc]['/'..item.font]
6048         end
6049     end
6050     toloc_save = toloc
6051     elseif not inmath and item.id == 7 then % Apply recursively
6052         item.replace = item.replace and Babel.locale_map(item.replace)
6053         item.pre      = item.pre and Babel.locale_map(item.pre)
6054         item.post     = item.post and Babel.locale_map(item.post)
6055     elseif item.id == node.id'math' then
6056         inmath = (item.subtype == 0)
6057     end
6058 end
6059 return head
6060 end
6061 }

```

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

```

6062 \newcommand\babelcharproperty[1]{%
6063   \count@=#1\relax
6064   \ifvmode
6065     \expandafter\bbl@chprop
6066   \else
6067     \bbl@error{charproperty-only-vertical}{}{}{}%
6068   \fi}
6069 \newcommand\bbl@chprop[3][\the\count@]{%
6070   \@tempcnta=#1\relax

```

```

6071 \bbl@ifunset{bbl@chprop@#2}% {unknown-char-property}
6072 {\bbl@error{unknown-char-property}}{#2}}}%
6073 {}%
6074 \loop
6075 \bbl@cs{chprop@#2}{#3}%
6076 \ifnum\count@<\@tempcnta
6077 \advance\count@\@ne
6078 \repeat}
6079 \def\bbl@chprop@direction#1{%
6080 \directlua{
6081   Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
6082   Babel.characters[\the\count@]['d'] = '#1'
6083 }}
6084 \let\bbl@chprop@bc\bbl@chprop@direction
6085 \def\bbl@chprop@mirror#1{%
6086 \directlua{
6087   Babel.characters[\the\count@] = Babel.characters[\the\count@] or {}
6088   Babel.characters[\the\count@]['m'] = '\number#1'
6089 }}
6090 \let\bbl@chprop@bmg\bbl@chprop@mirror
6091 \def\bbl@chprop@linebreak#1{%
6092 \directlua{
6093   Babel.cjk_characters[\the\count@] = Babel.cjk_characters[\the\count@] or {}
6094   Babel.cjk_characters[\the\count@]['c'] = '#1'
6095 }}
6096 \let\bbl@chprop@lb\bbl@chprop@linebreak
6097 \def\bbl@chprop@locale#1{%
6098 \directlua{
6099   Babel.chr_to_loc = Babel.chr_to_loc or {}
6100   Babel.chr_to_loc[\the\count@] =
6101     \bbl@ifblank{#1}{-1000}{\the\bbl@cs{id@#1}}\space
6102 }}

```

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.

```

6103 \directlua{% DL7
6104   Babel.nohyphenation = \the\l@nohyphenation
6105 }

```

Now the T_EX high level interface, which requires the function defined above for converting strings to functions returning a string. These functions handle the {*n*} syntax. For example, pre={1}{1}- becomes function(*m*) return *m*[1]..*m*[1]..'-' end, where *m* are the matches returned after applying the pattern. With a mapped capture the functions are similar to function(*m*) return Babel.capt_map(*m*[1],1) end, where the last argument identifies the mapping to be applied to *m*[1]. The way it is carried out is somewhat tricky, but the effect is not dissimilar to lua load – save the code as string in a TeX macro, and expand this macro at the appropriate place. As \directlua does not take into account the current catcode of @, we just avoid this character in macro names (which explains the internal group, too).

```

6106 \begingroup
6107 \catcode`\~ = 12
6108 \catcode`\% = 12
6109 \catcode`\& = 14
6110 \catcode`\| = 12
6111 \gdef\babelprehyphenation{%&
6112   \@ifnextchar[{\bbl@settransform{0}}{\bbl@settransform{0}}{]}
6113 \gdef\babelposthyphenation{%&
6114   \@ifnextchar[{\bbl@settransform{1}}{\bbl@settransform{1}}{]}
6115 \gdef\bbl@settransform#1[#2]#3#4#5{%&
6116   \ifcase#1
6117     \bbl@activateprehyphen
6118   \or
6119     \bbl@activateposthyphen
6120   \fi
6121 \begingroup

```



```

6122 \def\babeltempa{\bbl@add@list\babeltempb}&%
6123 \let\babeltempb\@empty
6124 \def\bbl@tempa{#5}&%
6125 \bbl@replace\bbl@tempa{,}{ ,}&% TODO. Ugly trick to preserve {}
6126 \expandafter\bbl@foreach\expandafter{\bbl@tempa}{&%
6127   \bbl@ifsamestring{##1}{remove}&%
6128   {\bbl@add@list\babeltempb{nil}}&%
6129   {\directlua{
6130     local rep = [=[#1]=]
6131     local three_args = '%s*=%s*([%-d%.%a{}|]+)%s+([%-d%.%a{}|]+)%s+([%-d%.%a{}|]+)'
6132     &% Numeric passes directly: kern, penalty...
6133     rep = rep:gsub('^%s*(remove)%s*$', 'remove = true')
6134     rep = rep:gsub('^%s*(insert)%s*', 'insert = true, ')
6135     rep = rep:gsub('^%s*(after)%s*', 'after = true, ')
6136     rep = rep:gsub('(string)%s*=%s*([^\s,]*)', Babel.capture_func)
6137     rep = rep:gsub('node%s*=%s*([a+)%s*([a+)]', Babel.capture_node)
6138     rep = rep:gsub(' (norule)' .. three_args,
6139       'norule = {' .. '%2, %3, %4' .. '}')
6140     if #1 == 0 or #1 == 2 then
6141       rep = rep:gsub(' (space)' .. three_args,
6142         'space = {' .. '%2, %3, %4' .. '}')
6143       rep = rep:gsub(' (spacefactor)' .. three_args,
6144         'spacefactor = {' .. '%2, %3, %4' .. '}')
6145       rep = rep:gsub('(kashida)%s*=%s*([^\s,]*)', Babel.capture_kashida)
6146       &% Transform values
6147       rep, n = rep:gsub(' {([%a-]+)|([%-d%.]+)}',
6148         '{\the\csname bbl@id@#3\endcsname,"%1",%2}')
6149     end
6150     if #1 == 1 then
6151       rep = rep:gsub(' (no)%s*=%s*([^\s,]*)', Babel.capture_func)
6152       rep = rep:gsub(' (pre)%s*=%s*([^\s,]*)', Babel.capture_func)
6153       rep = rep:gsub(' (post)%s*=%s*([^\s,]*)', Babel.capture_func)
6154     end
6155     tex.print([[string\babeltempa{[]] .. rep .. [{}]])
6156   }]}&%
6157 \bbl@foreach\babeltempb{&%
6158   \bbl@forkv{##1}{&%
6159     \in@{,###1,}{,nil,step,data,remove,insert,string,no,pre,no,&%
6160     post,penalty,kashida,space,spacefactor,kern,node,after,norule,}&%
6161     \ifin@else
6162       \bbl@error{bad-transform-option}{####1}{}&%
6163     \fi}&%
6164 \let\bbl@kv@attribute\relax
6165 \let\bbl@kv@label\relax
6166 \let\bbl@kv@fonts\@empty
6167 \bbl@forkv{#2}{\bbl@csarg\edef{kv@##1}{##2}}&%
6168 \ifx\bbl@kv@fonts\@empty\else\bbl@settransfont\fi
6169 \ifx\bbl@kv@attribute\relax
6170   \ifx\bbl@kv@label\relax\else
6171     \bbl@exp{\bbl@trim@def\bbl@kv@fonts{\bbl@kv@fonts}}&%
6172     \bbl@replace\bbl@kv@fonts{ ,}{,}&%
6173     \edef\bbl@kv@attribute{\bbl@ATR@bbl@kv@label @#3@bbl@kv@fonts}&%
6174     \count@ \z@
6175     \def\bbl@elt##1##2##3{&%
6176       \bbl@ifsamestring{#3,\bbl@kv@label}{##1,##2}&%
6177       {\bbl@ifsamestring{\bbl@kv@fonts}{##3}&%
6178         {\count@\@ne}&%
6179         {\bbl@error{font-conflict-transforms}{}}}&%
6180       {}}&%
6181     \bbl@transfont@list
6182     \ifnum\count@=\z@
6183       \bbl@exp{\global\bbl@add\bbl@transfont@list
6184         {\bbl@elt{#3}{\bbl@kv@label}{\bbl@kv@fonts}}}&%

```

```

6185     \fi
6186     \bbl@ifunset{\bbl@kv@attribute}&%
6187     {\global\bbl@carg\newattribute{\bbl@kv@attribute}}&%
6188     {}&%
6189     \global\bbl@carg\setattribute{\bbl@kv@attribute}\@ne
6190   \fi
6191 \else
6192   \edef\bbl@kv@attribute{\expandafter\bbl@stripslash\bbl@kv@attribute}&%
6193 \fi
6194 \directlua{
6195   local lbkr = Babel.linebreaking.replacements[#1]
6196   local u = unicode.utf8
6197   local id, attr, label
6198   if #1 == 0 then
6199     id = \the\csname bbl@id@#3\endcsname\space
6200   else
6201     id = \the\csname l@#3\endcsname\space
6202   end
6203   \ifx\bbl@kv@attribute\relax
6204     attr = -1
6205   \else
6206     attr = luatexbase.registernumber'\bbl@kv@attribute'
6207   \fi
6208   \ifx\bbl@kv@label\relax\else &% Same refs:
6209     label = [==[\bbl@kv@label]==]
6210   \fi
6211   &% Convert pattern:
6212   local patt = string.gsub([==[#4]==], '%s', '')
6213   if #1 == 0 then
6214     patt = string.gsub(patt, '|', ' ')
6215   end
6216   if not u.find(patt, '()', nil, true) then
6217     patt = '()' .. patt .. '()'
6218   end
6219   if #1 == 1 then
6220     patt = string.gsub(patt, '%(%)^', '^()')
6221     patt = string.gsub(patt, '%$(%)', '()$')
6222   end
6223   patt = u.gsub(patt, '{(.)}',
6224     function (n)
6225       return '%' .. (tonumber(n) and (tonumber(n)+1) or n)
6226     end)
6227   patt = u.gsub(patt, '{(%x%x%x%x+)}',
6228     function (n)
6229       return u.gsub(u.char(tonumber(n, 16)), '(%p)', '%%1')
6230     end)
6231   lbkr[id] = lbkr[id] or {}
6232   table.insert(lbkr[id],
6233     { label=label, attr=attr, pattern=patt, replace={\babeltempb} })
6234 }&%
6235 \endgroup}
6236 \endgroup
6237 \let\bbl@transfont@list\@empty
6238 \def\bbl@settransfont{%
6239   \global\let\bbl@settransfont\relax % Execute only once
6240   \gdef\bbl@transfont{%
6241     \def\bbl@elt####1####2####3{%
6242       \bbl@ifblank{####3}%
6243       {\count@tw@}% Do nothing if no fonts
6244       {\count@z@
6245         \bbl@vforeach{####3}{%
6246           \def\bbl@tempd{#####1}%
6247           \edef\bbl@tempe{\bbl@transfam/\f@series/\f@shape}%

```

```

6248         \ifx\bbl@tempd\bbl@tempe
6249         \count@\@ne
6250         \else\ifx\bbl@tempd\bbl@transfam
6251         \count@\@ne
6252         \fi\fi}%
6253     \ifcase\count@
6254         \bbl@csarg\unsetattribute{ATR@###2@###1@###3}%
6255     \or
6256         \bbl@csarg\setattribute{ATR@###2@###1@###3}\@ne
6257     \fi}}%
6258     \bbl@transfont@list}%
6259 \AddToHook{selectfont}{\bbl@transfont}% Hooks are global.
6260 \gdef\bbl@transfam{-unknown-}%
6261 \bbl@foreach\bbl@font@fams{%
6262     \AddToHook{##1family}{\def\bbl@transfam{##1}}%
6263     \bbl@ifsamestring{\@nameuse{##1default}}\familydefault
6264     {\xdef\bbl@transfam{##1}}%
6265     {}}
6266 \DeclareRobustCommand\enablelocaletransform[1]{%
6267     \bbl@ifunset\bbl@ATR@#1@\language @}%
6268     {\bbl@error{transform-not-available}{#1}{}}}%
6269     {\bbl@csarg\setattribute{ATR@#1@\language @}\@ne}}
6270 \DeclareRobustCommand\disablelocaletransform[1]{%
6271     \bbl@ifunset\bbl@ATR@#1@\language @}%
6272     {\bbl@error{transform-not-available-b}{#1}{}}}%
6273     {\bbl@csarg\unsetattribute{ATR@#1@\language @}}}%
6274 \def\bbl@activateposthyphen{%
6275     \let\bbl@activateposthyphen\relax
6276     \directlua{
6277         require('babel-transforms.lua')
6278         Babel.linebreaking.add_after(Babel.post_hyphenate_replace)
6279     }}
6280 \def\bbl@activateprehyphen{%
6281     \let\bbl@activateprehyphen\relax
6282     \directlua{
6283         require('babel-transforms.lua')
6284         Babel.linebreaking.add_before(Babel.pre_hyphenate_replace)
6285     }}
6286 \newcommand\SetTransformValue[3]{%
6287     \directlua{
6288         Babel.locale_props[\the\csname bbl@id@#1\endcsname].vars["#2"] = #3
6289     }}

```

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.

```

6290 \newcommand\localeprehyphenation[1]{%
6291     \directlua{ Babel.string_prehyphenation([==#1==], \the\localeid) }}

```

10.11.Bidi

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

```

6292 \def\bbl@activate@preotf{%
6293     \let\bbl@activate@preotf\relax % only once
6294     \directlua{
6295         function Babel.pre_otfload_v(head)
6296             if Babel.numbers and Babel.digits_mapped then
6297                 head = Babel.numbers(head)
6298             end

```

```

6299     if Babel.bidi_enabled then
6300         head = Babel.bidi(head, false, dir)
6301     end
6302     return head
6303 end
6304 %
6305 function Babel.pre_otfload_h(head, gc, sz, pt, dir) %%% TODO
6306     if Babel.numbers and Babel.digits_mapped then
6307         head = Babel.numbers(head)
6308     end
6309     if Babel.bidi_enabled then
6310         head = Babel.bidi(head, false, dir)
6311     end
6312     return head
6313 end
6314 %
6315 luatexbase.add_to_callback('pre_linebreak_filter',
6316     Babel.pre_otfload_v,
6317     'Babel.pre_otfload_v',
6318     luatexbase.priority_in_callback('pre_linebreak_filter',
6319         'luaotfload.node_processor') or nil)
6320 %
6321 luatexbase.add_to_callback('hpack_filter',
6322     Babel.pre_otfload_h,
6323     'Babel.pre_otfload_h',
6324     luatexbase.priority_in_callback('hpack_filter',
6325         'luaotfload.node_processor') or nil)
6326 }}

```

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=`. The hack for the PUA is no longer necessary with basic (24.8), but it's kept in basic-r.

```

6327 \breakafterdirmode=1
6328 \ifnum\bbl@bidimode>\@ne % Any bidi= except default (=1)
6329     \let\bbl@beforeforeign\leavevmode
6330     \AtEndOfPackage{\EnableBabelHook{babel-bidi}}
6331     \RequirePackage{luatexbase}
6332     \bbl@activate@preotf
6333     \directlua{
6334         require('babel-data-bidi.lua')
6335         \ifcase\expandafter\@gobbletwo\the\bbl@bidimode\or
6336             require('babel-bidi-basic.lua')
6337         \or
6338             require('babel-bidi-basic-r.lua')
6339         table.insert(Babel.ranges, {0xE000, 0xF8FF, 'on'})
6340         table.insert(Babel.ranges, {0xF000, 0xFFFFD, 'on'})
6341         table.insert(Babel.ranges, {0x10000, 0x10FFFD, 'on'})
6342     \fi}
6343     \newattribute\bbl@attr@dir
6344     \directlua{ Babel.attr_dir = luatexbase.registernumber'bbl@attr@dir' }
6345     \bbl@exp{\output{\bodydir\pagedir\the\output}}
6346 \fi
6347 \chardef\bbl@thetextdir\z@
6348 \chardef\bbl@thepardir\z@
6349 \def\bbl@getluadir#1{%
6350     \directlua{
6351         if tex.#ldir == 'TLT' then
6352             tex.sprint('0')
6353         elseif tex.#ldir == 'TRT' then
6354             tex.sprint('1')
6355         end}}
6356 \def\bbl@setluadir#1#2#3{% 1=text/par.. 2=\textdir.. 3=0 lr/1 rl

```

```

6357 \ifcase#3\relax
6358   \ifcase\bbl@getluadir{#1}\relax\else
6359     #2 TLT\relax
6360   \fi
6361 \else
6362   \ifcase\bbl@getluadir{#1}\relax
6363     #2 TRT\relax
6364   \fi
6365 \fi}
6366 % ..00PPTT, with masks 0xC (par dir) and 0x3 (text dir)
6367 \def\bbl@thedir{0}
6368 \def\bbl@textdir#1{%
6369   \bbl@setluadir{text}\textdir{#1}%
6370   \chardef\bbl@thetextdir#1\relax
6371   \edef\bbl@thedir{\the\numexpr\bbl@thepardir*4+#1}%
6372   \setattribute\bbl@attr@dir{\numexpr\bbl@thepardir*4+#1}}
6373 \def\bbl@pardir#1{% Used twice
6374   \bbl@setluadir{par}\pardir{#1}%
6375   \chardef\bbl@thepardir#1\relax}
6376 \def\bbl@bodydir{\bbl@setluadir{body}\bodydir}% Used once
6377 \def\bbl@pagedir{\bbl@setluadir{page}\pagedir}% Unused
6378 \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.

```

6379 \ifnum\bbl@bidimode>\z@ % Any bidi=
6380   \def\bbl@insidemath{0}%
6381   \def\bbl@everymath{\def\bbl@insidemath{1}}
6382   \def\bbl@everydisplay{\def\bbl@insidemath{2}}
6383   \frozen@everymath\expandafter{%
6384     \expandafter\bbl@everymath\the\frozen@everymath}
6385   \frozen@everydisplay\expandafter{%
6386     \expandafter\bbl@everydisplay\the\frozen@everydisplay}
6387   \AtBeginDocument{
6388     \directlua{
6389       function Babel.math_box_dir(head)
6390         if not (token.get_macro('bbl@insidemath') == '0') then
6391           if Babel.hlist_has_bidi(head) then
6392             local d = node.new(node.id'dir')
6393             d.dir = '+TRT'
6394             node.insert_before(head, node.has_glyph(head), d)
6395             local inmath = false
6396             for item in node.traverse(head) do
6397               if item.id == 11 then
6398                 inmath = (item.subtype == 0)
6399               elseif not inmath then
6400                 node.set_attribute(item,
6401                   Babel.attr_dir, token.get_macro('bbl@thedir'))
6402             end
6403           end
6404         end
6405       end
6406       return head
6407     end
6408     luatexbase.add_to_callback("hpack_filter", Babel.math_box_dir,
6409       "Babel.math_box_dir", 0)
6410     if Babel.unset_atdir then
6411       luatexbase.add_to_callback("pre_linebreak_filter", Babel.unset_atdir,
6412         "Babel.unset_atdir")
6413       luatexbase.add_to_callback("hpack_filter", Babel.unset_atdir,
6414         "Babel.unset_atdir")
6415     end
6416   }}%

```

```

6417 \fi
      Experimental. Tentative name.
6418 \DeclareRobustCommand\localebox[1]{%
6419   {\def\bbl@insidemath{0}%
6420    \mbox{\foreignlanguage{\language}\language{\#1}}}}

```

10.12 Layout

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

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.

```

6421 \bbl@trace{Redefinitions for bidi layout}
6422 %
6423 << *More package options >> ≡
6424 \chardef\bbl@eqnpos\z@
6425 \DeclareOption{leqno}{\chardef\bbl@eqnpos@ne}
6426 \DeclareOption{fleqn}{\chardef\bbl@eqnpos@tw@}
6427 << /More package options >>
6428 %
6429 \ifnum\bbl@bidimode>\z@ % Any bidi=
6430   \matheqdirmode@ne % A luatex primitive
6431   \let\bbl@eqnmdir\relax
6432   \def\bbl@eqdel{()}
6433   \def\bbl@eqnum{%
6434     {\normalfont\normalcolor
6435      \expandafter\@firstoftwo\bbl@eqdel
6436      \theequation
6437      \expandafter\@secondoftwo\bbl@eqdel}}
6438   \def\bbl@puteqno#1{\eqno\hbox{#1}}
6439   \def\bbl@putleqno#1{\leqno\hbox{#1}}
6440   \def\bbl@eqno@flip#1{%
6441     \ifdim\predisplaysize=-\maxdimen
6442       \eqno
6443       \hb@xt@.01pt{%
6444         \hb@xt@\displaywidth{\hss{#1}\glet\bbl@upset\@currentlabel}}\hss}%
6445     \else
6446       \leqno\hbox{#1}\glet\bbl@upset\@currentlabel}%
6447     \fi
6448     \bbl@exp{\def\\@currentlabel{\[bbl@upset]}}
6449   \def\bbl@leqno@flip#1{%
6450     \ifdim\predisplaysize=-\maxdimen
6451       \leqno
6452       \hb@xt@.01pt{%
6453         \hss\hb@xt@\displaywidth{{#1}\glet\bbl@upset\@currentlabel}\hss}}%
6454     \else
6455       \eqno\hbox{#1}\glet\bbl@upset\@currentlabel}%

```

```

6456 \fi
6457 \bbl@exp{\def\\@currentlabel{\bbl@upset}}}}
6458 \AtBeginDocument{%
6459 \ifx\bbl@noamsmath\relax\else
6460 \ifx\maketag@@@ \@undefined % Normal equation, eqnarray
6461 \AddToHook{env/equation/begin}{%
6462 \ifnum\bbl@thetextdir>\z@
6463 \def\bbl@mathboxdir{\def\bbl@insidemath{1}}%
6464 \let\@eqnnum\bbl@eqnum
6465 \edef\bbl@eqnodir{\noexpand\bbl@textdir{\the\bbl@thetextdir}}%
6466 \chardef\bbl@thetextdir\z@
6467 \bbl@add\normalfont{\bbl@eqnodir}%
6468 \ifcase\bbl@eqnpos
6469 \let\bbl@puteqno\bbl@eqno@flip
6470 \or
6471 \let\bbl@puteqno\bbl@leqno@flip
6472 \fi
6473 \fi}%
6474 \ifnum\bbl@eqnpos=\tw@ \else
6475 \def\endequation{\bbl@puteqno{\@eqnnum}$$\@ignoretrue}%
6476 \fi
6477 \AddToHook{env/eqnarray/begin}{%
6478 \ifnum\bbl@thetextdir>\z@
6479 \def\bbl@mathboxdir{\def\bbl@insidemath{1}}%
6480 \edef\bbl@eqnodir{\noexpand\bbl@textdir{\the\bbl@thetextdir}}%
6481 \chardef\bbl@thetextdir\z@
6482 \bbl@add\normalfont{\bbl@eqnodir}%
6483 \ifnum\bbl@eqnpos=\@ne
6484 \def\@eqnnum{%
6485 \setbox\z@\hbox{\bbl@eqnum}%
6486 \hbox to0.01pt{\hss\hbox to\displaywidth{\box\z@\hss}}}%
6487 \else
6488 \let\@eqnnum\bbl@eqnum
6489 \fi
6490 \fi}
6491 % Hack. YA luatex bug?:
6492 \expandafter\bbl@sreplace\csname\endcsname{${\eqno\kern.001pt$}}%
6493 \else % amstex
6494 \bbl@exp{% Hack to hide maybe undefined conditionals:
6495 \chardef\bbl@eqnpos=0%
6496 \<iftagsleft@>1\<else>\<if@fleqn>2\<fi>\<fi>\relax}%
6497 \ifnum\bbl@eqnpos=\@ne
6498 \let\bbl@ams@lap\hbox
6499 \else
6500 \let\bbl@ams@lap\llap
6501 \fi
6502 \ExplSyntaxOn % Required by \bbl@sreplace with \intertext@
6503 \bbl@sreplace\intertext@\normalbaselines%
6504 {\normalbaselines
6505 \ifx\bbl@eqnodir\relax\else\bbl@pardir\@ne\bbl@eqnodir\fi}%
6506 \ExplSyntaxOff
6507 \def\bbl@ams@tagbox#1#2{#1{\bbl@eqnodir#2}}% #1=hbox|@lap|flip
6508 \ifx\bbl@ams@lap\hbox % leqno
6509 \def\bbl@ams@flip#1{%
6510 \hbox to 0.01pt{\hss\hbox to\displaywidth{#1}\hss}}%
6511 \else % eqno
6512 \def\bbl@ams@flip#1{%
6513 \hbox to 0.01pt{\hbox to\displaywidth{\hss{#1}\hss}}%
6514 \fi
6515 \def\bbl@ams@preset#1{%
6516 \def\bbl@mathboxdir{\def\bbl@insidemath{1}}%
6517 \ifnum\bbl@thetextdir>\z@
6518 \edef\bbl@eqnodir{\noexpand\bbl@textdir{\the\bbl@thetextdir}}%

```

```

6519      \bbl@sreplace\textdef@{\hbox}{\bbl@ams@tagbox\hbox}%
6520      \bbl@sreplace\maketag@@@{\hbox}{\bbl@ams@tagbox#1}%
6521      \fi}%
6522  \ifnum\bbl@eqnpos=\tw@\else
6523      \def\bbl@ams@equation{%
6524      \def\bbl@mathboxdir{\def\bbl@insidemath{1}}%
6525      \ifnum\bbl@thetextdir>\z@
6526          \edef\bbl@eqnodir{\noexpand\bbl@textdir{\the\bbl@thetextdir}}%
6527          \chardef\bbl@thetextdir\z@
6528          \bbl@add\normalfont{\bbl@eqnodir}%
6529          \ifcase\bbl@eqnpos
6530              \def\veqno##1##2{\bbl@eqno@flip{##1##2}}%
6531          \or
6532              \def\veqno##1##2{\bbl@leqno@flip{##1##2}}%
6533          \fi
6534      \fi}%
6535      \AddToHook{env/equation/begin}{\bbl@ams@equation}%
6536      \AddToHook{env/equation*/begin}{\bbl@ams@equation}%
6537  \fi
6538  \AddToHook{env/cases/begin}{\bbl@ams@preset\bbl@ams@lap}%
6539  \AddToHook{env/multline/begin}{\bbl@ams@preset\hbox}%
6540  \AddToHook{env/gather/begin}{\bbl@ams@preset\bbl@ams@lap}%
6541  \AddToHook{env/gather*/begin}{\bbl@ams@preset\bbl@ams@lap}%
6542  \AddToHook{env/align/begin}{\bbl@ams@preset\bbl@ams@lap}%
6543  \AddToHook{env/align*/begin}{\bbl@ams@preset\bbl@ams@lap}%
6544  \AddToHook{env/alignat/begin}{\bbl@ams@preset\bbl@ams@lap}%
6545  \AddToHook{env/alignat*/begin}{\bbl@ams@preset\bbl@ams@lap}%
6546  \AddToHook{env/eqnalign/begin}{\bbl@ams@preset\hbox}%
6547  % Hackish, for proper alignment. Don't ask me why it works!:
6548  \bbl@exp{% Avoid a 'visible' conditional
6549      \\ \AddToHook{env/align*/end}{\<iftag>\<else>\\tag*{}\<fi>}%
6550      \\ \AddToHook{env/alignat*/end}{\<iftag>\<else>\\tag*{}\<fi>}%
6551  \AddToHook{env/flalign/begin}{\bbl@ams@preset\hbox}%
6552  \AddToHook{env/split/before}{%
6553      \def\bbl@mathboxdir{\def\bbl@insidemath{1}}%
6554      \ifnum\bbl@thetextdir>\z@
6555          \bbl@ifsamestring\@currentvir{equation}%
6556          {\ifx\bbl@ams@lap\hbox % leqno
6557              \def\bbl@ams@flip#1{%
6558                  \hbox to 0.01pt{\hbox to\displaywidth{#{1}\hss}\hss}}%
6559              \else
6560                  \def\bbl@ams@flip#1{%
6561                      \hbox to 0.01pt{\hss\hbox to\displaywidth{\hss{#1}}}%
6562                  \fi}%
6563              {}%
6564          \fi}%
6565      \fi\fi}
6566  \fi
6567  \def\bbl@provide@extra#1{%
6568      % == onchar ==
6569      \ifx\bbl@KVP@onchar\@nnil\else
6570          \bbl@luahyphenate
6571          \bbl@exp{%
6572              \\ \AddToHook{env/document/before}{\select@language{#1}}}%
6573      \directlua{
6574          if Babel.locale_mapped == nil then
6575              Babel.locale_mapped = true
6576              Babel.linebreaking.add_before(Babel.locale_map, 1)
6577              Babel.loc_to_scr = {}
6578              Babel.chr_to_loc = Babel.chr_to_loc or {}
6579          end
6580          Babel.locale_props[\the\localeid].letters = false
6581      }%

```



```

6582 \bbl@xin@{ letters }{ \bbl@KVP@onchar\space}%
6583 \ifin@
6584 \directlua{
6585     Babel.locale_props[\the\localeid].letters = true
6586 }%
6587 \fi
6588 \bbl@xin@{ ids }{ \bbl@KVP@onchar\space}%
6589 \ifin@
6590 \ifx\bbl@starthyphens\undefined % Needed if no explicit selection
6591     \AddBabelHook{babel-onchar}{beforestart}{\bbl@starthyphens}%
6592 \fi
6593 \bbl@exp{\bbl@add\bbl@starthyphens
6594     {\bbl@patterns@lua{\language\language}}}%
6595 %^A add error/warning if no script
6596 \directlua{
6597     if Babel.script_blocks['\bbl@cl{sbc}'] then
6598         Babel.loc_to_scr[\the\localeid] = Babel.script_blocks['\bbl@cl{sbc}']
6599         Babel.locale_props[\the\localeid].lg = \the\nameuse{l@language}\space
6600     end
6601 }%
6602 \fi
6603 \bbl@xin@{ fonts }{ \bbl@KVP@onchar\space}%
6604 \ifin@
6605     \bbl@ifunset{bbl@lsys@language}{\bbl@provide@lsys@language}%
6606     \bbl@ifunset{bbl@wdir@language}{\bbl@provide@dirs@language}%
6607 \directlua{
6608     if Babel.script_blocks['\bbl@cl{sbc}'] then
6609         Babel.loc_to_scr[\the\localeid] =
6610             Babel.script_blocks['\bbl@cl{sbc}']
6611     end}%
6612 \ifx\bbl@mapselect\undefined % TODO. almost the same as mapfont
6613     \AtBeginDocument{%
6614         \bbl@patchfont{\bbl@mapselect}%
6615         {\selectfont}%
6616     \def\bbl@mapselect{%
6617         \let\bbl@mapselect\relax
6618         \edef\bbl@prefontid{\fontid\font}%
6619     \def\bbl@mapdir##1{%
6620         \begingroup
6621             \setbox\z@ \hbox{% Force text mode
6622                 \def\language{##1}%
6623                 \let\bbl@ifrestoring\@firstoftwo % To avoid font warning
6624                 \bbl@switchfont
6625                 \ifnum\fontid\font>\z@ % A hack, for the pgf nullfont hack
6626                     \directlua{
6627                         Babel.locale_props[\the\csname bbl@id@##1\endcsname]%
6628                             [\bbl@prefontid] = \fontid\font\space}%
6629                     \fi}%
6630             \endgroup}%
6631     \fi
6632     \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{language}}}%
6633 \fi
6634 % TODO - catch non-valid values
6635 \fi
6636 % == mapfont ==
6637 % For bidi texts, to switch the font based on direction
6638 \ifx\bbl@KVP@mapfont\@nnil\else
6639     \bbl@ifsamestring{\bbl@KVP@mapfont}{direction}%
6640     {\bbl@error{unknown-mapfont}}}%
6641 \bbl@ifunset{bbl@lsys@language}{\bbl@provide@lsys@language}%
6642 \bbl@ifunset{bbl@wdir@language}{\bbl@provide@dirs@language}%
6643 \ifx\bbl@mapselect\undefined % TODO. See onchar.
6644     \AtBeginDocument{%

```

```

6645     \bbl@patchfont{\bbl@mapselect}}%
6646     {\selectfont}}%
6647     \def\bbl@mapselect{%
6648         \let\bbl@mapselect\relax
6649         \edef\bbl@prefontid{\fontid\font}}%
6650     \def\bbl@mapdir##1{%
6651         {\def\language{##1}%
6652         \let\bbl@ifrestoring\@firstoftwo % avoid font warning
6653         \bbl@switchfont
6654         \directlua{Babel.fontmap
6655             [\the\csname bbl@wdir@##1\endcsname]%
6656             [\bbl@prefontid]=\fontid\font}}}%
6657     \fi
6658     \bbl@exp{\bbl@add\bbl@mapselect{\bbl@mapdir{\language}}}%
6659     \fi
6660     % == Line breaking: CJK quotes == %^A -> @extras
6661     \ifcase\bbl@engine\or
6662         \bbl@xin@{/c}{/\bbl@cl{lnbrk}}%
6663     \ifin@
6664         \bbl@ifunset\bbl@quote@\language{}{%
6665             {\directlua{
6666                 Babel.locale_props[\the\localeid].cjk_quotes = {}
6667                 local cs = 'op'
6668                 for c in string.utfvalues(
6669                     [[\csname bbl@quote@\language\endcsname]]) do
6670                     if Babel.cjk_characters[c].c == 'qu' then
6671                         Babel.locale_props[\the\localeid].cjk_quotes[c] = cs
6672                     end
6673                     cs = ( cs == 'op') and 'cl' or 'op'
6674                 end
6675             }}%
6676         \fi
6677     \fi
6678     % == Counters: mapdigits ==
6679     % Native digits
6680     \ifx\bbl@KVP@mapdigits\@nnil\else
6681         \bbl@ifunset\bbl@dgnat@\language{}{%
6682             {\RequirePackage{luatexbase}%
6683             \bbl@activate@preotf
6684             \directlua{
6685                 Babel.digits_mapped = true
6686                 Babel.digits = Babel.digits or {}
6687                 Babel.digits[\the\localeid] =
6688                     table.pack(string.utfvalue('\bbl@cl{dgnat}'))
6689                 if not Babel.numbers then
6690                     function Babel.numbers(head)
6691                         local LOCALE = Babel.attr_locale
6692                         local GLYPH = node.id'glyph'
6693                         local inmath = false
6694                         for item in node.traverse(head) do
6695                             if not inmath and item.id == GLYPH then
6696                                 local temp = node.get_attribute(item, LOCALE)
6697                                 if Babel.digits[temp] then
6698                                     local chr = item.char
6699                                     if chr > 47 and chr < 58 then
6700                                         item.char = Babel.digits[temp][chr-47]
6701                                     end
6702                                 end
6703                             elseif item.id == node.id'math' then
6704                                 inmath = (item.subtype == 0)
6705                             end
6706                         end
6707                     return head

```

```

6708         end
6709     end
6710 }}%
6711 \fi
6712 % == transforms ==
6713 \ifx\bbL@KVP@transforms\@nnil\else
6714   \def\bbL@elt##1##2##3{%
6715     \in@{$transforms.}{$##1}%
6716     \ifin@
6717       \def\bbL@tempa{##1}%
6718       \bbL@replace\bbL@tempa{transforms.}{}%
6719       \bbL@carg\bbL@transforms{babel\bbL@tempa}{##2}{##3}%
6720     \fi}%
6721 \bbL@exp{%
6722   \\bbL@ifblank{\bbL@cl{dgnat}}}%
6723   {\let\\bbL@tempa\relax}%
6724   {\def\\bbL@tempa{%
6725     \\bbL@elt{transforms.prehyphenation}%
6726     {digits.native.1.0}{([0-9])}%
6727     \\bbL@elt{transforms.prehyphenation}%
6728     {digits.native.1.1}{string={\string|0123456789\string|\bbL@cl{dgnat}}}}}%
6729 \ifx\bbL@tempa\relax\else
6730   \toks@{\expandafter\expandafter\expandafter{%
6731     \csname \bbL@inidata@\language\endcsname}%
6732     \bbL@csarg\edef{inidata@\language}{%
6733       \unexpanded\expandafter{\bbL@tempa}%
6734       \the\toks@}%
6735   \fi
6736   \csname \bbL@inidata@\language\endcsname
6737   \bbL@release@transforms\relax % \relax closes the last item.
6738 \fi}

```

Start tabular here:

```

6739 \def\localerestoredirs{%
6740   \ifcase\bbL@thetextdir
6741     \ifnum\textdirection=\z@\else\textdir TLT\fi
6742   \else
6743     \ifnum\textdirection=\@ne\else\textdir TRT\fi
6744   \fi
6745   \ifcase\bbL@thepardir
6746     \ifnum\pardirection=\z@\else\pardir TLT\bodydir TLT\fi
6747   \else
6748     \ifnum\pardirection=\@ne\else\pardir TRT\bodydir TRT\fi
6749   \fi}
6750 \IfBabelLayout{tabular}%
6751   {\chardef\bbL@tabular@mode\tw@}% All RTL
6752   {\IfBabelLayout{notabular}%
6753     {\chardef\bbL@tabular@mode\z@}%
6754     {\chardef\bbL@tabular@mode\@ne}}% Mixed, with LTR cols
6755 \ifnum\bbL@bidimode>\@ne % Any lua bidi= except default=1
6756 % Redefine: vrules mess up dirs. TODO: why?
6757 \def\@arstrut{\relax\copy\@arstrutbox}%
6758 \ifcase\bbL@tabular@mode\or % 1 = Mixed - default
6759   \let\bbL@parabefore\relax
6760   \AddToHook{para/before}{\bbL@parabefore}
6761   \AtBeginDocument{%
6762     \bbL@replace\@tabular{$}{$%
6763       \def\bbL@insidemath{0}%
6764       \def\bbL@parabefore{\localerestoredirs}}}%
6765   \ifnum\bbL@tabular@mode=\@ne
6766     \bbL@ifunset{@tabclassz}{}%
6767     \bbL@exp{% Hide conditionals
6768       \\bbL@sreplace\\@tabclassz

```

```

6769         {\<ifcase>\\@chnum}%
6770         {\\\localerestoredirs\<ifcase>\\@chnum}}}%
6771     \@ifpackageloaded{colortbl}%
6772     {\bbl@sreplace\@classz
6773     {\hbox\bgroup\bgroup}{\hbox\bgroup\bgroup\localerestoredirs}}%
6774     {\@ifpackageloaded{array}%
6775     {\bbl@exp{% Hide conditionals
6776         \\bbl@sreplace\\@classz
6777         {\<ifcase>\\@chnum}%
6778         {\bgroup\\localerestoredirs\<ifcase>\\@chnum}%
6779         \\bbl@sreplace\\@classz
6780         {\\\do@row@strut\<fi>}{\\do@row@strut\<fi>\egroup}}}%
6781     {}}%
6782 \fi}%
6783 \or % 2 = All RTL - tabular
6784 \let\bbl@parabefore\relax
6785 \AddToHook{para/before}{\bbl@parabefore}%
6786 \AtBeginDocument{%
6787     \@ifpackageloaded{colortbl}%
6788     {\bbl@replace\@tabular{$}{$%
6789         \def\bbl@insidemath{0}%
6790         \def\bbl@parabefore{\localerestoredirs}}%
6791         \bbl@sreplace\@classz
6792         {\hbox\bgroup\bgroup}{\hbox\bgroup\bgroup\localerestoredirs}}%
6793     {}}%
6794 \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.

```

6795 \AtBeginDocument{%
6796     \@ifpackageloaded{multicol}%
6797     {\toks\expandafter{\multi@column@out}%
6798     \edef\multi@column@out{\bodydir\pagedir\the\toks@}}%
6799     {}%
6800     \@ifpackageloaded{paracol}%
6801     {\edef\pcol@output{%
6802         \bodydir\pagedir\unexpanded\expandafter{\pcol@output}}}%
6803     {}}%
6804 \fi
6805 \ifx\bbl@opt@layout\@nnil\endinput\fi % if no layout

```

OMEGA provided a companion to `\mathdir` (`\nextfake`) 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`.

```

6806 \ifnum\bbl@bidimode>\z@ % Any bidi=
6807 \def\bbl@nextfake#1{% non-local changes, use always inside a group!
6808     \bbl@exp{%
6809         \mathdir\the\bodydir
6810         #1%         Once entered in math, set boxes to restore values
6811         \def\\bbl@insidemath{0}%
6812         \<ifmmode>%
6813         \everyvbox{%
6814             \the\everyvbox
6815             \bodydir\the\bodydir
6816             \mathdir\the\mathdir
6817             \everyhbox{\the\everyhbox}%
6818             \everyvbox{\the\everyvbox}}%
6819         \everyhbox{%
6820             \the\everyhbox
6821             \bodydir\the\bodydir
6822             \mathdir\the\mathdir
6823             \everyhbox{\the\everyhbox}%

```

```

6824 \everyvbox{\the\everyvbox}}%
6825 \<fi>}}%
6826 \def\@hangfrom#1{%
6827 \setbox\@tempboxa\hbox{#1}}%
6828 \hangindent\wd\@tempboxa
6829 \ifnum\bbbl@getluadir{page}=\bbbl@getluadir{par}\else
6830 \shapemode\@ne
6831 \fi
6832 \noindent\box\@tempboxa}
6833 \fi
6834 \IfBabelLayout{tabular}
6835 {\let\bbbl@OL@tabular\@tabular
6836 \bbbl@replace\@tabular{$}\bbbl@nextfake$}%
6837 \let\bbbl@NL@tabular\@tabular
6838 \AtBeginDocument{%
6839 \ifx\bbbl@NL@tabular\@tabular\else
6840 \bbbl@exp{\in{\bbbl@nextfake}{\@tabular}}}%
6841 \ifin\else
6842 \bbbl@replace\@tabular{$}\bbbl@nextfake$}%
6843 \fi
6844 \let\bbbl@NL@tabular\@tabular
6845 \fi}}
6846 {}
6847 \IfBabelLayout{lists}
6848 {\let\bbbl@OL@list\list
6849 \bbbl@sreplace\list{\parshape}\bbbl@listparshape}%
6850 \let\bbbl@NL@list\list
6851 \def\bbbl@listparshape#1#2#3{%
6852 \parshape #1 #2 #3 %
6853 \ifnum\bbbl@getluadir{page}=\bbbl@getluadir{par}\else
6854 \shapemode\tw@
6855 \fi}}
6856 {}
6857 \IfBabelLayout{graphics}
6858 {\let\bbbl@pictresetdir\relax
6859 \def\bbbl@pictsetdir#1{%
6860 \ifcase\bbbl@thetextdir
6861 \let\bbbl@pictresetdir\relax
6862 \else
6863 \ifcase#1\bodydir TLT % Remember this sets the inner boxes
6864 \or\textdir TLT
6865 \else\bodydir TLT \textdir TLT
6866 \fi
6867 % \textdir required in pgf:
6868 \def\bbbl@pictresetdir{\bodydir TRT\pardir TRT\textdir TRT\relax}%
6869 \fi}%
6870 \AddToHook{env/picture/begin}{\bbbl@pictsetdir\tw@}%
6871 \directlua{
6872 Babel.get_picture_dir = true
6873 Babel.picture_has_bidi = 0
6874 %
6875 function Babel.picture_dir (head)
6876 if not Babel.get_picture_dir then return head end
6877 if Babel.hlist_has_bidi(head) then
6878 Babel.picture_has_bidi = 1
6879 end
6880 return head
6881 end
6882 luatexbase.add_to_callback("hpack_filter", Babel.picture_dir,
6883 "Babel.picture_dir")
6884 }%
6885 \AtBeginDocument{%
6886 \def\LS@rot{%

```

```

6887 \setbox\@outputbox\vbox{%
6888 \hbox dir TLT{\rotatebox{90}{\box\@outputbox}}}%
6889 \long\def\put(#1,#2)#3{%
6890 \@killglue
6891 % Try:
6892 \ifx\bbbl@pictresetdir\relax
6893 \def\bbbl@tempc{0}%
6894 \else
6895 \directlua{
6896 Babel.get_picture_dir = true
6897 Babel.picture_has_bidi = 0
6898 }%
6899 \setbox\z@\hb@xt@\z@{%
6900 \@defaultunitsset\@tempdimc{#1}\unitlength
6901 \kern\@tempdimc
6902 #3\hss}% TODO: #3 executed twice (below). That's bad.
6903 \edef\bbbl@tempc{\directlua{tex.print(Babel.picture_has_bidi)}}%
6904 \fi
6905 % Do:
6906 \@defaultunitsset\@tempdimc{#2}\unitlength
6907 \raise\@tempdimc\hb@xt@\z@{%
6908 \@defaultunitsset\@tempdimc{#1}\unitlength
6909 \kern\@tempdimc
6910 {\ifnum\bbbl@tempc>\z@\bbbl@pictresetdir\fi#3}\hss}%
6911 \ignorespaces}%
6912 \MakeRobust\put}%
6913 \AtBeginDocument
6914 {\AddToHook{cmd/diagbox@pict/before}{\let\bbbl@pictsetdir\@gobble}%
6915 \ifx\pgfpicture\undefined\else % TODO. Allow deactivate?
6916 \AddToHook{env/pgfpicture/begin}{\bbbl@pictsetdir\@ne}%
6917 \bbbl@add\pgfinterruptpicture{\bbbl@pictresetdir}%
6918 \bbbl@add\pgfsys@beginpicture{\bbbl@pictsetdir\z@}%
6919 \fi
6920 \ifx\tikzpicture\undefined\else
6921 \AddToHook{env/tikzpicture/begin}{\bbbl@pictsetdir\tw@}%
6922 \bbbl@add\tikz@atbegin@node{\bbbl@pictresetdir}%
6923 \bbbl@sreplace\tikz{\begingroup}{\begingroup\bbbl@pictsetdir\tw@}%
6924 \fi
6925 \ifx\tcolorbox\undefined\else
6926 \def\tcb@drawing@env@begin{%
6927 \csname tcb@before@tcb@split@state\endcsname
6928 \bbbl@pictsetdir\tw@
6929 \begin{\kv tcb@graphenv}%
6930 \tcb@bbdraw
6931 \tcb@apply@graph@patches}%
6932 \def\tcb@drawing@env@end{%
6933 \end{\kv tcb@graphenv}%
6934 \bbbl@pictresetdir
6935 \csname tcb@after@tcb@split@state\endcsname}%
6936 \fi
6937 }}
6938 {}

```

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.

```

6939 \IfBabelLayout{counters*}%
6940 {\bbbl@add\bbbl@opt@layout{.counters.}}%
6941 \directlua{
6942 luatexbase.add_to_callback("process_output_buffer",
6943 Babel.discard_sublr , "Babel.discard_sublr") }%
6944 {}
6945 \IfBabelLayout{counters}%

```

```

6946 {\let\bbl@0L@@textsuperscript\@textsuperscript
6947 \bbl@sreplace\@textsuperscript{\m@th}{\m@th\mathdir\pagedir}%
6948 \let\bbl@latinarabic=\@arabic
6949 \let\bbl@0L@@arabic\@arabic
6950 \def\@arabic#1{\babelsublr{\bbl@latinarabic#1}}%
6951 \ifpackagewith{babel}{\bidi=default}%
6952 {\let\bbl@asciroman=\@roman
6953 \let\bbl@0L@@roman\@roman
6954 \def\@roman#1{\babelsublr{\ensureascii{\bbl@asciroman#1}}}%
6955 \let\bbl@asciiRoman=\@Roman
6956 \let\bbl@0L@@roman\@Roman
6957 \def\@Roman#1{\babelsublr{\ensureascii{\bbl@asciiRoman#1}}}%
6958 \let\bbl@0L@labelenumii\labelenumii
6959 \def\labelenumii{}\theenumii}%
6960 \let\bbl@0L@p@enumiii\p@enumiii
6961 \def\p@enumiii{\p@enumii}\theenumii{}\{}\}%
6962 <@Footnote changes@>
6963 \IfBabelLayout{footnotes}%
6964 {\let\bbl@0L@footnote\footnote
6965 \BabelFootnote\footnote\language\language{}{}\}%
6966 \BabelFootnote\localfootnote\language\language{}{}\}%
6967 \BabelFootnote\mainfootnote{}\{}\}%
6968 {}

```

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

```

6969 \IfBabelLayout{extras}%
6970 {\bbl@ncarg\let\bbl@0L@underline{underline }%
6971 \bbl@carg\bbl@sreplace{underline }%
6972 {\$@@underline}{\bgroup\bbl@nextfake$@@underline}%
6973 \bbl@carg\bbl@sreplace{underline }%
6974 {\m@th$}{\m@th$\egroup}%
6975 \let\bbl@0L@LaTeXe\LaTeXe
6976 \DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
6977 \if b\expandafter\@car\@series\@nil\boldmath\fi
6978 \babelsublr{%
6979 \LaTeX\kern.15em2\bbl@nextfake$_{\textstyle\varepsilon}$}}}%
6980 {}
6981 </luatex>

```

10.13 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 discretionary, 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.

```

6982 <*transforms>
6983 Babel.linebreaking.replacements = {}
6984 Babel.linebreaking.replacements[0] = {} -- pre
6985 Babel.linebreaking.replacements[1] = {} -- post
6986
6987 function Babel.tovalue(v)
6988   if type(v) == 'table' then
6989     return Babel.locale_props[v[1]].vars[v[2]] or v[3]
6990   else
6991     return v

```

```

6992 end
6993 end
6994
6995 Babel.fetch_subtext = {}
6996
6997 Babel.ignore_pre_char = function(node)
6998   return (node.lang == Babel.nohyphenation)
6999 end
7000
7001 -- Merging both functions doesn't seem feasible, because there are too
7002 -- many differences.
7003 Babel.fetch_subtext[0] = function(head)
7004   local word_string = ''
7005   local word_nodes = {}
7006   local lang
7007   local item = head
7008   local inmath = false
7009
7010   while item do
7011
7012     if item.id == 11 then
7013       inmath = (item.subtype == 0)
7014     end
7015
7016     if inmath then
7017       -- pass
7018
7019     elseif item.id == 29 then
7020       local locale = node.get_attribute(item, Babel.attr_locale)
7021
7022       if lang == locale or lang == nil then
7023         lang = lang or locale
7024         if Babel.ignore_pre_char(item) then
7025           word_string = word_string .. Babel.us_char
7026         else
7027           word_string = word_string .. unicode.utf8.char(item.char)
7028         end
7029         word_nodes[#word_nodes+1] = item
7030       else
7031         break
7032       end
7033
7034     elseif item.id == 12 and item.subtype == 13 then
7035       word_string = word_string .. ' '
7036       word_nodes[#word_nodes+1] = item
7037
7038     -- Ignore leading unrecognized nodes, too.
7039     elseif word_string ~= '' then
7040       word_string = word_string .. Babel.us_char
7041       word_nodes[#word_nodes+1] = item -- Will be ignored
7042     end
7043
7044     item = item.next
7045   end
7046
7047   -- Here and above we remove some trailing chars but not the
7048   -- corresponding nodes. But they aren't accessed.
7049   if word_string:sub(-1) == ' ' then
7050     word_string = word_string:sub(1,-2)
7051   end
7052   word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
7053   return word_string, word_nodes, item, lang
7054 end

```



```

7055
7056 Babel.fetch_subtext[1] = function(head)
7057   local word_string = ''
7058   local word_nodes = {}
7059   local lang
7060   local item = head
7061   local inmath = false
7062
7063   while item do
7064
7065     if item.id == 11 then
7066       inmath = (item.subtype == 0)
7067     end
7068
7069     if inmath then
7070       -- pass
7071
7072     elseif item.id == 29 then
7073       if item.lang == lang or lang == nil then
7074         if (item.char ~= 124) and (item.char ~= 61) then -- not =, not |
7075           lang = lang or item.lang
7076           word_string = word_string .. unicode.utf8.char(item.char)
7077           word_nodes[#word_nodes+1] = item
7078         end
7079       else
7080         break
7081       end
7082
7083     elseif item.id == 7 and item.subtype == 2 then
7084       word_string = word_string .. '='
7085       word_nodes[#word_nodes+1] = item
7086
7087     elseif item.id == 7 and item.subtype == 3 then
7088       word_string = word_string .. '|'
7089       word_nodes[#word_nodes+1] = item
7090
7091     -- (1) Go to next word if nothing was found, and (2) implicitly
7092     -- remove leading USs.
7093     elseif word_string == '' then
7094       -- pass
7095
7096     -- This is the responsible for splitting by words.
7097     elseif (item.id == 12 and item.subtype == 13) then
7098       break
7099
7100     else
7101       word_string = word_string .. Babel.us_char
7102       word_nodes[#word_nodes+1] = item -- Will be ignored
7103     end
7104
7105     item = item.next
7106   end
7107
7108   word_string = unicode.utf8.gsub(word_string, Babel.us_char .. '+$', '')
7109   return word_string, word_nodes, item, lang
7110 end
7111
7112 function Babel.pre_hyphenate_replace(head)
7113   Babel.hyphenate_replace(head, 0)
7114 end
7115
7116 function Babel.post_hyphenate_replace(head)
7117   Babel.hyphenate_replace(head, 1)

```

```

7118 end
7119
7120 Babel.us_char = string.char(31)
7121
7122 function Babel.hyphenate_replace(head, mode)
7123   local u = unicode.utf8
7124   local lbkr = Babel.linebreaking.replacements[mode]
7125   local tovalue = Babel.tovalue
7126
7127   local word_head = head
7128
7129   while true do -- for each subtext block
7130
7131     local w, w_nodes, nw, lang = Babel.fetch_subtext[mode](word_head)
7132
7133     if Babel.debug then
7134       print()
7135       print((mode == 0) and '@@@<' or '@@@>', w)
7136     end
7137
7138     if nw == nil and w == '' then break end
7139
7140     if not lang then goto next end
7141     if not lbkr[lang] then goto next end
7142
7143     -- For each saved (pre|post)hyphenation. TODO. Reconsider how
7144     -- loops are nested.
7145     for k=1, #lbkr[lang] do
7146       local p = lbkr[lang][k].pattern
7147       local r = lbkr[lang][k].replace
7148       local attr = lbkr[lang][k].attr or -1
7149
7150       if Babel.debug then
7151         print('*****', p, mode)
7152       end
7153
7154       -- This variable is set in some cases below to the first *byte*
7155       -- after the match, either as found by u.match (faster) or the
7156       -- computed position based on sc if w has changed.
7157       local last_match = 0
7158       local step = 0
7159
7160       -- For every match.
7161       while true do
7162         if Babel.debug then
7163           print('====')
7164         end
7165         local new -- used when inserting and removing nodes
7166         local dummy_node -- used by after
7167
7168         local matches = { u.match(w, p, last_match) }
7169
7170         if #matches < 2 then break end
7171
7172         -- Get and remove empty captures (with ())'s, which return a
7173         -- number with the position), and keep actual captures
7174         -- (from (...)), if any, in matches.
7175         local first = table.remove(matches, 1)
7176         local last = table.remove(matches, #matches)
7177         -- Non re-fetched substrings may contain \31, which separates
7178         -- subsubstrings.
7179         if string.find(w:sub(first, last-1), Babel.us_char) then break end
7180

```

```

7181     local save_last = last -- with A()BC()D, points to D
7182
7183     -- Fix offsets, from bytes to unicode. Explained above.
7184     first = u.len(w:sub(1, first-1)) + 1
7185     last = u.len(w:sub(1, last-1)) -- now last points to C
7186
7187     -- This loop stores in a small table the nodes
7188     -- corresponding to the pattern. Used by 'data' to provide a
7189     -- predictable behavior with 'insert' (w_nodes is modified on
7190     -- the fly), and also access to 'remove'd nodes.
7191     local sc = first-1 -- Used below, too
7192     local data_nodes = {}
7193
7194     local enabled = true
7195     for q = 1, last-first+1 do
7196         data_nodes[q] = w_nodes[sc+q]
7197         if enabled
7198             and attr > -1
7199             and not node.has_attribute(data_nodes[q], attr)
7200         then
7201             enabled = false
7202         end
7203     end
7204
7205     -- This loop traverses the matched substring and takes the
7206     -- corresponding action stored in the replacement list.
7207     -- sc = the position in substr nodes / string
7208     -- rc = the replacement table index
7209     local rc = 0
7210
7211     ----- TODO. dummy_node?
7212     while rc < last-first+1 or dummy_node do -- for each replacement
7213         if Babel.debug then
7214             print('.....', rc + 1)
7215         end
7216         sc = sc + 1
7217         rc = rc + 1
7218
7219         if Babel.debug then
7220             Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
7221             local ss = ''
7222             for itt in node.traverse(head) do
7223                 if itt.id == 29 then
7224                     ss = ss .. unicode.utf8.char(itt.char)
7225                 else
7226                     ss = ss .. '{' .. itt.id .. '}'
7227                 end
7228             end
7229             print('*****', ss)
7230
7231         end
7232
7233         local crep = r[rc]
7234         local item = w_nodes[sc]
7235         local item_base = item
7236         local placeholder = Babel.us_char
7237         local d
7238
7239         if crep and crep.data then
7240             item_base = data_nodes[crep.data]
7241         end
7242
7243         if crep then

```

```

7244         step = crep.step or step
7245     end
7246
7247     if crep and crep.after then
7248         crep.insert = true
7249         if dummy_node then
7250             item = dummy_node
7251         else -- TODO. if there is a node after?
7252             d = node.copy(item_base)
7253             head, item = node.insert_after(head, item, d)
7254             dummy_node = item
7255         end
7256     end
7257
7258     if crep and not crep.after and dummy_node then
7259         node.remove(head, dummy_node)
7260         dummy_node = nil
7261     end
7262
7263     if (not enabled) or (crep and next(crep) == nil) then -- = {}
7264         if step == 0 then
7265             last_match = save_last    -- Optimization
7266         else
7267             last_match = utf8.offset(w, sc+step)
7268         end
7269         goto next
7270
7271     elseif crep == nil or crep.remove then
7272         node.remove(head, item)
7273         table.remove(w_nodes, sc)
7274         w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
7275         sc = sc - 1 -- Nothing has been inserted.
7276         last_match = utf8.offset(w, sc+1+step)
7277         goto next
7278
7279     elseif crep and crep.kashida then -- Experimental
7280         node.set_attribute(item,
7281             Babel.attr_kashida,
7282             crep.kashida)
7283         last_match = utf8.offset(w, sc+1+step)
7284         goto next
7285
7286     elseif crep and crep.string then
7287         local str = crep.string(matches)
7288         if str == '' then -- Gather with nil
7289             node.remove(head, item)
7290             table.remove(w_nodes, sc)
7291             w = u.sub(w, 1, sc-1) .. u.sub(w, sc+1)
7292             sc = sc - 1 -- Nothing has been inserted.
7293         else
7294             local loop_first = true
7295             for s in string.utfvalues(str) do
7296                 d = node.copy(item_base)
7297                 d.char = s
7298                 if loop_first then
7299                     loop_first = false
7300                     head, new = node.insert_before(head, item, d)
7301                     if sc == 1 then
7302                         word_head = head
7303                     end
7304                     w_nodes[sc] = d
7305                     w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc+1)
7306                 else

```

```

7307         sc = sc + 1
7308         head, new = node.insert_before(head, item, d)
7309         table.insert(w_nodes, sc, new)
7310         w = u.sub(w, 1, sc-1) .. u.char(s) .. u.sub(w, sc)
7311     end
7312     if Babel.debug then
7313         print('.....', 'str')
7314         Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
7315     end
7316     end -- for
7317     node.remove(head, item)
7318 end -- if ''
7319 last_match = utf8.offset(w, sc+1+step)
7320 goto next
7321
7322 elseif mode == 1 and crep and (crep.pre or crep.no or crep.post) then
7323     d = node.new(7, 3) -- (disc, regular)
7324     d.pre = Babel.str_to_nodes(crep.pre, matches, item_base)
7325     d.post = Babel.str_to_nodes(crep.post, matches, item_base)
7326     d.replace = Babel.str_to_nodes(crep.no, matches, item_base)
7327     d.attr = item_base.attr
7328     if crep.pre == nil then -- TeXbook p96
7329         d.penalty = tovalue(crep.penalty) or tex.hyphenpenalty
7330     else
7331         d.penalty = tovalue(crep.penalty) or tex.exhyphenpenalty
7332     end
7333     placeholder = '|'
7334     head, new = node.insert_before(head, item, d)
7335
7336 elseif mode == 0 and crep and (crep.pre or crep.no or crep.post) then
7337     -- ERROR
7338
7339 elseif crep and crep.penalty then
7340     d = node.new(14, 0) -- (penalty, userpenalty)
7341     d.attr = item_base.attr
7342     d.penalty = tovalue(crep.penalty)
7343     head, new = node.insert_before(head, item, d)
7344
7345 elseif crep and crep.space then
7346     -- 655360 = 10 pt = 10 * 65536 sp
7347     d = node.new(12, 13) -- (glue, spaceskip)
7348     local quad = font.getfont(item_base.font).size or 655360
7349     node.setglue(d, tovalue(crep.space[1]) * quad,
7350                 tovalue(crep.space[2]) * quad,
7351                 tovalue(crep.space[3]) * quad)
7352     if mode == 0 then
7353         placeholder = ' '
7354     end
7355     head, new = node.insert_before(head, item, d)
7356
7357 elseif crep and crep.norule then
7358     -- 655360 = 10 pt = 10 * 65536 sp
7359     d = node.new(2, 3) -- (rule, empty) = \no*rule
7360     local quad = font.getfont(item_base.font).size or 655360
7361     d.width = tovalue(crep.norule[1]) * quad
7362     d.height = tovalue(crep.norule[2]) * quad
7363     d.depth = tovalue(crep.norule[3]) * quad
7364     head, new = node.insert_before(head, item, d)
7365
7366 elseif crep and crep.spacefactor then
7367     d = node.new(12, 13) -- (glue, spaceskip)
7368     local base_font = font.getfont(item_base.font)
7369     node.setglue(d,

```

```

7370         tovalue(crep.spacefactor[1]) * base_font.parameters['space'],
7371         tovalue(crep.spacefactor[2]) * base_font.parameters['space_stretch'],
7372         tovalue(crep.spacefactor[3]) * base_font.parameters['space_shrink'])
7373     if mode == 0 then
7374         placeholder = ' '
7375     end
7376     head, new = node.insert_before(head, item, d)
7377
7378 elseif mode == 0 and crep and crep.space then
7379     -- ERROR
7380
7381 elseif crep and crep.kern then
7382     d = node.new(13, 1) -- (kern, user)
7383     local quad = font.getfont(item_base.font).size or 655360
7384     d.attr = item_base.attr
7385     d.kern = tovalue(crep.kern) * quad
7386     head, new = node.insert_before(head, item, d)
7387
7388 elseif crep and crep.node then
7389     d = node.new(crep.node[1], crep.node[2])
7390     d.attr = item_base.attr
7391     head, new = node.insert_before(head, item, d)
7392
7393 end -- ie replacement cases
7394
7395 -- Shared by disc, space(factor), kern, node and penalty.
7396 if sc == 1 then
7397     word_head = head
7398 end
7399 if crep.insert then
7400     w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc)
7401     table.insert(w_nodes, sc, new)
7402     last = last + 1
7403 else
7404     w_nodes[sc] = d
7405     node.remove(head, item)
7406     w = u.sub(w, 1, sc-1) .. placeholder .. u.sub(w, sc+1)
7407 end
7408
7409 last_match = utf8.offset(w, sc+1+step)
7410
7411 ::next::
7412
7413 end -- for each replacement
7414
7415 if Babel.debug then
7416     print('.....', '/')
7417     Babel.debug_hyph(w, w_nodes, sc, first, last, last_match)
7418 end
7419
7420 if dummy_node then
7421     node.remove(head, dummy_node)
7422     dummy_node = nil
7423 end
7424
7425 end -- for match
7426
7427 end -- for patterns
7428
7429 ::next::
7430 word_head = nw
7431 end -- for substring
7432 return head

```

```

7433 end
7434
7435 -- This table stores capture maps, numbered consecutively
7436 Babel.capture_maps = {}
7437
7438 -- The following functions belong to the next macro
7439 function Babel.capture_func(key, cap)
7440   local ret = "[" .. cap:gsub('{{[0-9]}}', "]]..m[%1]..[" .. "]"
7441   local cnt
7442   local u = unicode.utf8
7443   ret, cnt = ret:gsub('{{[0-9]}|(^|)|(.-)}', Babel.capture_func_map)
7444   if cnt == 0 then
7445     ret = u.gsub(ret, '{{(%%X%%X%%X+)}',
7446       function (n)
7447         return u.char(tonumber(n, 16))
7448       end)
7449   end
7450   ret = ret:gsub("%[%[%]%.%", '')
7451   ret = ret:gsub("%.%.%[%[%]%", '')
7452   return key .. "[=function(m) return ]] .. ret .. [[ end]]
7453 end
7454
7455 function Babel.capt_map(from, mapno)
7456   return Babel.capture_maps[mapno][from] or from
7457 end
7458
7459 -- Handle the {n|abc|ABC} syntax in captures
7460 function Babel.capture_func_map(capno, from, to)
7461   local u = unicode.utf8
7462   from = u.gsub(from, '{{(%%X%%X%%X+)}',
7463     function (n)
7464       return u.char(tonumber(n, 16))
7465     end)
7466   to = u.gsub(to, '{{(%%X%%X%%X+)}',
7467     function (n)
7468       return u.char(tonumber(n, 16))
7469     end)
7470   local froms = {}
7471   for s in string.utfcharacters(from) do
7472     table.insert(froms, s)
7473   end
7474   local cnt = 1
7475   table.insert(Babel.capture_maps, {})
7476   local mlen = table.getn(Babel.capture_maps)
7477   for s in string.utfcharacters(to) do
7478     Babel.capture_maps[mlen][froms[cnt]] = s
7479     cnt = cnt + 1
7480   end
7481   return "]]..Babel.capt_map(m[" .. capno .. "], " ..
7482     (mlen) .. " ).. " .. "["
7483 end
7484
7485 -- Create/Extend reversed sorted list of kashida weights:
7486 function Babel.capture_kashida(key, wt)
7487   wt = tonumber(wt)
7488   if Babel.kashida_wts then
7489     for p, q in ipairs(Babel.kashida_wts) do
7490       if wt == q then
7491         break
7492       elseif wt > q then
7493         table.insert(Babel.kashida_wts, p, wt)
7494         break
7495       elseif table.getn(Babel.kashida_wts) == p then

```

```

7496         table.insert(Babel.kashida_wts, wt)
7497     end
7498 end
7499 else
7500     Babel.kashida_wts = { wt }
7501 end
7502 return 'kashida = ' .. wt
7503 end
7504
7505 function Babel.capture_node(id, subtype)
7506     local sbt = 0
7507     for k, v in pairs(node.subtypes(id)) do
7508         if v == subtype then sbt = k end
7509     end
7510     return 'node = {' .. node.id(id) .. ', ' .. sbt .. '}'
7511 end
7512
7513 -- Experimental: applies prehyphenation transforms to a string (letters
7514 -- and spaces).
7515 function Babel.string_prehyphenation(str, locale)
7516     local n, head, last, res
7517     head = node.new(8, 0) -- dummy (hack just to start)
7518     last = head
7519     for s in string.utfvalues(str) do
7520         if s == 20 then
7521             n = node.new(12, 0)
7522         else
7523             n = node.new(29, 0)
7524             n.char = s
7525         end
7526         node.set_attribute(n, Babel.attr_locale, locale)
7527         last.next = n
7528         last = n
7529     end
7530     head = Babel.hyphenate_replace(head, 0)
7531     res = ''
7532     for n in node.traverse(head) do
7533         if n.id == 12 then
7534             res = res .. ' '
7535         elseif n.id == 29 then
7536             res = res .. unicode.utf8.char(n.char)
7537         end
7538     end
7539     tex.print(res)
7540 end
7541 </transforms>

```

10.14 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.

```

7542 (*basic-r)
7543 Babel.bidi_enabled = true
7544
7545 require('babel-data-bidi.lua')
7546
7547 local characters = Babel.characters
7548 local ranges = Babel.ranges
7549
7550 local DIR = node.id("dir")
7551
7552 local function dir_mark(head, from, to, outer)
7553   dir = (outer == 'r') and 'TLT' or 'TRT' -- ie, reverse
7554   local d = node.new(DIR)
7555   d.dir = '+' .. dir
7556   node.insert_before(head, from, d)
7557   d = node.new(DIR)
7558   d.dir = '-' .. dir
7559   node.insert_after(head, to, d)
7560 end
7561
7562 function Babel.bidi(head, ispar)
7563   local first_n, last_n          -- first and last char with nums
7564   local last_es                  -- an auxiliary 'last' used with nums
7565   local first_d, last_d          -- first and last char in L/R block
7566   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):

```

7567   local strong = ('TRT' == tex.pardir) and 'r' or 'l'
7568   local strong_lr = (strong == 'l') and 'l' or 'r'
7569   local outer = strong
7570
7571   local new_dir = false
7572   local first_dir = false
7573   local inmath = false
7574
7575   local last_lr
7576
7577   local type_n = ''
7578

```

```

7579 for item in node.traverse(head) do
7580
7581   -- three cases: glyph, dir, otherwise
7582   if item.id == node.id'glyph'
7583     or (item.id == 7 and item.subtype == 2) then
7584
7585     local itemchar
7586     if item.id == 7 and item.subtype == 2 then
7587       itemchar = item.replace.char
7588     else
7589       itemchar = item.char
7590     end
7591     local chardata = characters[itemchar]
7592     dir = chardata and chardata.d or nil
7593     if not dir then
7594       for nn, et in ipairs(ranges) do
7595         if itemchar < et[1] then
7596           break
7597         elseif itemchar <= et[2] then
7598           dir = et[3]
7599           break
7600         end
7601       end
7602     end
7603     dir = dir or 'l'
7604     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).

```

7605   if new_dir then
7606     attr_dir = 0
7607     for at in node.traverse(item.attr) do
7608       if at.number == Babel.attr_dir then
7609         attr_dir = at.value & 0x3
7610       end
7611     end
7612     if attr_dir == 1 then
7613       strong = 'r'
7614     elseif attr_dir == 2 then
7615       strong = 'al'
7616     else
7617       strong = 'l'
7618     end
7619     strong_lr = (strong == 'l') and 'l' or 'r'
7620     outer = strong_lr
7621     new_dir = false
7622   end
7623
7624   if dir == 'nsm' then dir = strong end -- W1

```

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

```

7625   dir_real = dir -- We need dir_real to set strong below
7626   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:

```

7627   if strong == 'al' then
7628     if dir == 'en' then dir = 'an' end -- W2
7629     if dir == 'et' or dir == 'es' then dir = 'on' end -- W6
7630     strong_lr = 'r' -- W3
7631   end

```

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

```

7632     elseif item.id == node.id'dir' and not inmath then
7633         new_dir = true
7634         dir = nil
7635     elseif item.id == node.id'math' then
7636         inmath = (item.subtype == 0)
7637     else
7638         dir = nil          -- Not a char
7639     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>.

```

7640     if dir == 'en' or dir == 'an' or dir == 'et' then
7641         if dir ~= 'et' then
7642             type_n = dir
7643         end
7644         first_n = first_n or item
7645         last_n = last_es or item
7646         last_es = nil
7647     elseif dir == 'es' and last_n then -- W3+W6
7648         last_es = item
7649     elseif dir == 'cs' then          -- it's right - do nothing
7650     elseif first_n then -- & if dir = any but en, et, an, es, cs, inc nil
7651         if strong_lr == 'r' and type_n ~= '' then
7652             dir_mark(head, first_n, last_n, 'r')
7653         elseif strong_lr == 'l' and first_d and type_n == 'an' then
7654             dir_mark(head, first_n, last_n, 'r')
7655             dir_mark(head, first_d, last_d, outer)
7656             first_d, last_d = nil, nil
7657         elseif strong_lr == 'l' and type_n ~= '' then
7658             last_d = last_n
7659         end
7660         type_n = ''
7661         first_n, last_n = nil, nil
7662     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:

```

7663     if dir == 'l' or dir == 'r' then
7664         if dir ~= outer then
7665             first_d = first_d or item
7666             last_d = item
7667         elseif first_d and dir ~= strong_lr then
7668             dir_mark(head, first_d, last_d, outer)
7669             first_d, last_d = nil, nil
7670         end
7671     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. Numbers in R mode are processed. It should not be done, but it doesn't hurt.

```

7672     if dir and not last_lr and dir ~= 'l' and outer == 'r' then
7673         item.char = characters[item.char] and
7674             characters[item.char].m or item.char
7675     elseif (dir or new_dir) and last_lr ~= item then
7676         local mir = outer .. strong_lr .. (dir or outer)

```

```

7677     if mir == 'rrr' or mir == 'lrr' or mir == 'rrl' or mir == 'rlr' then
7678         for ch in node.traverse(node.next(last_lr)) do
7679             if ch == item then break end
7680             if ch.id == node.id'glyph' and characters[ch.char] then
7681                 ch.char = characters[ch.char].m or ch.char
7682             end
7683         end
7684     end
7685 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).

```

7686     if dir == 'l' or dir == 'r' then
7687         last_lr = item
7688         strong = dir_real          -- Don't search back - best save now
7689         strong_lr = (strong == 'l') and 'l' or 'r'
7690     elseif new_dir then
7691         last_lr = nil
7692     end
7693 end

```

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

```

7694     if last_lr and outer == 'r' then
7695         for ch in node.traverse_id(node.id'glyph', node.next(last_lr)) do
7696             if characters[ch.char] then
7697                 ch.char = characters[ch.char].m or ch.char
7698             end
7699         end
7700     end
7701     if first_n then
7702         dir_mark(head, first_n, last_n, outer)
7703     end
7704     if first_d then
7705         dir_mark(head, first_d, last_d, outer)
7706     end

```

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

```

7707     return node.prev(head) or head
7708 end
7709 </basic-r>

```

And here the Lua code for bidi=basic:

```

7710 <{*basic}
7711 -- eg, Babel.fontmap[1][<prefontid>]=<dirfontid>
7712
7713 Babel.fontmap = Babel.fontmap or {}
7714 Babel.fontmap[0] = {}          -- l
7715 Babel.fontmap[1] = {}          -- r
7716 Babel.fontmap[2] = {}          -- al/an
7717
7718 -- To cancel mirroring. Also OML, OMS, U?
7719 Babel.symbol_fonts = Babel.symbol_fonts or {}
7720 Babel.symbol_fonts[font.id('tenln')] = true
7721 Babel.symbol_fonts[font.id('tenlnw')] = true
7722 Babel.symbol_fonts[font.id('tencirc')] = true
7723 Babel.symbol_fonts[font.id('tencircw')] = true
7724
7725 Babel.bidi_enabled = true
7726 Babel.mirroring_enabled = true
7727
7728 require('babel-data-bidi.lua')
7729
7730 local characters = Babel.characters

```

```

7731 local ranges = Babel.ranges
7732
7733 local DIR = node.id('dir')
7734 local GLYPH = node.id('glyph')
7735
7736 local function insert_implicit(head, state, outer)
7737   local new_state = state
7738   if state.sim and state.eim and state.sim ~= state.eim then
7739     dir = ((outer == 'r') and 'TLT' or 'TRT') -- ie, reverse
7740     local d = node.new(DIR)
7741     d.dir = '+' .. dir
7742     node.insert_before(head, state.sim, d)
7743     local d = node.new(DIR)
7744     d.dir = '-' .. dir
7745     node.insert_after(head, state.eim, d)
7746   end
7747   new_state.sim, new_state.eim = nil, nil
7748   return head, new_state
7749 end
7750
7751 local function insert_numeric(head, state)
7752   local new
7753   local new_state = state
7754   if state.san and state.ean and state.san ~= state.ean then
7755     local d = node.new(DIR)
7756     d.dir = '+TLT'
7757     _, new = node.insert_before(head, state.san, d)
7758     if state.san == state.sim then state.sim = new end
7759     local d = node.new(DIR)
7760     d.dir = '-TLT'
7761     _, new = node.insert_after(head, state.ean, d)
7762     if state.ean == state.eim then state.eim = new end
7763   end
7764   new_state.san, new_state.ean = nil, nil
7765   return head, new_state
7766 end
7767
7768 local function glyph_not_symbol_font(node)
7769   if node.id == GLYPH then
7770     return not Babel.symbol_fonts[node.font]
7771   else
7772     return false
7773   end
7774 end
7775
7776 -- TODO - \hbox with an explicit dir can lead to wrong results
7777 -- <R \hbox dir TLT{<R>}> and <L \hbox dir TRT{<L>}>. A small attempt
7778 -- was made to improve the situation, but the problem is the 3-dir
7779 -- model in babel/Unicode and the 2-dir model in LuaTeX don't fit
7780 -- well.
7781
7782 function Babel.bidi(head, ispar, hdir)
7783   local d -- d is used mainly for computations in a loop
7784   local prev_d = ''
7785   local new_d = false
7786
7787   local nodes = {}
7788   local outer_first = nil
7789   local inmath = false
7790
7791   local glue_d = nil
7792   local glue_i = nil
7793

```

```

7794 local has_en = false
7795 local first_et = nil
7796
7797 local has_hyperlink = false
7798
7799 local ATDIR = Babel.attr_dir
7800 local attr_d
7801
7802 local save_outer
7803 local temp = node.get_attribute(head, ATDIR)
7804 if temp then
7805     temp = temp & 0x3
7806     save_outer = (temp == 0 and 'l') or
7807                 (temp == 1 and 'r') or
7808                 (temp == 2 and 'al')
7809 elseif ispar then -- Or error? Shouldn't happen
7810     save_outer = ('TRT' == tex.pardir) and 'r' or 'l'
7811 else -- Or error? Shouldn't happen
7812     save_outer = ('TRT' == hdir) and 'r' or 'l'
7813 end
7814 -- when the callback is called, we are just _after_ the box,
7815 -- and the textdir is that of the surrounding text
7816 -- if not ispar and hdir ~= tex.textdir then
7817 --     save_outer = ('TRT' == hdir) and 'r' or 'l'
7818 -- end
7819 local outer = save_outer
7820 local last = outer
7821 -- 'al' is only taken into account in the first, current loop
7822 if save_outer == 'al' then save_outer = 'r' end
7823
7824 local fontmap = Babel.fontmap
7825
7826 for item in node.traverse(head) do
7827
7828     -- In what follows, #node is the last (previous) node, because the
7829     -- current one is not added until we start processing the neutrals.
7830
7831     -- three cases: glyph, dir, otherwise
7832     if glyph_not_symbol_font(item)
7833     or (item.id == 7 and item.subtype == 2) then
7834
7835         if node.get_attribute(item, ATDIR) == 128 then goto nextnode end
7836
7837         local d_font = nil
7838         local item_r
7839         if item.id == 7 and item.subtype == 2 then
7840             item_r = item.replace -- automatic discs have just 1 glyph
7841         else
7842             item_r = item
7843         end
7844
7845         local chardata = characters[item_r.char]
7846         d = chardata and chardata.d or nil
7847         if not d or d == 'nsm' then
7848             for nn, et in ipairs(ranges) do
7849                 if item_r.char < et[1] then
7850                     break
7851                 elseif item_r.char <= et[2] then
7852                     if not d then d = et[3]
7853                     elseif d == 'nsm' then d_font = et[3]
7854                     end
7855                     break
7856                 end
7857             end
7858         end
7859     end
7860 end

```

```

7857     end
7858 end
7859 d = d or 'l'
7860
7861 -- A short 'pause' in bidi for mapfont
7862 d_font = d_font or d
7863 d_font = (d_font == 'l' and 0) or
7864           (d_font == 'nsm' and 0) or
7865           (d_font == 'r' and 1) or
7866           (d_font == 'al' and 2) or
7867           (d_font == 'an' and 2) or nil
7868 if d_font and fontmap and fontmap[d_font][item_r.font] then
7869     item_r.font = fontmap[d_font][item_r.font]
7870 end
7871
7872 if new_d then
7873     table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
7874     if inmath then
7875         attr_d = 0
7876     else
7877         attr_d = node.get_attribute(item, ATDIR)
7878         attr_d = attr_d & 0x3
7879     end
7880     if attr_d == 1 then
7881         outer_first = 'r'
7882         last = 'r'
7883     elseif attr_d == 2 then
7884         outer_first = 'r'
7885         last = 'al'
7886     else
7887         outer_first = 'l'
7888         last = 'l'
7889     end
7890     outer = last
7891     has_en = false
7892     first_et = nil
7893     new_d = false
7894 end
7895
7896 if glue_d then
7897     if (d == 'l' and 'l' or 'r') ~= glue_d then
7898         table.insert(nodes, {glue_i, 'on', nil})
7899     end
7900     glue_d = nil
7901     glue_i = nil
7902 end
7903
7904 elseif item.id == DIR then
7905     d = nil
7906
7907     if head ~= item then new_d = true end
7908
7909 elseif item.id == node.id'glue' and item.subtype == 13 then
7910     glue_d = d
7911     glue_i = item
7912     d = nil
7913
7914 elseif item.id == node.id'math' then
7915     inmath = (item.subtype == 0)
7916
7917 elseif item.id == 8 and item.subtype == 19 then
7918     has_hyperlink = true
7919

```

```

7920 else
7921     d = nil
7922 end
7923
7924 -- AL <= EN/ET/ES      -- W2 + W3 + W6
7925 if last == 'al' and d == 'en' then
7926     d = 'an'           -- W3
7927 elseif last == 'al' and (d == 'et' or d == 'es') then
7928     d = 'on'           -- W6
7929 end
7930
7931 -- EN + CS/ES + EN      -- W4
7932 if d == 'en' and #nodes >= 2 then
7933     if (nodes[#nodes][2] == 'es' or nodes[#nodes][2] == 'cs')
7934         and nodes[#nodes-1][2] == 'en' then
7935         nodes[#nodes][2] = 'en'
7936     end
7937 end
7938
7939 -- AN + CS + AN          -- W4 too, because uax9 mixes both cases
7940 if d == 'an' and #nodes >= 2 then
7941     if (nodes[#nodes][2] == 'cs')
7942         and nodes[#nodes-1][2] == 'an' then
7943         nodes[#nodes][2] = 'an'
7944     end
7945 end
7946
7947 -- ET/EN                  -- W5 + W7->l / W6->on
7948 if d == 'et' then
7949     first_et = first_et or (#nodes + 1)
7950 elseif d == 'en' then
7951     has_en = true
7952     first_et = first_et or (#nodes + 1)
7953 elseif first_et then      -- d may be nil here !
7954     if has_en then
7955         if last == 'l' then
7956             temp = 'l'    -- W7
7957         else
7958             temp = 'en'   -- W5
7959         end
7960     else
7961         temp = 'on'      -- W6
7962     end
7963     for e = first_et, #nodes do
7964         if glyph_not_symbol_font(nodes[e][1]) then nodes[e][2] = temp end
7965     end
7966     first_et = nil
7967     has_en = false
7968 end
7969
7970 -- Force mathdir in math if ON (currently works as expected only
7971 -- with 'l')
7972
7973 if inmath and d == 'on' then
7974     d = ('TRT' == tex.mathdir) and 'r' or 'l'
7975 end
7976
7977 if d then
7978     if d == 'al' then
7979         d = 'r'
7980         last = 'al'
7981     elseif d == 'l' or d == 'r' then
7982         last = d

```



```

7983     end
7984     prev_d = d
7985     table.insert(nodes, {item, d, outer_first})
7986 end
7987
7988 node.set_attribute(item, ATDIR, 128)
7989 outer_first = nil
7990
7991 ::nextnode::
7992
7993 end -- for each node
7994
7995 -- TODO -- repeated here in case EN/ET is the last node. Find a
7996 -- better way of doing things:
7997 if first_et then      -- dir may be nil here !
7998     if has_en then
7999         if last == 'l' then
8000             temp = 'l'    -- W7
8001         else
8002             temp = 'en'   -- W5
8003         end
8004     else
8005         temp = 'on'      -- W6
8006     end
8007     for e = first_et, #nodes do
8008         if glyph_not_symbol_font(nodes[e][1]) then nodes[e][2] = temp end
8009     end
8010 end
8011
8012 -- dummy node, to close things
8013 table.insert(nodes, {nil, (outer == 'l') and 'l' or 'r', nil})
8014
8015 ----- NEUTRAL -----
8016
8017 outer = save_outer
8018 last = outer
8019
8020 local first_on = nil
8021
8022 for q = 1, #nodes do
8023     local item
8024
8025     local outer_first = nodes[q][3]
8026     outer = outer_first or outer
8027     last = outer_first or last
8028
8029     local d = nodes[q][2]
8030     if d == 'an' or d == 'en' then d = 'r' end
8031     if d == 'cs' or d == 'et' or d == 'es' then d = 'on' end --- W6
8032
8033     if d == 'on' then
8034         first_on = first_on or q
8035     elseif first_on then
8036         if last == d then
8037             temp = d
8038         else
8039             temp = outer
8040         end
8041         for r = first_on, q - 1 do
8042             nodes[r][2] = temp
8043             item = nodes[r][1]    -- MIRRORING
8044             if Babel.mirroring_enabled and glyph_not_symbol_font(item)
8045                 and temp == 'r' and characters[item.char] then

```

```

8046         local font_mode = ''
8047         if item.font > 0 and font.fonts[item.font].properties then
8048             font_mode = font.fonts[item.font].properties.mode
8049         end
8050         if font_mode ~= 'harf' and font_mode ~= 'plug' then
8051             item.char = characters[item.char].m or item.char
8052         end
8053     end
8054 end
8055 first_on = nil
8056 end
8057
8058 if d == 'r' or d == 'l' then last = d end
8059 end
8060
8061 ----- IMPLICIT, REORDER -----
8062
8063 outer = save_outer
8064 last = outer
8065
8066 local state = {}
8067 state.has_r = false
8068
8069 for q = 1, #nodes do
8070
8071     local item = nodes[q][1]
8072
8073     outer = nodes[q][3] or outer
8074
8075     local d = nodes[q][2]
8076
8077     if d == 'nsm' then d = last end          -- W1
8078     if d == 'en' then d = 'an' end
8079     local isdir = (d == 'r' or d == 'l')
8080
8081     if outer == 'l' and d == 'an' then
8082         state.san = state.san or item
8083         state.ean = item
8084     elseif state.san then
8085         head, state = insert_numeric(head, state)
8086     end
8087
8088     if outer == 'l' then
8089         if d == 'an' or d == 'r' then      -- im -> implicit
8090             if d == 'r' then state.has_r = true end
8091             state.sim = state.sim or item
8092             state.eim = item
8093         elseif d == 'l' and state.sim and state.has_r then
8094             head, state = insert_implicit(head, state, outer)
8095         elseif d == 'l' then
8096             state.sim, state.eim, state.has_r = nil, nil, false
8097         end
8098     else
8099         if d == 'an' or d == 'l' then
8100             if nodes[q][3] then -- nil except after an explicit dir
8101                 state.sim = item -- so we move sim 'inside' the group
8102             else
8103                 state.sim = state.sim or item
8104             end
8105             state.eim = item
8106         elseif d == 'r' and state.sim then
8107             head, state = insert_implicit(head, state, outer)
8108         elseif d == 'r' then

```

```

8109         state.sim, state.eim = nil, nil
8110     end
8111 end
8112
8113 if isdir then
8114     last = d          -- Don't search back - best save now
8115 elseif d == 'on' and state.san then
8116     state.san = state.san or item
8117     state.ean = item
8118 end
8119
8120 end
8121
8122 head = node.prev(head) or head
8123
8124 ----- FIX HYPERLINKS -----
8125
8126 if has_hyperlink then
8127     local flag, linking = 0, 0
8128     for item in node.traverse(head) do
8129         if item.id == DIR then
8130             if item.dir == '+TRT' or item.dir == '+TLT' then
8131                 flag = flag + 1
8132             elseif item.dir == '-TRT' or item.dir == '-TLT' then
8133                 flag = flag - 1
8134             end
8135             elseif item.id == 8 and item.subtype == 19 then
8136                 linking = flag
8137             elseif item.id == 8 and item.subtype == 20 then
8138                 if linking > 0 then
8139                     if item.prev.id == DIR and
8140                         (item.prev.dir == '-TRT' or item.prev.dir == '-TLT') then
8141                         d = node.new(DIR)
8142                         d.dir = item.prev.dir
8143                         node.remove(head, item.prev)
8144                         node.insert_after(head, item, d)
8145                     end
8146                 end
8147                 linking = 0
8148             end
8149         end
8150     end
8151
8152     return head
8153 end
8154 -- Make sure anything is marked as 'bidi done' (including nodes inserted
8155 -- after the babel algorithm).
8156 function Babel.unset_atdir(head)
8157     local ATDIR = Babel.attr_dir
8158     for item in node.traverse(head) do
8159         node.set_attribute(item, ATDIR, 128)
8160     end
8161     return head
8162 end
8163 /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='p o'},
% [0x0028]={c='o p'},
% [0x0029]={c='c p'},
% [0x002B]={c='p r'},
%
```

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.

```
8164 ⟨*nil⟩
8165 \ProvidesLanguage{nil}[<@date@> v<@version@> Nil language]
8166 \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.

```
8167 \ifx\l@nil\undefined
8168   \newlanguage\l@nil
8169   \@namedef{bbl@hyphendata@the\l@nil}{}{}% Remove warning
8170   \let\bbl@elt\relax
8171   \edef\bbl@languages{% Add it to the list of languages
8172     \bbl@languages\bbl@elt{nil}{the\l@nil}{}{}}
8173 \fi
```

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

```
8174 \providehyphenmins{\CurrentOption}{\m@ne\m@ne}
```

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

`\captionnil`
`\datenil`

```
8175 \let\captionnil\@empty
8176 \let\datenil\@empty
```

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

```
8177 \def\bbl@inidata@nil{%
8178   \bbl@elt{identification}{tag.ini}{und}%
8179   \bbl@elt{identification}{load.level}{0}%
8180   \bbl@elt{identification}{charset}{utf8}%
8181   \bbl@elt{identification}{version}{1.0}%
8182   \bbl@elt{identification}{date}{2022-05-16}%
8183   \bbl@elt{identification}{name.local}{nil}%
8184   \bbl@elt{identification}{name.english}{nil}%
8185   \bbl@elt{identification}{name.babel}{nil}%
8186   \bbl@elt{identification}{tag.bcp47}{und}%
8187   \bbl@elt{identification}{language.tag.bcp47}{und}%
8188   \bbl@elt{identification}{tag.opentype}{dflt}%
8189   \bbl@elt{identification}{script.name}{Latin}%
8190   \bbl@elt{identification}{script.tag.bcp47}{Latn}%
8191   \bbl@elt{identification}{script.tag.opentype}{DFLT}%
8192   \bbl@elt{identification}{level}{1}%
8193   \bbl@elt{identification}{encodings}{}%
8194   \bbl@elt{identification}{derivate}{no}}
8195 \@namedef{bbl@tbcp@nil}{und}
8196 \@namedef{bbl@lbcp@nil}{und}
8197 \@namedef{bbl@casing@nil}{und} % TODO
8198 \@namedef{bbl@lotf@nil}{dflt}
```

```

8199 \@namedef{bbl@elname@nil}{nil}
8200 \@namedef{bbl@lname@nil}{nil}
8201 \@namedef{bbl@esname@nil}{Latin}
8202 \@namedef{bbl@sname@nil}{Latin}
8203 \@namedef{bbl@sbcpl@nil}{Latn}
8204 \@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.

```

8205 \ldf@finish{nil}
8206 </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.

```

8207 <<Compute Julian day>> ≡
8208 \def\bbl@fpmmod#1#2{(#1-#2*floor(#1/#2))}
8209 \def\bbl@cs@gregleap#1{%
8210   (\bbl@fpmmod{#1}{4} == 0) &&
8211   (!((\bbl@fpmmod{#1}{100} == 0) && (\bbl@fpmmod{#1}{400} != 0)))}
8212 \def\bbl@cs@jd#1#2#3{% year, month, day
8213   \fp_eval:n{ 1721424.5 + (365 * (#1 - 1)) +
8214     floor((#1 - 1) / 4) + (-floor((#1 - 1) / 100)) +
8215     floor((#1 - 1) / 400) + floor(((367 * #2) - 362) / 12) +
8216     ((#2 <= 2) ? 0 : (\bbl@cs@gregleap{#1} ? -1 : -2)) + #3} }
8217 <</Compute Julian day>>

```

13.1. Islamic

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

```

8218 <ca-islamic>
8219 \ExplSyntaxOn
8220 <@Compute Julian day>
8221 % == islamic (default)
8222 % Not yet implemented
8223 \def\bbl@ca@islamic#1-#2-#3\@#4#5#6{}

```

The Civil calendar.

```

8224 \def\bbl@cs@isltojd#1#2#3{ % year, month, day
8225   ((#3 + ceil(29.5 * (#2 - 1)) +
8226     (#1 - 1) * 354 + floor((3 + (11 * #1)) / 30) +
8227     1948439.5) - 1) }
8228 \@namedef{bbl@ca@islamic-civil++}{\bbl@ca@islamicvl@x{+2}}
8229 \@namedef{bbl@ca@islamic-civil+}{\bbl@ca@islamicvl@x{+1}}
8230 \@namedef{bbl@ca@islamic-civil}{\bbl@ca@islamicvl@x{}}
8231 \@namedef{bbl@ca@islamic-civil-}{\bbl@ca@islamicvl@x{-1}}
8232 \@namedef{bbl@ca@islamic-civil--}{\bbl@ca@islamicvl@x{-2}}
8233 \def\bbl@ca@islamicvl@x#1#2-#3-#4\@#5#6#7{%
8234   \edef\bbl@tempa{%
8235     \fp_eval:n{ floor(\bbl@cs@jd{#2}{#3}{#4})+0.5 #1}}%
8236   \edef#5{%
8237     \fp_eval:n{ floor(((30*(\bbl@tempa-1948439.5)) + 10646)/10631) }}%
8238   \edef#6{\fp_eval:n{
8239     min(12,ceil((\bbl@tempa-(29+\bbl@cs@isltojd{#5}{1}{1}))/29.5)+1) }}%
8240   \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).

```

8241 \def\bbl@cs@umalqura@data{56660, 56690,56719,56749,56778,56808,%
8242 56837,56867,56897,56926,56956,56985,57015,57044,57074,57103,%
8243 57133,57162,57192,57221,57251,57280,57310,57340,57369,57399,%
8244 57429,57458,57487,57517,57546,57576,57605,57634,57664,57694,%
8245 57723,57753,57783,57813,57842,57871,57901,57930,57959,57989,%
8246 58018,58048,58077,58107,58137,58167,58196,58226,58255,58285,%
8247 58314,58343,58373,58402,58432,58461,58491,58521,58551,58580,%
8248 58610,58639,58669,58698,58727,58757,58786,58816,58845,58875,%
8249 58905,58934,58964,58994,59023,59053,59082,59111,59141,59170,%
8250 59200,59229,59259,59288,59318,59348,59377,59407,59436,59466,%
8251 59495,59525,59554,59584,59613,59643,59672,59702,59731,59761,%
8252 59791,59820,59850,59879,59909,59939,59968,59997,60027,60056,%
8253 60086,60115,60145,60174,60204,60234,60264,60293,60323,60352,%
8254 60381,60411,60440,60469,60499,60528,60558,60588,60618,60648,%
8255 60677,60707,60736,60765,60795,60824,60853,60883,60912,60942,%
8256 60972,61002,61031,61061,61090,61120,61149,61179,61208,61237,%
8257 61267,61296,61326,61356,61385,61415,61445,61474,61504,61533,%
8258 61563,61592,61621,61651,61680,61710,61739,61769,61799,61828,%
8259 61858,61888,61917,61947,61976,62006,62035,62064,62094,62123,%
8260 62153,62182,62212,62242,62271,62301,62331,62360,62390,62419,%
8261 62448,62478,62507,62537,62566,62596,62625,62655,62685,62715,%
8262 62744,62774,62803,62832,62862,62891,62921,62950,62980,63009,%
8263 63039,63069,63099,63128,63157,63187,63216,63246,63275,63305,%
8264 63334,63363,63393,63423,63453,63482,63512,63541,63571,63600,%
8265 63630,63659,63689,63718,63747,63777,63807,63836,63866,63895,%
8266 63925,63955,63984,64014,64043,64073,64102,64131,64161,64190,%
8267 64220,64249,64279,64309,64339,64368,64398,64427,64457,64486,%
8268 64515,64545,64574,64603,64633,64663,64692,64722,64752,64782,%
8269 64811,64841,64870,64899,64929,64958,64987,65017,65047,65076,%
8270 65106,65136,65166,65195,65225,65254,65283,65313,65342,65371,%
8271 65401,65431,65460,65490,65520}
8272 \@namedef{bbl@ca@islamic-umalqura+}{\bbl@ca@islamcuqr@x{+1}}
8273 \@namedef{bbl@ca@islamic-umalqura}{\bbl@ca@islamcuqr@x{}}
8274 \@namedef{bbl@ca@islamic-umalqura-}{\bbl@ca@islamcuqr@x{-1}}
8275 \def\bbl@ca@islamcuqr@x#1#2-#3-#4\@#5#6#7{%
8276 \ifnum#2>2014 \ifnum#2<2038
8277 \bbl@afterfi\expandafter\@gobble
8278 \fi\fi
8279 {\bbl@error{year-out-range}{2014-2038}{}}}%
8280 \edef\bbl@tempd{\fp_eval:n{ % (Julian) day
8281 \bbl@cs@jd{#2}{#3}{#4} + 0.5 - 2400000 #1}}%
8282 \count@\@ne
8283 \bbl@foreach\bbl@cs@umalqura@data{%
8284 \advance\count@\@ne
8285 \ifnum##1>\bbl@tempd\else
8286 \edef\bbl@tempe{\the\count@}%
8287 \edef\bbl@tempb{##1}%
8288 \fi}%
8289 \edef\bbl@templ{\fp_eval:n{ \bbl@tempe + 16260 + 949 }}% month-lunar
8290 \edef\bbl@tempa{\fp_eval:n{ floor((\bbl@templ - 1 ) / 12) }}% annus
8291 \edef#5{\fp_eval:n{ \bbl@tempa + 1 }}%
8292 \edef#6{\fp_eval:n{ \bbl@templ - (12 * \bbl@tempa) }}%
8293 \edef#7{\fp_eval:n{ \bbl@tempd - \bbl@tempb + 1 }}%
8294 \ExplSyntaxOff
8295 \bbl@add\bbl@precalendar{%
8296 \bbl@replace\bbl@ld@calendar{-civil}{}}%
8297 \bbl@replace\bbl@ld@calendar{-umalqura}{}}%
8298 \bbl@replace\bbl@ld@calendar{+}{}}%
8299 \bbl@replace\bbl@ld@calendar{-}{}}%
8300 </ca-islamic>

```

13.2. Hebrew

This is basically the set of macros written by Michail Rozman in 1991, with corrections and adaption 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`

```
8301 (*ca-hebrew)
8302 \newcount\bbl@cntcommon
8303 \def\bbl@remainder#1#2#3{%
8304   #3=#1\relax
8305   \divide #3 by #2\relax
8306   \multiply #3 by -#2\relax
8307   \advance #3 by #1\relax}%
8308 \newif\ifbbl@divisible
8309 \def\bbl@checkifdivisible#1#2{%
8310   {\countdef\tmp=0
8311     \bbl@remainder{#1}{#2}{\tmp}%
8312     \ifnum \tmp=0
8313       \global\bbl@divisibletrue
8314     \else
8315       \global\bbl@divisiblefalse
8316     \fi}}
8317 \newif\ifbbl@gregleap
8318 \def\bbl@ifgregleap#1{%
8319   \bbl@checkifdivisible{#1}{4}%
8320   \ifbbl@divisible
8321     \bbl@checkifdivisible{#1}{100}%
8322     \ifbbl@divisible
8323       \bbl@checkifdivisible{#1}{400}%
8324       \ifbbl@divisible
8325         \bbl@gregleaptrue
8326       \else
8327         \bbl@gregleapfalse
8328       \fi
8329     \else
8330       \bbl@gregleaptrue
8331     \fi
8332   \else
8333     \bbl@gregleapfalse
8334   \fi
8335   \ifbbl@gregleap}
8336 \def\bbl@gregdayspriormonths#1#2#3{%
8337   {#3=\ifcase #1 0 \or 0 \or 31 \or 59 \or 90 \or 120 \or 151 \or
8338     181 \or 212 \or 243 \or 273 \or 304 \or 334 \fi
8339   \bbl@ifgregleap{#2}%
8340   \ifnum #1 > 2
8341     \advance #3 by 1
8342   \fi
8343   \fi
8344   \global\bbl@cntcommon=#3}%
8345   #3=\bbl@cntcommon}
8346 \def\bbl@gregdaysprioryears#1#2{%
8347   {\countdef\tmpc=4
8348     \countdef\tmpb=2
8349     \tmpb=#1\relax
8350     \advance \tmpb by -1
8351     \tmpc=\tmpb
8352     \multiply \tmpc by 365
8353     #2=\tmpc
8354     \tmpc=\tmpb
8355     \divide \tmpc by 4
8356     \advance #2 by \tmpc
8357     \tmpc=\tmpb
8358     \divide \tmpc by 100
```

```

8359 \advance #2 by -\tmpc
8360 \tmpc=\tmpb
8361 \divide \tmpc by 400
8362 \advance #2 by \tmpc
8363 \global\bbl@cntcommon=#2\relax}%
8364 #2=\bbl@cntcommon}
8365 \def\bbl@absfromgreg#1#2#3#4{%
8366 {\countdef\tmpd=0
8367 #4=#1\relax
8368 \bbl@gregdayspriormonths{#2}{#3}{\tmpd}%
8369 \advance #4 by \tmpd
8370 \bbl@gregdaysprioryears{#3}{\tmpd}%
8371 \advance #4 by \tmpd
8372 \global\bbl@cntcommon=#4\relax}%
8373 #4=\bbl@cntcommon}
8374 \newif\ifbbl@hebrleap
8375 \def\bbl@checkleaphebryear#1{%
8376 {\countdef\tmpa=0
8377 \countdef\tmpb=1
8378 \tmpa=#1\relax
8379 \multiply \tmpa by 7
8380 \advance \tmpa by 1
8381 \bbl@remainder{\tmpa}{19}{\tmpb}%
8382 \ifnum \tmpb < 7
8383 \global\bbl@hebrleaptrue
8384 \else
8385 \global\bbl@hebrleapfalse
8386 \fi}}
8387 \def\bbl@hebreleapsedmonths#1#2{%
8388 {\countdef\tmpa=0
8389 \countdef\tmpb=1
8390 \countdef\tmpc=2
8391 \tmpa=#1\relax
8392 \advance \tmpa by -1
8393 #2=\tmpa
8394 \divide #2 by 19
8395 \multiply #2 by 235
8396 \bbl@remainder{\tmpa}{19}{\tmpb}% \tmpa=years%19-years this cycle
8397 \tmpc=\tmpb
8398 \multiply \tmpb by 12
8399 \advance #2 by \tmpb
8400 \multiply \tmpc by 7
8401 \advance \tmpc by 1
8402 \divide \tmpc by 19
8403 \advance #2 by \tmpc
8404 \global\bbl@cntcommon=#2}%
8405 #2=\bbl@cntcommon}
8406 \def\bbl@hebreleapseddays#1#2{%
8407 {\countdef\tmpa=0
8408 \countdef\tmpb=1
8409 \countdef\tmpc=2
8410 \bbl@hebreleapsedmonths{#1}{#2}%
8411 \tmpa=#2\relax
8412 \multiply \tmpa by 13753
8413 \advance \tmpa by 5604
8414 \bbl@remainder{\tmpa}{25920}{\tmpc}% \tmpc == ConjunctionParts
8415 \divide \tmpa by 25920
8416 \multiply #2 by 29
8417 \advance #2 by 1
8418 \advance #2 by \tmpa
8419 \bbl@remainder{#2}{7}{\tmpa}%
8420 \ifnum \tmpc < 19440
8421 \ifnum \tmpc < 9924

```



```

8422     \else
8423         \ifnum \tmpa=2
8424             \bbl@checkleaphebrewyear{#1}% of a common year
8425             \ifbbl@hebrleap
8426                 \else
8427                     \advance #2 by 1
8428                 \fi
8429             \fi
8430         \fi
8431     \ifnum \tmpc < 16789
8432     \else
8433         \ifnum \tmpa=1
8434             \advance #1 by -1
8435             \bbl@checkleaphebrewyear{#1}% at the end of leap year
8436             \ifbbl@hebrleap
8437                 \advance #2 by 1
8438             \fi
8439         \fi
8440     \fi
8441 \else
8442     \advance #2 by 1
8443 \fi
8444 \bbl@remainder{#2}{7}{\tmpa}%
8445 \ifnum \tmpa=0
8446     \advance #2 by 1
8447 \else
8448     \ifnum \tmpa=3
8449         \advance #2 by 1
8450     \else
8451         \ifnum \tmpa=5
8452             \advance #2 by 1
8453         \fi
8454     \fi
8455 \fi
8456 \global\bbl@cntcommon=#2\relax}%
8457 #2=\bbl@cntcommon}
8458 \def\bbl@daysinhebrewyear#1#2{%
8459 {\countdef\tmpe=12
8460  \bbl@hebreleapseddays{#1}{\tmpe}%
8461  \advance #1 by 1
8462  \bbl@hebreleapseddays{#1}{#2}%
8463  \advance #2 by -\tmpe
8464  \global\bbl@cntcommon=#2}%
8465  #2=\bbl@cntcommon}
8466 \def\bbl@hebrdayspriormonths#1#2#3{%
8467 {\countdef\tmpf= 14
8468  #3=\ifcase #1\relax
8469      0 \or
8470      0 \or
8471      30 \or
8472      59 \or
8473      89 \or
8474      118 \or
8475      148 \or
8476      148 \or
8477      177 \or
8478      207 \or
8479      236 \or
8480      266 \or
8481      295 \or
8482      325 \or
8483      400
8484  \fi

```

```

8485 \bbl@checkleaphebryear{#2}%
8486 \ifbbl@hebrleap
8487 \ifnum #1 > 6
8488 \advance #3 by 30
8489 \fi
8490 \fi
8491 \bbl@daysinhebryear{#2}{\tmpf}%
8492 \ifnum #1 > 3
8493 \ifnum \tmpf=353
8494 \advance #3 by -1
8495 \fi
8496 \ifnum \tmpf=383
8497 \advance #3 by -1
8498 \fi
8499 \fi
8500 \ifnum #1 > 2
8501 \ifnum \tmpf=355
8502 \advance #3 by 1
8503 \fi
8504 \ifnum \tmpf=385
8505 \advance #3 by 1
8506 \fi
8507 \fi
8508 \global\bbl@cntcommon=#3\relax}%
8509 #3=\bbl@cntcommon}
8510 \def\bbl@absfromhebr#1#2#3#4{%
8511 {#4=#1\relax
8512 \bbl@hebrdayspriormonths{#2}{#3}{#1}%
8513 \advance #4 by #1\relax
8514 \bbl@hebrrelapseddays{#3}{#1}%
8515 \advance #4 by #1\relax
8516 \advance #4 by -1373429
8517 \global\bbl@cntcommon=#4\relax}%
8518 #4=\bbl@cntcommon}
8519 \def\bbl@hebrfromgreg#1#2#3#4#5#6{%
8520 {\countdef\tmpx= 17
8521 \countdef\tmpy= 18
8522 \countdef\tmpz= 19
8523 #6=#3\relax
8524 \global\advance #6 by 3761
8525 \bbl@absfromgreg{#1}{#2}{#3}{#4}%
8526 \tmpz=1 \tmpy=1
8527 \bbl@absfromhebr{\tmpz}{\tmpy}{#6}{\tmpx}%
8528 \ifnum \tmpx > #4\relax
8529 \global\advance #6 by -1
8530 \bbl@absfromhebr{\tmpz}{\tmpy}{#6}{\tmpx}%
8531 \fi
8532 \advance #4 by -\tmpx
8533 \advance #4 by 1
8534 #5=#4\relax
8535 \divide #5 by 30
8536 \loop
8537 \bbl@hebrdayspriormonths{#5}{#6}{\tmpx}%
8538 \ifnum \tmpx < #4\relax
8539 \advance #5 by 1
8540 \tmpy=\tmpx
8541 \repeat
8542 \global\advance #5 by -1
8543 \global\advance #4 by -\tmpy}}
8544 \newcount\bbl@hebrday \newcount\bbl@hebrmonth \newcount\bbl@hebryear
8545 \newcount\bbl@gregday \newcount\bbl@gregmonth \newcount\bbl@gregyear
8546 \def\bbl@ca@hebrew#1-#2-#3\@#4#5#6{%
8547 \bbl@gregday=#3\relax \bbl@gregmonth=#2\relax \bbl@gregyear=#1\relax

```

```

8548 \bbl@hebrfromgreg
8549 {\bbl@gregday}{\bbl@gregmonth}{\bbl@gregyear}%
8550 {\bbl@hebrday}{\bbl@hebrmonth}{\bbl@hebyear}%
8551 \edef#4{\the\bbl@hebyear}%
8552 \edef#5{\the\bbl@hebrmonth}%
8553 \edef#6{\the\bbl@hebrday}%
8554 </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 LPPL 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).

```

8555 <*ca-persian>
8556 \ExplSyntaxOn
8557 <@Compute Julian day@>
8558 \def\bbl@cs@firstjal@xx{2012,2016,2020,2024,2028,2029,% March 20
8559 2032,2033,2036,2037,2040,2041,2044,2045,2048,2049}
8560 \def\bbl@ca@persian#1-#2-#3\@@#4#5#6{%
8561 \edef\bbl@tempa{#1}% 20XX-03-\bbl@tempe = 1 farvardin:
8562 \ifnum\bbl@tempa>2012 \ifnum\bbl@tempa<2051
8563 \bbl@afterfi\expandafter\@gobble
8564 \fi\fi
8565 {\bbl@error{year-out-range}{2013-2050}{}}}%
8566 \bbl@xin@{\bbl@tempa}{\bbl@cs@firstjal@xx}%
8567 \ifin\def\bbl@tempe{20}\else\def\bbl@tempe{21}\fi
8568 \edef\bbl@tempc{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{#2}{#3}+.5}}% current
8569 \edef\bbl@tempb{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{03}{\bbl@tempe}+.5}}% begin
8570 \ifnum\bbl@tempc<\bbl@tempb
8571 \edef\bbl@tempa{\fp_eval:n{\bbl@tempa-1}}% go back 1 year and redo
8572 \bbl@xin@{\bbl@tempa}{\bbl@cs@firstjal@xx}%
8573 \ifin\def\bbl@tempe{20}\else\def\bbl@tempe{21}\fi
8574 \edef\bbl@tempb{\fp_eval:n{\bbl@cs@jd{\bbl@tempa}{03}{\bbl@tempe}+.5}}%
8575 \fi
8576 \edef#4{\fp_eval:n{\bbl@tempa-621}}% set Jalali year
8577 \edef#6{\fp_eval:n{\bbl@tempc-\bbl@tempb+1}}% days from 1 farvardin
8578 \edef#5{\fp_eval:n{% set Jalali month
8579 (#6 <= 186) ? ceil(#6 / 31) : ceil((#6 - 6) / 30)}}
8580 \edef#6{\fp_eval:n{% set Jalali day
8581 (#6 - ((#5 <= 7) ? ((#5 - 1) * 31) : ((#5 - 1) * 30) + 6))}}%
8582 \ExplSyntaxOff
8583 </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.

```

8584 <*ca-coptic>
8585 \ExplSyntaxOn
8586 <@Compute Julian day@>
8587 \def\bbl@ca@coptic#1-#2-#3\@@#4#5#6{%
8588 \edef\bbl@tempd{\fp_eval:n{floor(\bbl@cs@jd{#1}{#2}{#3}) + 0.5}}%
8589 \edef\bbl@tempc{\fp_eval:n{\bbl@tempd - 1825029.5}}%
8590 \edef#4{\fp_eval:n{%
8591 floor((\bbl@tempc - floor((\bbl@tempc+366) / 1461)) / 365) + 1}}%
8592 \edef\bbl@tempc{\fp_eval:n{%
8593 \bbl@tempd - (#4-1) * 365 - floor(#4/4) - 1825029.5}}%
8594 \edef#5{\fp_eval:n{floor(\bbl@tempc / 30) + 1}}%
8595 \edef#6{\fp_eval:n{\bbl@tempc - (#5 - 1) * 30 + 1}}%
8596 \ExplSyntaxOff

```

```

8597 </ca-coptic>
8598 <*ca-ethiopic>
8599 \ExplSyntaxOn
8600 <@Compute Julian day@>
8601 \def\bbl@ca@ethiopic#1-#2-#3\@#4#5#6{%
8602   \edef\bbl@tempd{\fp_eval:n{floor(\bbl@cs@jd{#1}{#2}{#3}) + 0.5}}%
8603   \edef\bbl@tempc{\fp_eval:n{\bbl@tempd - 1724220.5}}%
8604   \edef#4{\fp_eval:n{%
8605     floor((\bbl@tempc - floor((\bbl@tempc+366) / 1461)) / 365) + 1}}%
8606   \edef\bbl@tempc{\fp_eval:n{%
8607     \bbl@tempd - (#4-1) * 365 - floor(#4/4) - 1724220.5}}%
8608   \edef#5{\fp_eval:n{floor(\bbl@tempc / 30) + 1}}%
8609   \edef#6{\fp_eval:n{\bbl@tempc - (#5 - 1) * 30 + 1}}
8610 \ExplSyntaxOff
8611 </ca-ethiopic>

```

13.5. Buddhist

That's very simple.

```

8612 <*ca-buddhist>
8613 \def\bbl@ca@buddhist#1-#2-#3\@#4#5#6{%
8614   \edef#4{\number\numexpr#1+543\relax}%
8615   \edef#5{#2}%
8616   \edef#6{#3}}
8617 </ca-buddhist>
8618 %
8619 % \subsection{Chinese}
8620 %
8621 % Brute force, with the Julian day of first day of each month. The
8622 % table has been computed with the help of \textsf{python-lunardate} by
8623 % Ricky Yeung, GPLv2 (but the code itself has not been used). The range
8624 % is 2015-2044.
8625 %
8626 % \begin{macrocode}
8627 <*ca-chinese>
8628 \ExplSyntaxOn
8629 <@Compute Julian day@>
8630 \def\bbl@ca@chinese#1-#2-#3\@#4#5#6{%
8631   \edef\bbl@tempd{\fp_eval:n{%
8632     \bbl@cs@jd{#1}{#2}{#3} - 2457072.5 }}%
8633   \count@\z@
8634   \@tempcnta=2015
8635   \bbl@foreach\bbl@cs@chinese@data{%
8636     \ifnum##1>\bbl@tempd\else
8637       \advance\count@\@ne
8638       \ifnum\count@>12
8639         \count@\@ne
8640         \advance\@tempcnta\@ne\fi
8641       \bbl@xin@{,##1,}{,\bbl@cs@chinese@leap,}%
8642       \ifin@
8643         \advance\count@\m@ne
8644         \edef\bbl@tempe{\the\numexpr\count@+12\relax}%
8645       \else
8646         \edef\bbl@tempe{\the\count@}%
8647       \fi
8648       \edef\bbl@tempb{##1}%
8649     \fi}%
8650   \edef#4{\the\@tempcnta}%
8651   \edef#5{\bbl@tempe}%
8652   \edef#6{\the\numexpr\bbl@tempd-\bbl@tempb+1\relax}}
8653 \def\bbl@cs@chinese@leap{%
8654   885,1920,2953,3809,4873,5906,6881,7825,8889,9893,10778}
8655 \def\bbl@cs@chinese@data{0,29,59,88,117,147,176,206,236,266,295,325,

```

```

8656 354,384,413,443,472,501,531,560,590,620,649,679,709,738,%
8657 768,797,827,856,885,915,944,974,1003,1033,1063,1093,1122,%
8658 1152,1181,1211,1240,1269,1299,1328,1358,1387,1417,1447,1477,%
8659 1506,1536,1565,1595,1624,1653,1683,1712,1741,1771,1801,1830,%
8660 1860,1890,1920,1949,1979,2008,2037,2067,2096,2126,2155,2185,%
8661 2214,2244,2274,2303,2333,2362,2392,2421,2451,2480,2510,2539,%
8662 2569,2598,2628,2657,2687,2717,2746,2776,2805,2835,2864,2894,%
8663 2923,2953,2982,3011,3041,3071,3100,3130,3160,3189,3219,3248,%
8664 3278,3307,3337,3366,3395,3425,3454,3484,3514,3543,3573,3603,%
8665 3632,3662,3691,3721,3750,3779,3809,3838,3868,3897,3927,3957,%
8666 3987,4016,4046,4075,4105,4134,4163,4193,4222,4251,4281,4311,%
8667 4341,4370,4400,4430,4459,4489,4518,4547,4577,4606,4635,4665,%
8668 4695,4724,4754,4784,4814,4843,4873,4902,4931,4961,4990,5019,%
8669 5049,5079,5108,5138,5168,5197,5227,5256,5286,5315,5345,5374,%
8670 5403,5433,5463,5492,5522,5551,5581,5611,5640,5670,5699,5729,%
8671 5758,5788,5817,5846,5876,5906,5935,5965,5994,6024,6054,6083,%
8672 6113,6142,6172,6201,6231,6260,6289,6319,6348,6378,6408,6437,%
8673 6467,6497,6526,6556,6585,6615,6644,6673,6703,6732,6762,6791,%
8674 6821,6851,6881,6910,6940,6969,6999,7028,7057,7087,7116,7146,%
8675 7175,7205,7235,7264,7294,7324,7353,7383,7412,7441,7471,7500,%
8676 7529,7559,7589,7618,7648,7678,7708,7737,7767,7796,7825,7855,%
8677 7884,7913,7943,7972,8002,8032,8062,8092,8121,8151,8180,8209,%
8678 8239,8268,8297,8327,8356,8386,8416,8446,8475,8505,8534,8564,%
8679 8593,8623,8652,8681,8711,8740,8770,8800,8829,8859,8889,8918,%
8680 8948,8977,9007,9036,9066,9095,9124,9154,9183,9213,9243,9272,%
8681 9302,9331,9361,9391,9420,9450,9479,9508,9538,9567,9597,9626,%
8682 9656,9686,9715,9745,9775,9804,9834,9863,9893,9922,9951,9981,%
8683 10010,10040,10069,10099,10129,10158,10188,10218,10247,10277,%
8684 10306,10335,10365,10394,10423,10453,10483,10512,10542,10572,%
8685 10602,10631,10661,10690,10719,10749,10778,10807,10837,10866,%
8686 10896,10926,10956,10986,11015,11045,11074,11103}
8687 \ExplSyntaxOff
8688 </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 `locallyhyphen.tex` or whatever they like, but they mustn’t diddle with `hyphen.tex` (or `plain.tex` except to preload additional fonts).

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

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

```

8689 <*bplain | blplain>
8690 \catcode`\{=1 % left brace is begin-group character
8691 \catcode`\}=2 % right brace is end-group character
8692 \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).

```

8693 \openin 0 hyphen.cfg
8694 \ifeof0

```

```

8695 \else
8696   \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.

```

8697 \def\input #1 {%
8698   \let\input\a
8699   \a hyphen.cfg
8700   \let\a\undefined
8701 }
8702 \fi
8703 </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`.

```

8704 <bplain>\a plain.tex
8705 <bplain>\a lplain.tex

```

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

```

8706 <bplain>\def\fmtname{babel-plain}
8707 <bplain>\def\fmtname{babel-lplain}

```

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

14.2. Emulating some \LaTeX features

The file `babel.def` expects some definitions made in the $\text{\LaTeX} 2_{\epsilon}$ 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).

```

8708 <<*Emulate LaTeX>> ≡
8709 \def\@empty{}
8710 \def\loadlocalcfg#1{%
8711   \openin0#1.cfg
8712   \ifeof0
8713     \closein0
8714   \else
8715     \closein0
8716     {\immediate\writel6{*****}%
8717      \immediate\writel6{* Local config file #1.cfg used}%
8718      \immediate\writel6{*}%
8719     }
8720   \input #1.cfg\relax
8721 \fi
8722 \@endofldf}

```

14.3. General tools

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

```

8723 \long\def\@firstofone#1{#1}
8724 \long\def\@firstoftwo#1#2{#1}
8725 \long\def\@secondoftwo#1#2{#2}
8726 \def\@nnil{\@nil}
8727 \def\@gobbletwo#1#2{}
8728 \def\@ifstar#1{\@ifnextchar *{\@firstoftwo{#1}}}
8729 \def\@star@@@long#1{%
8730   \@ifstar
8731   {\let\l@ngrel@x\relax#1}%
8732   {\let\l@ngrel@x\long#1}}
8733 \let\l@ngrel@x\relax

```

```

8734 \def\@car#1#2\@nil{#1}
8735 \def\@cdr#1#2\@nil{#2}
8736 \let\@typeset@protect\relax
8737 \let\protected@edef\edef
8738 \long\def\@gobble#1{}
8739 \edef\@backslashchar{\expandafter\@gobble\string\}
8740 \def\strip@prefix#1>{}
8741 \def\g@addto@macro#1#2{%
8742     \toks@\expandafter{#1#2}%
8743     \xdef#1{\the\toks@}}
8744 \def\@namedef#1{\expandafter\def\csname #1\endcsname}
8745 \def\@nameuse#1{\csname #1\endcsname}
8746 \def\@ifundefined#1{%
8747     \expandafter\ifx\csname#1\endcsname\relax
8748     \expandafter\@firstoftwo
8749     \else
8750     \expandafter\@secondoftwo
8751     \fi}
8752 \def\@expandtwoargs#1#2#3{%
8753     \edef\reserved@a{\noexpand#1{#2}{#3}}\reserved@a}
8754 \def\zap@space#1 #2{%
8755     #1%
8756     \ifx#2\@empty\else\expandafter\zap@space\fi
8757     #2}
8758 \let\bbl@trace\@gobble
8759 \def\bbl@error#1{% Implicit #2#3#4
8760     \begingroup
8761         \catcode`\=0 \catcode`\==12 \catcode`\`=12
8762         \catcode`\^M=5 \catcode`\%=14
8763         \input errbabel.def
8764     \endgroup
8765     \bbl@error{#1}}
8766 \def\bbl@warning#1{%
8767     \begingroup
8768         \newlinechar=`^^J
8769         \def\{^^J(babel) }%
8770         \message{\{#1}%
8771     \endgroup}
8772 \let\bbl@infowarn\bbl@warning
8773 \def\bbl@info#1{%
8774     \begingroup
8775         \newlinechar=`^^J
8776         \def\{^^J}%
8777         \wlog{#1}%
8778     \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}`.

```

8779 \ifx\@preamblecmds\undefined
8780     \def\@preamblecmds{}
8781 \fi
8782 \def\@onlypreamble#1{%
8783     \expandafter\gdef\expandafter\@preamblecmds\expandafter{%
8784         \@preamblecmds\do#1}}
8785 \@onlypreamble\@onlypreamble

```

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

```

8786 \def\begindocument{%
8787     \@begindocumenthook
8788     \global\let\@begindocumenthook\@undefined
8789     \def\do##1{\global\let##1\@undefined}%
8790     \@preamblecmds
8791     \global\let\do\noexpand}

```

```

8792 \ifx\@begindocumenthook\undefined
8793   \def\@begindocumenthook{}
8794 \fi
8795 \onlypreamble\@begindocumenthook
8796 \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 `\@endoflfd`.

```

8797 \def\AtEndOfPackage#1{\g@addto@macro\@endoflfd{#1}}
8798 \onlypreamble\AtEndOfPackage
8799 \def\@endoflfd{}
8800 \onlypreamble\@endoflfd
8801 \let\bbl@afterlang\empty
8802 \chardef\bbl@opt@hyphenmap\z@

```

\LaTeX needs to be able to switch off writing to its auxiliary files; plain doesn't have them by default. There is a trick to hide some conditional commands from the outer `\ifx`. The same trick is applied below.

```

8803 \catcode`\&=\z@
8804 \ifx\if@files\undefined
8805   \expandafter\let\csname if@files\expandafter\endcsname
8806     \csname iffalse\endcsname
8807 \fi
8808 \catcode`\&=4

```

Mimic \LaTeX 's commands to define control sequences.

```

8809 \def\newcommand{\@star@or@long\new@command}
8810 \def\new@command#1{%
8811   \@testopt{\@newcommand#1}0}
8812 \def\@newcommand#1[#2]{%
8813   \@ifnextchar [{\@xargdef#1[#2]}%
8814     {\@argdef#1[#2]}}
8815 \long\def\@argdef#1[#2]#3{%
8816   \@yargdef#1\@ne{#2}{#3}}
8817 \long\def\@xargdef#1[#2][#3]#4{%
8818   \expandafter\def\expandafter#1\expandafter{%
8819     \expandafter\@protected@testopt\expandafter #1%
8820     \csname\string#1\expandafter\endcsname{#3}}%
8821   \expandafter\@yargdef \csname\string#1\endcsname
8822   \tw@{#2}{#4}}
8823 \long\def\@yargdef#1#2#3{%
8824   \@tempcnta#3\relax
8825   \advance \@tempcnta \@ne
8826   \let\@hash\relax
8827   \edef\reserved@a{\ifx#2\tw@ [\@hash@1]\fi}%
8828   \@tempcntb #2%
8829   \@whilenum \@tempcntb < \@tempcnta
8830   \do{%
8831     \edef\reserved@a{\reserved@a\@hash@the\@tempcntb}%
8832     \advance \@tempcntb \@ne}%
8833   \let\@hash###%
8834   \l@ngrel@x\expandafter\def\expandafter#1\reserved@a}
8835 \def\providecommand{\@star@or@long\provide@command}
8836 \def\provide@command#1{%
8837   \begingroup
8838     \escapechar\m@ne\xdef\@gtempa{\string#1}%
8839   \endgroup
8840   \expandafter\ifundefined\@gtempa
8841     {\def\reserved@a{\newcommand#1}}%
8842     {\let\reserved@a\relax
8843       \def\reserved@a{\newcommand\reserved@a}}%
8844   \reserved@a}%
8845 \def\DeclareRobustCommand{\@star@or@long\declare@robustcommand}

```



```

8846 \def\declare@robustcommand#1{%
8847   \edef\reserved@a{\string#1}%
8848   \def\reserved@b{#1}%
8849   \edef\reserved@b{\expandafter\strip@prefix\meaning\reserved@b}%
8850   \edef#1{%
8851     \ifx\reserved@a\reserved@b
8852       \noexpand\x@protect
8853       \noexpand#1%
8854     \fi
8855     \noexpand\protect
8856     \expandafter\noexpand\csname
8857       \expandafter@gobble\string#1 \endcsname
8858   }%
8859   \expandafter\new@command\csname
8860     \expandafter@gobble\string#1 \endcsname
8861 }
8862 \def\x@protect#1{%
8863   \ifx\protect\@typeset@protect\else
8864     \@x@protect#1%
8865   \fi
8866 }
8867 \catcode`\&=\z@ % Trick to hide conditionals
8868 \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`.

```

8869 \def\bbl@tempa{\csname newif\endcsname&ifin@}
8870 \catcode`\&=4
8871 \ifx\in@\@undefined
8872   \def\in@#1#2{%
8873     \def\in@@##1##2##3\in@@{%
8874       \ifx\in@@##2\in@false\else\in@true\fi}%
8875     \in@@##1\in@\in@@}
8876 \else
8877   \let\bbl@tempa\@empty
8878 \fi
8879 \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).

```

8880 \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.

```

8881 \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 $\text{\LaTeX} 2_{\epsilon}$ versions; just enough to make things work in plain \TeX environments.

```

8882 \ifx\@tempcnta\@undefined
8883   \csname newcount\endcsname\@tempcnta\relax
8884 \fi
8885 \ifx\@tempcntb\@undefined
8886   \csname newcount\endcsname\@tempcntb\relax
8887 \fi

```

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

```

8888 \ifx\bye\@undefined
8889   \advance\count10 by -2\relax

```

```

8890 \fi
8891 \ifx\@ifnextchar\@undefined
8892   \def\@ifnextchar#1#2#3{%
8893     \let\reserved@d=#1%
8894     \def\reserved@a{#2}\def\reserved@b{#3}%
8895     \futurelet\@let@token\@ifnch}
8896   \def\@ifnch{%
8897     \ifx\@let@token\@sptoken
8898       \let\reserved@c\@xifnch
8899     \else
8900       \ifx\@let@token\reserved@d
8901         \let\reserved@c\reserved@a
8902       \else
8903         \let\reserved@c\reserved@b
8904       \fi
8905     \fi
8906     \reserved@c}
8907   \def\:{\let\@sptoken= } \: % this makes \@sptoken a space token
8908   \def\:{\@xifnch} \expandafter\def\:{\futurelet\@let@token\@ifnch}
8909 \fi
8910 \def\@testopt#1#2{%
8911   \@ifnextchar[#{1}{#1[#2]}}
8912 \def\@protected@testopt#1{%
8913   \ifx\protect\@typeset@protect
8914     \expandafter\@testopt
8915   \else
8916     \@x@protect#1%
8917   \fi}
8918 \long\def\@whilenum#1\do #2{\ifnum #1\relax #2\relax\@iwhilenum{#1\relax
8919   #2\relax}\fi}
8920 \long\def\@iwhilenum#1{\ifnum #1\expandafter\@iwhilenum
8921   \else\expandafter\@gobble\fi{#1}}

```

14.4. Encoding related macros

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

```

8922 \def\DeclareTextCommand{%
8923   \@dec@text@cmd\providecommand
8924 }
8925 \def\ProvideTextCommand{%
8926   \@dec@text@cmd\providecommand
8927 }
8928 \def\DeclareTextSymbol#1#2#3{%
8929   \@dec@text@cmd\chardef#1{#2}#3\relax
8930 }
8931 \def\@dec@text@cmd#1#2#3{%
8932   \expandafter\def\expandafter#2%
8933     \expandafter{%
8934       \csname#3-cmd\expandafter\endcsname
8935       \expandafter#2%
8936       \csname#3\string#2\endcsname
8937     }%
8938 %   \let\@ifdefinable\@rc@ifdefinable
8939   \expandafter#1\csname#3\string#2\endcsname
8940 }
8941 \def\@current@cmd#1{%
8942   \ifx\protect\@typeset@protect\else
8943     \noexpand#1\expandafter\@gobble
8944   \fi
8945 }
8946 \def\@changed@cmd#1#2{%
8947   \ifx\protect\@typeset@protect
8948     \expandafter\ifx\csname\cf@encoding\string#1\endcsname\relax

```

```

8949         \expandafter\ifx\csname ?\string#1\endcsname\relax
8950         \expandafter\def\csname ?\string#1\endcsname{%
8951             \@changed@x@err{#1}%
8952         }%
8953     \fi
8954     \global\expandafter\let
8955         \csname\cf@encoding\string#1\expandafter\endcsname
8956         \csname ?\string#1\endcsname
8957 \fi
8958 \csname\cf@encoding\string#1%
8959 \expandafter\endcsname
8960 \else
8961     \noexpand#1%
8962 \fi
8963 }
8964 \def\@changed@x@err#1{%
8965     \errhelp{Your command will be ignored, type <return> to proceed}%
8966     \errmessage{Command \protect#1 undefined in encoding \cf@encoding}}
8967 \def\DeclareTextCommandDefault#1{%
8968     \DeclareTextCommand#1?%
8969 }
8970 \def\ProvideTextCommandDefault#1{%
8971     \ProvideTextCommand#1?%
8972 }
8973 \expandafter\let\csname OT1-cmd\endcsname\@current@cmd
8974 \expandafter\let\csname?-cmd\endcsname\@changed@cmd
8975 \def\DeclareTextAccent#1#2#3{%
8976     \DeclareTextCommand#1{#2}[1]{\accent#3 ##1}
8977 }
8978 \def\DeclareTextCompositeCommand#1#2#3#4{%
8979     \expandafter\let\expandafter\reserved@a\csname#2\string#1\endcsname
8980     \edef\reserved@b{\string##1}%
8981     \edef\reserved@c{%
8982         \expandafter\@strip@args\meaning\reserved@a:-\@strip@args}%
8983     \ifx\reserved@b\reserved@c
8984         \expandafter\expandafter\expandafter\ifx
8985             \expandafter\@car\reserved@a\relax\relax\@nil
8986             \@text@composite
8987     \else
8988         \edef\reserved@b##1{%
8989             \def\expandafter\noexpand
8990                 \csname#2\string#1\endcsname###1{%
8991                 \noexpand\@text@composite
8992                 \expandafter\noexpand\csname#2\string#1\endcsname
8993                 ###1\noexpand\@empty\noexpand\@text@composite
8994                 {##1}%
8995             }%
8996         }%
8997         \expandafter\reserved@b\expandafter{\reserved@a{##1}}%
8998     \fi
8999     \expandafter\def\csname\expandafter\string\csname
9000         #2\endcsname\string#1-\string#3\endcsname{#4}
9001 \else
9002     \errhelp{Your command will be ignored, type <return> to proceed}%
9003     \errmessage{\string\DeclareTextCompositeCommand\space used on
9004         inappropriate command \protect#1}
9005 \fi
9006 }
9007 \def\@text@composite#1#2#3\@text@composite{%
9008     \expandafter\@text@composite@x
9009     \csname\string#1-\string#2\endcsname
9010 }
9011 \def\@text@composite@x#1#2{%

```

```

9012 \ifx#1\relax
9013     #2%
9014 \else
9015     #1%
9016 \fi
9017 }
9018 %
9019 \def\@strip@args#1:#2-#3\@strip@args{#2}
9020 \def\DeclareTextComposite#1#2#3#4{%
9021     \def\reserved@a{\DeclareTextCompositeCommand#1{#2}{#3}}%
9022     \bgroup
9023         \lccode\@=#4%
9024         \lowercase{%
9025     \egroup
9026     \reserved@a @%
9027     }%
9028 }
9029 %
9030 \def\UseTextSymbol#1#2{#2}
9031 \def\UseTextAccent#1#2#3{}
9032 \def\@use@text@encoding#1{}
9033 \def\DeclareTextSymbolDefault#1#2{%
9034     \DeclareTextCommandDefault#1{\UseTextSymbol{#2}#1}%
9035 }
9036 \def\DeclareTextAccentDefault#1#2{%
9037     \DeclareTextCommandDefault#1{\UseTextAccent{#2}#1}%
9038 }
9039 \def\cf@encoding{OT1}

```

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

```

9040 \DeclareTextAccent{"}{OT1}{127}
9041 \DeclareTextAccent{'}{OT1}{19}
9042 \DeclareTextAccent{^}{OT1}{94}
9043 \DeclareTextAccent{\`}{OT1}{18}
9044 \DeclareTextAccent{\~}{OT1}{126}

```

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

```

9045 \DeclareTextSymbol{\textquotedblleft}{OT1}{92}
9046 \DeclareTextSymbol{\textquotedblright}{OT1}{`\"}
9047 \DeclareTextSymbol{\textquoteleft}{OT1}{``}
9048 \DeclareTextSymbol{\textquoteright}{OT1}{``'}
9049 \DeclareTextSymbol{\i}{OT1}{16}
9050 \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`.

```

9051 \ifx\scriptsize\undefined
9052     \let\scriptsize\sevenrm
9053 \fi

```

And a few more “dummy” definitions.

```

9054 \def\language{english}%
9055 \let\bbl@opt@shorthands\@nnil
9056 \def\bbl@ifshorthand#1#2#3{#2}%
9057 \let\bbl@language@opts\@empty
9058 \let\bbl@ensureinfo\gobble
9059 \let\bbl@provide@locale\relax
9060 \ifx\babeloptionstrings\undefined
9061     \let\bbl@opt@strings\@nnil
9062 \else
9063     \let\bbl@opt@strings\babeloptionstrings
9064 \fi
9065 \def\BabelStringsDefault{generic}

```

```

9066 \def\bbl@tempa{normal}
9067 \ifx\babeloptionmath\bbl@tempa
9068 \def\bbl@mathnormal{\noexpand\textormath}
9069 \fi
9070 \def\AfterBabelLanguage#1#2{}
9071 \ifx\BabelModifiers\undefined\let\BabelModifiers\relax\fi
9072 \let\bbl@afterlang\relax
9073 \def\bbl@opt@safe{BR}
9074 \ifx\@uclclist\undefined\let\@uclclist\@empty\fi
9075 \ifx\bbl@trace\undefined\def\bbl@trace#1{}\fi
9076 \expandafter\newif\csname ifbbl@single\endcsname
9077 \chardef\bbl@bidimode\z@
9078 <</Emulate LaTeX>>

```

A proxy file:

```

9079 <*\plain>
9080 \input babel.def
9081 </\plain>

```

15. Acknowledgements

In the initial stages of the development of babel, Bernd Raichle provided many helpful suggestions and Michel Goossens supplied contributions for many languages. Ideas from Nico Poppelier, Piet van Oostrum and many others have been used. Paul Wackers and Werenfried Spit helped find and repair bugs.

More recently, there are significant contributions by Salim Bou, Ulrike Fischer, Loren Davis and Udi Fogiel.

There are also many contributors for specific languages, which are mentioned in the respective files. Without them, babel just wouldn't exist.

References

- [1] Huda Smitshuijzen Abifares, *Arabic Typography*, Saqi, 2001.
- [2] Johannes Braams, Victor Eijkhout and Nico Poppelier, *The development of national \LaTeX styles*, *TUGboat* 10 (1989) #3, p. 401–406.
- [3] Yannis Haralambous, *Fonts & Encodings*, O'Reilly, 2007.
- [4] Donald E. Knuth, *The \TeX book*, Addison-Wesley, 1986.
- [5] Jukka K. Korpela, *Unicode Explained*, O'Reilly, 2006.
- [6] Leslie Lamport, *\LaTeX , A document preparation System*, Addison-Wesley, 1986.
- [7] Leslie Lamport, in: \TeX hax Digest, Volume 89, #13, 17 February 1989.
- [8] Ken Lunde, *CJKV Information Processing*, O'Reilly, 2nd ed., 2009.
- [9] Edward M. Reingold and Nachum Dershowitz, *Calendrical Calculations: The Ultimate Edition*, Cambridge University Press, 2018.
- [10] Hubert Partl, *German \TeX* , *TUGboat* 9 (1988) #1, p. 70–72.
- [11] Joachim Schrod, *International \LaTeX is ready to use*, *TUGboat* 11 (1990) #1, p. 87–90.
- [12] Apostolos Syropoulos, Antonis Tsolomitis and Nick Sofroniu, *Digital typography using \LaTeX* , Springer, 2002, p. 301–373.
- [13] K.F. Treebus. *Tekstwijzer, een gids voor het grafisch verwerken van tekst*, SDU Uitgeverij ('s-Gravenhage, 1988).