Hyphenation languages in LuaT\TeX\ 0.90

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In LuaT\TeX\ you can define up to 16,383 separate languages, and words can be up to 256 characters long. The language is stored with each character. You can set \texttt{\firstvalidlanguage} (a new variable) to, for instance, 1 and thereby make language 0 an ignored hyphenation language. Because the language is stored in the glyph nodes this is an efficient way to disable hyphenation locally.

The new primitive \texttt{\hyphenationmin} can be set to specify the minimum length of a word considered for hyphenation. This value is stored with the (current) language and applies to the whole paragraph. Because \texttt{\lefthyphenmin} and \texttt{\righthyphenmin} are stored with the glyphs you can temporarily change them. The \texttt{\uchyph} value is also saved in the actual nodes, therefore its handling is different from \TeX\82: changes to \texttt{\uchyph} become effective immediately, not at the end of the current partial paragraph.

LuaT\TeX\ now uses the new language-specific variables \texttt{\prehyphenchar} and \texttt{\posthyphenchar} when creating implicit discretionaries, instead of \TeX\82’s \texttt{\hyphenchar}, and new variables \texttt{\preexhyphenchar} and \texttt{\postexhyphenchar} (also language-specific) for explicit discretionaries, instead of \TeX\82’s empty discretionary.

Typeset boxes now always have their language information embedded in the nodes themselves, so there is no longer a dependency on the surrounding language settings. In \TeX\82, a mid-paragraph statement like \texttt{\unhbox0} would process the box using the current paragraph language unless there was a \texttt{\setlanguage} issued inside the box. In LuaT\TeX\ all language variables are already frozen.

In traditional \TeX, hyphenation is driven by the so-called \texttt{\lccode} table. In LuaT\TeX\ we made this dependency less strong. Several strategies are possible. When you do nothing, the currently-used \texttt{\lccode}s are still the default when loading patterns, setting exceptions or hyphenating a list.

When you set \texttt{\savinghyphcodes} to a value larger than zero the current set of \texttt{\lccode}s will be saved with the language but in a dedicated namespace reflecting hyphenation-justification codes. In this case changing a \texttt{\lccode} afterwards has no effect. Instead of \texttt{\lccode} you can use \texttt{\hjcode}. These are per-language and when set take precedence over the shared \texttt{\lccode}s. So, LuaT\TeX\ doesn’t store \texttt{\lccode}s per language but has a dedicated hyphenation-justification code instead. You can change these values at any time with \texttt{\hjcode}=‘a’.

This change is global which makes sense if you keep in mind that the moment when hyphenation happens is (normally) when the paragraph or a horizontal box is constructed. If \texttt{\savinghyphcodes} was zero when the language was initialized you start out with nothing, otherwise you already have a set. Beware: the \texttt{\hjcode} values are always saved in the format, independent of the value of \texttt{\savinghyphcodes} when the format is dumped.

The value of the two counters related to hyphenation, \texttt{\hyphenpenalty} and \texttt{\exhyphenpenalty}, are now stored in the discretionary nodes. This permits a local overload when explicit \texttt{\discretionary} commands are used. The implementation is downward compatible but permits control for special situations.

MetaPost arrowhead variants

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Some colleagues have complained that the arrowheads in MetaPost graphics are too blunt, and that they would like to see a more stylish arrowhead. Perhaps they do not appreciate how MetaPost produces arrowheads that actually follow a curved path? Still, we realized that one can easily modify the arrowhead macro to produce variants to satisfy everyone while remaining simple and elegant.

We settled on a backwards-compatible solution of adding two new global, internal variables to the existing \texttt{ahlength} and \texttt{ahangle}: \texttt{ahvariant} and \texttt{ahdimple}. With the default \texttt{ahvariant}=0, one gets the traditional MetaPost arrowhead. A non-zero value will give a more stylized arrowhead that uses the value of \texttt{ahdimple}, a unitless fraction of \texttt{ahlength}, by default 0.2, to create a dimple at the base. The \texttt{ahvariant}=1 uses \ldots{} to give a rounded dimple or “ear” and \texttt{ahvariant}=2 uses -- to create a barb. Finally, a sort of “broadhead” can be produced by making \texttt{ahdimple} negative. (We also made an efficiency change in PDF drawing that leads to an improvement when drawing arrowheads.)

This change is now part of MetaFun and Con-
\TeX\xt and can be easily included as MetaPost macros. Examples follow (scaled for \texttt{TUGboat}).