The luatex package

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Abstract

This package manages the new and extended features and resources that
LuaTEX provides. Examples are attributes and catcode tables.

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*Please report any issues at https://github.com/ho-tex/oberdiek/issues
1 Documentation

1.1 Introduction

\TeX{} provides global resources such as registers. But it does not provide an interface for managing these resources. For example, two packages want to use a counter register. If they take the same register number, then the use of both packages will conflict and they cannot be used together. Therefore formats such as plain \TeX{} or \LaTeX{} implement an allocation scheme for registers. A package reserves with \texttt{\newcount} an unused register number for its own exclusive use.

Nowadays \TeX{} is not alone anymore: \varepsilon-\TeX{}, pdf\TeX{} and other compilers for \TeX{} are developed that extend and add new features and resources. Now Lua\TeX{} has reached beta state. It inherits most of pdf\TeX{}’s features including \varepsilon-\TeX{}. Also it implements new concepts such as attributes or catcode tables.

1.1.1 \LaTeX{}

\LaTeX{} is frozen and therefore refuses to even notice the new \TeX{} variants. Not even the old \varepsilon-\TeX{} is supported by its kernel. At least there is a third party package \texttt{etex} that manages the new \varepsilon-\TeX{} resources.

This package tries to do the same for Lua\TeX{} and starts to support at least a few of the new features.

1.1.2 plain \TeX{}

\paket{} has inherited its resource handling from plain \TeX{}. The interface is basically the same: \texttt{\newcount}, \ldots. Therefore this package tries to follow this tradition by providing compatibility to plain \TeX{}. It can be loaded with plain \TeX{} and defines at least some of the features that this packages provides for \paket{}.
1.2 Register allocation

1.2.1 Register with 16 bit

Because LuaTeX is a super set of \texttt{\varepsilon-\TeX} regarding registers, the register allocation scheme should not conflict with package \texttt{etex}. Therefore this package is loaded to inherit its allocation scheme. The only change is currently that the limit is increased to 65536 registers for the following register classes:

- count
- dimen
- skip
- muskip
- marks
- toks
- box

This affects the number of global and local registers. Because it is done in a package and not in the kernel, it is possible that someone loads package \texttt{etex} before uses the local allocation variants. This will prevent the extension for this register class. If more registers are needed, just load package \texttt{luatex} earlier.

1.2.2 Insertions

Insertions need four registers \texttt{\textbackslash count}, \texttt{\textbackslash dimen}, \texttt{\textbackslash skip}, and \texttt{\textbackslash box} with the same number. Usually they are allocated downwards from 254, 253, \ldots Also \texttt{\textbackslash newcount}, \texttt{\textbackslash newdimen}, \texttt{\textbackslash newskip}, and \texttt{\textbackslash newbox} are replaced by their global variants (\texttt{\textbackslash globcount}, ...) that use the higher numbers immediately, leaving the room for insertions. Therefore \texttt{\textbackslash newcount}, \texttt{\textbackslash newdimen}, \texttt{\textbackslash newskip}, and \texttt{\textbackslash newbox} are replaced by their global variants (\texttt{\textbackslash globcount}, ...) that use the higher numbers immediately, leaving the room for insertions. When this occurs, no insertions can be allocated anymore.

Nodes can have custom attributes in LuaTeX. These attributes are organized by a new register class. As the other registers up to $2^{16}$ attributes are supported. An attribute value can be negative that means the attribute is not set. Otherwise \TeX’s range of non-negative integers up to $2^{31}$ (the upper limit is the same as for other \TeX integer numbers).

\begin{verbatim}
\newattribute {⟨cmd⟩}

Macro \texttt{\newattribute} defines command \texttt{⟨cmd⟩} using \texttt{\attributedef} using an new attribute number. The new attribute is initially unset.
\end{verbatim}

\begin{verbatim}
\setAttribute {⟨cmd⟩} {⟨value⟩}

Macro \texttt{\setAttribute} locally sets attribute command \texttt{⟨cmd⟩} to the number \texttt{⟨value⟩}. Valid values range from −1 until $2^{31}$ (the upper limit is the same as for other \TeX integer numbers).
\end{verbatim}

\begin{verbatim}
\unsetattribute {⟨cmd⟩}

Macro \texttt{\unsetattribute} clears the attribute command \texttt{⟨cmd⟩}.
\end{verbatim}
1.4 Catcode tables

LuaTEX introduces catcode tables as new feature, see documentation. There is need for discussion, how to deal best:

- \initcatcodetable and \setcatcodetable act globally.
- \catcodetable causes an error if used with an uninitialized catcode table.
- Large catcode table numbers should be avoided because of performance breakdown.
- Use case INTEX package: The package must not be surprised by changed catcodes and must not surprise by changing catcodes accidently. Catcode tables could offer a solution. At the begin a catcode regime with standard catcodes is established and the old one is restored afterwards.
- Use case: LuaTEX’s \text{tex.print} might be used with a catcode table number, for example a table where all entries have catcode “other”.
- Readonly catcode tables.
- Is there is a need for local allocations? (Package etex’s \doc variants are not used in \TeX\ Live 2007.)

1.4.1 Interface proposal

The idea: \newcatcodetable allocates odd numbered catcode tables. Even numbered tables are managed as stack. Also some catcode tables are defined. These must not be changed.

\newcatcodetable \{⟨cmd⟩\}

Macro \newcatcodetable reserves a new catcode table and remembers its number in \{⟨cmd⟩\}. The catcode table is initialized with ini-\TeX’s catcodes.

\CatcodeTableIniTeX
\CatcodeTableString
\CatcodeTableOther
\CatcodeTableLaTeX

These are catcode tables and must not be changed. \CatcodeTableIniTeX contains the catcode settings of ini-\TeX. \CatcodeTableString follows \TeX’s convention of \text{string}, \text{meaning} and friends. The space gets catcode 10 (space), the other characters have catcode 12 (other). In \CatcodeTableOther all entries have catcode 12 (other). \CatcodeTableLaTeX contains the setting of a pure \LaTeX format (‘at’ is other).

\CatcodeTableStack
\IncCatcodeTableStack
\DecCatcodeTableStack

\CatcodeTableStack is the stack pointer. Initially it is catcode table zero. \IncCatcodeTableStack and \DecCatcodeTableStack increments and decrements the stack pointer. Currently \IncCatcodeTableStack does not initialize a new catcode table. Both increment and decrement operations do not set a catcode table.
It can be handy to have a global stack for catcode table numbers to deal with the
global assignment property of \initcatcodetable and \savecatcodetable. \PushCatcodeTableNumStack pushes the current catcode table on the stack. \PopCatcodeTableNumStack pops the topmost number off the number stack to set
the current catcode table. Catcode table zero is used in case of an empty stack.

\BeginCatcodeRegime {\catcodetable}
\EndCatcodeRegime

\BeginCatcodeRegime remembers the current catcode table number. Then it cre-
ates and uses a fresh catcode table on the stack that is initialized by \catcodetable:

\PushCatcodeTableNumStack
\catcodetable\IncCatcodeTableStack
\savecatcodetable\CatcodeTableStack
\catcodetable\CatcodeTableStack

\EndCatcodeRegime drops the catcode table, created by \BeginCatcodeRegime
and sets the catcode table that was active before:

\DecCatcodeTableStack
\PopCatcodeTableNumStack

These macros solve the use case, described earlier for a \LaTeX{} package:

% package foobar.sty
\BeginCatcodeRegime\CatcodeTableLaTeX
\makeatletter
% ... package contents ...
\EndCatcodeRegime
% end of package

If the package wants to change catcodes after its loading, \AtBeginDocument or
\AtEndOfPackage can be used.

\SetCatcodeRange {\langle from\rangle} {\langle to\rangle} {\langle catcode\rangle}

The catcodes of characters in range from \langle from\rangle to inclusive \langle to\rangle are set to
\langle catcode\rangle.

1.5 Lua module loading

Currently Lua\TeX{} (version 0.20) does not support Lua script files inside \texttt{TDS:scripts//},
because Lua’s mechanism for module loading does not use the \texttt{kpathsea} library.
Therefore this packages appends a kpse loader to the list of Lua’s module loaders.
It finds the module \langle module\rangle by

kpse.find_file(\langle module\rangle.lua", "texmfscripts")

Unhappily \texttt{kpathsea} does not support directory components in a file name. There-
fore the Lua convention is not followed to replace dots in the module name by the
directory separator.

Example: A Lua script of a package foobar wants the following modules:

require("foobar.hello.world")
require("org.somewhere.xyz")

Then they can be find in:
I would have preferred the following locations, following lua conventions, e.g.:

```
TDS:scripts/foobar/hello/world.lua
TDS:scripts/foobar/org/somewhere/xyz.lua
```

But I do not know, how to achieve this in a reliable way using kpathsea.

### 1.5.1 Package luatex-loader

If someone do not need or want package luatex but it’s extension for module loading, then he can use package luatex-loader. Both plain \TeX\ and \LaTeX\ are supported.

## 2 Implementation

### 2.1 Reload check and package identification

Reload check, especially if the package is not used with \LaTeX.

```
\begingroup\catcode61\catcode48\catcode32=10\relax%
\catcode13=5 % ^^M
% \endlinechar=13 %
\catcode35=6 % #
\catcode39=12 % '
\catcode44=12 % ,
\catcode45=12 % -
\catcode46=12 % .
\catcode58=12 % :
\catcode64=11 % @
\catcode123=1 % {
\catcode125=2 % }
\expandafter\let\expandafter\x\csname ver@luatex.sty\endcsname
\ifx\x\relax % plain-TeX, first loading
\else
\def\empty{}
\ifx\empty % LaTeX, first loading, % variable is initialized, but \ProvidesPackage not yet seen
\else
\expandafter\ifx\csname PackageInfo\endcsname\relax
\def\x#1#2{%
\immediate\write-1{Package \string#1 Info: \string#2.}%
}%
\else
\expandafter\ifx\csname PackageInfo\endcsname\relax
\def\x#1#2{%
\immediate\write-1{Package \string#1 Info: \string#2, stopped}%
}%
\else
\expandafter\ifx\csname PackageInfo\endcsname\relax
\def\x#1#2{%
\immediate\write-1{Package \string#1 Info: \string#2}%
}%
\else
\expandafter\ifx\csname PackageInfo\endcsname\relax
\def\x#1#2{%
\immediate\write-1{Package \string#1 Info: \string#2, stopped}%
}%
\else
\fi
\fi
(\luatex){The package is already loaded}%
\aftergroup\endinput%
\endgroup%
```

Package identification:
\begin{verbatim}
\catcode44=12 \%
\catcode45=12 \%
\catcode46=12 \%
\catcode47=12 \%
\catcode58=12 \%
\catcode64=11 \%
\catcode91=12 \%
\catcode93=12 \%
\catcode123=1 \%
\expandafter\ifx\csname ProvidesPackage\endcsname\relax
  \def\x#1#2#3[#4]{\endgroup
    \immediate\write-1{Package: #3 #4}\
    \xdef#1{#4}\
  }\
\else
  \def\x#1#2[#3]{\endgroup
    #2[{#3}]\
    \ifx#1\@undefined
      \xdef#1{#3}\
    \fi
    \ifx#1\relax
      \xdef#1{#3}\
    \fi
  }\
\fi
\expandafter\x\csname ver@luatex.sty\endcsname
\ProvidesPackage{luatex}[
2016/05/16 v0.6 LuaTeX basic definition package (HO)]
\end{verbatim}

2.2 Catcodes

\begin{verbatim}
\begin{group}
  \catcode61=10\relax
  \catcode13=5 \%
  \catcode123=1 \%
  \def\x\endgroup
  \expandafter\edef\csname LuT@AtEnd\endcsname{\
    \catcode61=10\relax
    \catcode13=5 \%
    \catcode123=1 \%
  }
\end{group}
\end{verbatim}

\begin{verbatim}
\end{verbatim}

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2.3 Check for LuaTeX

Without LuaTeX there is no point in using this package.

\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname RequirePackage\endcsname\relax
\input infwarerr.sty\relax
\input ifluatex.sty\relax
\else
\RequirePackage{infwarerr}[2007/09/09]%
\RequirePackage{ifluatex}[2009/04/10]%
\fi
\ifluatex
\else
\@PackageError{luatex}{This package may only be run using LuaTeX}%
\@ehc
\expandafter\LuT@AtEnd
\fi%

2.4 Provide LuaTeX primitives

\ifnum\luatexversion<36 %
\def\LuT@MakePrimitive#1{%
\expandafter\let\csname luatex#1\expandafter\endcsname\endcsname
\csname #1\endcsname
}%
\else
\def\LuT@MakeLuatexPrimitive#1{%
\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname luatex#1\endcsname\relax
\begin{group}\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname #1\endcsname\relax
\else
\expandafter\let\csname luatex#1\expandafter\endcsname\csname #1\endcsname
\fi
\end{group}
\expandafter\ifx\csname luatex#1\endcsname\relax
\fi
\fi
\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname luatex#1\endcsname\relax
\fi
\fi
2.5 Inherit support for \textsf{\LaTeX} \euro-\textsf{TEX}\n
Package \texttt{etex} is not compatible for plain \LaTeX. But it could be present if a format is used that is based on \texttt{etex.src}. Therefore we only load the package in case of \texttt{\LaTeX} and tests its presence independently of the format by looking for \texttt{\et@xins}.
2.6 Adaption of $\varepsilon$-\TeX’s register allocation

$\varepsilon$-\TeX\ has increased the number of \TeX\ registers from $2^8$ (256) to $2^{15}$ (32768) for a register class. Lua\TeX\ extends the limit further to $2^4$ (65536). The allocation scheme of package etex is not changed. But this can be subject for discussion.

If a register class hasn’t registered any local registers yet, then the limit can safely be pushed to 65536.

$\varepsilon$-\TeX\ uses an array for the first 256 registers and then a tree structure. Lua\TeX\ stores all registers of a class in one Lua table. There shouldn’t be large performance differences. This allows starting immediately in the extended area, leaving room for insertions.

2.7 plain \TeX\ compatibility

\empty
\texttt{\textbackslash LuT@newcommand}

\begin{verbatim}
\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname newcommand\endcsname\relax
\def\LuT@newcommand#1[#2]#3{%
  \ifx#1\@undefined
  \let#1\relax
  \else
  \ifx#1\relax
  \else
    \@PackageError{luatex}{\string#1 is already defined.\MessageBreak
    Redefinition is skipped}\@ehc
  \fi
  \fi
  \ifx#1\relax
  \ifcase#2 %
    \def#1{#3}%
  \or
    \def#1##1{#3}%
  \or
    \def#1##1##2{#3}%
  \or
    \def#1##1##2##3{#3}%
  \or
    \@INTERNAL@ERROR
  \fi
  \fi
}%
\else
\def\LuT@newcommand\newcommand*% 
\fi
\fi
\end{verbatim}

2.8 Attributes

2.8.1 Allocation

\texttt{\textbackslash LuT@AllocAttribute}

\begin{verbatim}
\newcount\LuT@AllocAttribute
\LuT@AllocAttribute=\m@ne

\newattribute
\expandafter\ifx\csname newattribute\endcsname\@undefined
\LuT@newcommand\newattribute[1]{%
  \ifnum\LuT@AllocAttribute<65535 %
    \global\advance\LuT@AllocAttribute\@one
    \allocationnumber\LuT@AllocAttribute\one
    \unsetattribute{#1}%
    \wlog{\string#1=\string\attribute\the\allocationnumber}%
  \else
    \errmessage{No room for a new \string\attribute}%
  \fi
}%
\else
\def\LuT@newcommand{\newcommand*}%
\fi
\end{verbatim}

2.8.2 Interface

\texttt{\textbackslash setattribute}

\begin{verbatim}
\expandafter\ifx\csname setattribute\endcsname\@undefined
\LuT@newcommand\setattribute[2]{%
  #1=\numexpr#2\relax
}%
\else
\def\LuT@newcommand{\newcommand*}%
\fi
\end{verbatim}
\unsetattribute
\ifx\unsetattribute\@undefined
\ifnum\luatexversion<37
\LuT@newcommand\LuT@UnsetAttributeValue[0]{}%
\let\LuT@UnsetAttributeValue\m@ne
\else
\LuT@newcommand\LuT@UnsetAttributeValue[0]{-2147483647 }%
\fi
\fi
\LuT@newcommand\unsetattribute[1]{% #1=\LuT@UnsetAttributeValue
}\fi

2.9 Catcode tables

2.9.1 Allocation

\LuT@AllocCatcodeTable
\newcount\LuT@AllocCatcodeTable
\LuT@AllocCatcodeTable=\m@ne
\newcount\CatcodeTableStack
\CatcodeTableStack=\z@

\newcatcodetable
\ifx\newcatcodetable\@undefined
\LuT@newcommand\newcatcodetable[1]{% #1=\LuT@AllocCatcodeTable
\ifnum\LuT@AllocCatcodeTable<1114110 % 0x10FFFF is maximal \chardef
\% or < 268435455 % 2^28 - 1
\global\advance\LuT@AllocCatcodeTable by\tw@
\allocationnumber=\LuT@AllocCatcodeTable
\global\chardef#1=\allocationnumber
\wlog{\% #1=\string\catcodetable\the\allocationnumber
\}%
\else
\errmessage{No room for a new \string\catcodetable}%
\fi
}\fi

\IncCatcodeTableStack
\LuT@newcommand\IncCatcodeTableStack[0]{%
\ifnum\CatcodeTableStack<268435454 %
\global\advance\CatcodeTableStack by\tw@
\else
\@PackageError{luatex}{Catcode table stack overflow%}
\@ehd
\fi
}

\DecCatcodeTableStack
\LuT@newcommand\DecCatcodeTableStack[0]{%
\ifnum\CatcodeTableStack<268435454 %
\global\advance\CatcodeTableStack by-2 %
\else
\@PackageError{luatex}{Catcode table stack is empty%}
\@ehd
\}
2.9.2 \SetCatcodeRange

\SetCatcodeRange
\edef\LuT@temp{\noexpand\@tempcnta=\the\@tempcnta}
\edef\LuT@tempb=\the\@tempcntb
\edef\count@=\the\count@
\relax
\@tempcnta=\numexpr#1\relax
\@tempcntb=\numexpr#2\relax
\count@=\numexpr#3\relax
\loop
\unless\ifnum\@tempcnta>\@tempcntb
\catcode\@tempcnta=\count@
\advance\@tempcnta by \@ne
\repeat
\relax
}\fi
}

2.9.3 Predefined catcode tables

\newcatcodetable\CatcodeTableIniTeX
\newcatcodetable\CatcodeTableString
\newcatcodetable\CatcodeTableOther
\newcatcodetable\CatcodeTableLaTeX
\luatexinitcatcodetable\CatcodeTableIniTeX
\begingroup
\def\@makeother#1{\catcode#1=12\relax}\
\@firstofone{%}
\luatexcatcodetable\CatcodeTableIniTeX
\begingroup
\SetCatcodeRange{0}{8}{15}
\catcode9=10 % tab
\catcode11=15 %
\catcode12=13 % form feed
\SetCatcodeRange{14}{31}{15}
\catcode35=6 % hash
\catcode36=3 % dollar
\catcode38=4 % ampersand
\catcode94=7 % circumflex
\catcode95=8 % underscore
\catcode123=1 % brace left
\catcode125=2 % brace right
\catcode126=13 % tilde
\catcode127=15 %
\luatexsavecatcodetable\CatcodeTableLaTeX
\@makeother{32}% space
\luatexsavecatcodetable\CatcodeTableString
\@makeother{0}% nul
\@makeother{13}% carriage return
\@makeother{37}% percent
\@makeother{92}% backslash
\@makeother{127}%
\SetCatcodeRange{65}{90}{12}% A-Z
\SetCatcodeRange{97}{122}{12}% a-z
\luatexsavecatcodetable\CatcodeTableOther
\endgroup
\@makeother{0}% nul
\@makeother{13}% carriage return
\@makeother{37}% percent
\@makeother{92}% backslash
\@makeother{127}%
\SetCatcodeRange{65}{90}{12}% A-Z
\SetCatcodeRange{97}{122}{12}% a-z
\luatexsavecatcodetable\CatcodeTableString
\@makeother{32}% space
\luatexsavecatcodetable\CatcodeTableOther
2.9.4 Number stack

\LuT@NumStackEmpty

A special empty stack value because of \@cdr’s brace removal.

\def\LuT@NumStackEmpty{0}

\LuT@NumStack

\let\LuT@NumStack\LuT@NumStackEmpty

\PushCatcodeTableNumStack

\LuT@newcommand\PushCatcodeTableNumStack[0]{%
\xdef\LuT@NumStack{%
{\the\luatexcatcodetable}\LuT@NumStack%
}%
}

\PopCatcodeTableNumStack

\LuT@newcommand\PopCatcodeTableNumStack[0]{%
\ifx\LuT@NumStack\LuT@NumStackEmpty
\@PackageWarning{luatex}{Empty catcode table number stack}%
\luatexcatcodetable\z@
\else
\luatexcatcodetable=\expandafter\@car\LuT@NumStack@nil\relax
\xdef\LuT@NumStack{%
\expandafter\@cdr\LuT@NumStack@nil%
}\fi
%
}

2.9.5 Catcode regime macros

\BeginCatcodeRegime

\LuT@newcommand\BeginCatcodeRegime[1]{%
\PushCatcodeTableNumStack
\luatexcatcodetable=\numexpr#1\relax
\IncCatcodeTableStack
\luatexsavecatcodetable\CatcodeTableStack
\luatexcatcodetable\CatcodeTableStack
}

\EndCatcodeRegime

\LuT@newcommand\EndCatcodeRegime[0]{%
\DecCatcodeTableStack
\PopCatcodeTableNumStack
}

2.10 Lua module loader

\begingroup\expandafter\expandafter\expandafter\endgroup
\expandafter\ifx\csname RequirePackage\endcsname\relax
\input luatex-loader.sty\relax
\else
\RequirePackage{luatex-loader}[2010/03/09]\fi
\LuT@AtEnd%
\endgroup\catcode61\catcode48\catcode32=10\relax%

Reload check, especially if the package is not used with \LaTeX.
CurrentlyLuaTEX does not use KPSE when searching for module files. The following Lua script implements a workaround. It extends package.loader by another search method. Modules are found by the module name with extension .lua similar to

kpsewhich --format=texmfscripts (module).lua

Unhappily kpsewhich does not support directory components in the file name. Therefore a module a.b.c cannot be installed as a/b/c.lua. The script must be named a.b.c.lua.

module("oberdiek.luatem", package.seeall)

function kpse_module_loader(module)
local script = module .. ".lua"
local file = kpse.find_file(script, "texmfscripts")
if file then
  texio.write_nl("(" .. file .. ")")
dofile(file)
else
  error("File `" .. script .. "' not found")
end
end

2.11 Lua script
return loader
end
return "\n\t[oberdiek.luatex.kpse_module_loader] Loading error:"
.. error
end
return "\n\t[oberdiek.luatex.kpse_module_loader] Search failed"
end

following line changed to use package.searchers instead of package.loaders for current luatex; this is the only change in the code. eroux, 28apr13, (or package.loaders), 29mar14.

table.insert(package.searchers or package.loaders, kpse_module_loader)

(/lua)

3 Test

(*test2)
\documentclass{article}
\def\LoadCommand{%
\RequirePackage{luatex}\[2010/03/09]%
}
(*test2)

(*test3)
\documentclass{article}
\def\LoadCommand{%
\RequirePackage{luatex-loader}\[2010/03/09]%
}
(*test3)

3.1 Catcode checks for loading

(*test1)
\catcode\{=1 %
\catcode\} =2 %
\catcode\#=6 %
\catcode\@ =11 %
\expandafter\ifx\csname count@\endcsname\relax
\countdef\count@=255 %
\fi
\expandafter\ifx\csname @gobble\endcsname\relax
\long\def\@gobble#1{}%
\fi
\expandafter\ifx\csname @firstofone\endcsname\relax
\long\def\@firstofone#1{#1}%
\fi
\expandafter\if\csname loop\endcsname\relax
\let\next\iterate
\else
\let\next\relax
\fi
{\def\loop#1\repeat{%
\def\body{#1}%
\iterate
}%
\def\iterate{%
\body
\let\next\iterate
\else
\let\next\relax
\fi

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\let\repeat=\fi\%\edef\RestoreCatcodes{\RestoreCatcodes\catcode\the\count@=\the\catcode\count@\relax\}%\ifnum\count@<255 \advance\count@ 1 \repeat\edef\RangeCatcodeInvalid#1#2{\count@=#1\relax\loop\catcode\count@=15 \ifnum\count@<#2\relax\advance\count@ 1 \repeat}\def\RangeCatcodeCheck#1#2#3{\count@=#1\relax\loop\ifnum#3=\catcode\count@\else\message{Character \the\count@ with wrong catcode \the\catcode\count@ instead of \number#3}\fi\ifnum\count@<#2\relax\advance\count@ 1 \repeat}\space{ }\expandafter\ifx\csname LoadCommand\endcsname\relax\def\LoadCommand{\input luatex.sty\relax}\fi\edef\Test{%\RangeCatcodeInvalid{0}{47}\RangeCatcodeInvalid{58}{64}\RangeCatcodeInvalid{91}{96}\RangeCatcodeInvalid{123}{255}\catcode`\@=12 \catcode`\%=14 \catcode`\&=15 \catcode`\^=0 \catcode`\_=14 \LoadCommand \RangeCatcodeCheck{0}{36}{15}\RangeCatcodeCheck{37}{37}{14}\RangeCatcodeCheck{48}{57}{12}\RangeCatcodeCheck{58}{63}{15}\RangeCatcodeCheck{64}{64}{12}\RangeCatcodeCheck{65}{90}{11}\RangeCatcodeCheck{91}{91}{15}\RangeCatcodeCheck{92}{92}{0}\RangeCatcodeCheck{93}{96}{15}\RangeCatcodeCheck{97}{122}{11}
3.2 Catcode tables

3.2.1 Predefined catcode tables

Remember \LaTeX{}'s initial catcodes in count registers starting at \TestLaTeX.  
\count0=0 \%
\chardef\TestLaTeX=1000 \%
\chardef\TestMax=300 \%
\loop
\count\numexpr\TestLaTeX+\count0\relax=\catcode\count0 \%
\ifnum\count0<\TestMax
\advance\count0 by 1 \%
\repeat
\documentclass{minimal}
\usepackage{luatex}[2010/03/09]
\usepackage{qstest}
\IncludeTests{*}
\LogTests{log}{*}{*}
\makeatletter
\def\Check#1{\Expect*{\the\count@=\the\catcode\count@}*
\the\count@=#1}
\newcount\scratch
\def\Test#1#2{\begin{qstest}{CatcodeTable#1}{CatcodeTable#1}
\luatexcatcodetable\csname CatcodeTable#1\endcsname
\count@=\z@ \loop
\scratch=#2 \relax \Expect*{\the\count@=\the\catcode\count@}
*{\the\count@=\the\scratch}\ifnum\count@<\TestMax
\advance\count@ by 1 \repeat
\end{qstest}}
\begingroup
% luatex-unicode-letters.tex makes some slots to letters
\def\TestMax{169}\%
\Test{LaTeX}{\the\count\numexpr\TestLaTeX+\count0}\%
\Test{String}{\ifnum\count@=32 10\else 12\fi}
\Test{Other}{12}
\luatexinitcatcodetable99 \%
\Test{IniTeX}{0}\relax \begingroup
\luatexcatcodetable99 \%
\global\scratch=\the\catcode\count@ \%
\endgroup
\endgroup
\endgroup
\endgroup
\end{qstest}
3.2.2 Catcode table number stack

\begin{qstest}{CatcodeTableNumStack}{CatcodeTableNumStack}
\def\TestStack#1{%
  \Expect*{\LuT@NumStack}{#1}%
}%
\TestStack{0}%
\PushCatcodeTableNumStack
\TestStack{{0}0}%
@firstofone{
  \begingroup
  \luatexinitcatcodetable12 %
  \luatexcatcodetable12 %
  \PushCatcodeTableNumStack
  \TestStack{(12){0}0}%
  \PopCatcodeTableNumStack
  \PushCatcodeTableNumStack
  \TestStack{{12}{0}0}%
  \PopCatcodeTableNumStack
  \TestStack{{0}0}%
  \PopCatcodeTableNumStack
  \TestStack{0}%
  \def\TestWarning{Missing empty stack warning}%
  \def\@PackageWarning#1#2{\def\TestWarning{empty stack}}%
  \PopCatcodeTableNumStack
  \TestStack{0}%
  \Expect*{\TestWarning}{empty stack}%
  \endgroup
}%
\end{qstest}

3.2.3 Catcode table stack

\begin{qstest}{CatcodeTableStack}{CatcodeTableStack}
\def\TestStack#1{%
  \Expect*{the\CatcodeTableStack}{#1}%
}%
\TestStack{0}%
\IncCatcodeTableStack
\TestStack{2}%
\IncCatcodeTableStack
\TestStack{4}%
\begingroup
  \IncCatcodeTableStack
  \TestStack{6}%
  \endgroup
\TestStack{6}%
\begingroup
  \DecCatcodeTableStack
  \TestStack{4}%
  \endgroup
\DecCatcodeTableStack
\TestStack{2}%
\DecCatcodeTableStack
\TestStack{0}%
\begingroup
  \DecCatcodeTableStack
  \TestStack{6}%
  \endgroup
\DecCatcodeTableStack
\TestStack{6}%
\begingroup
  \DecCatcodeTableStack
  \TestStack{4}%
  \endgroup
\DecCatcodeTableStack
\TestStack{2}%
\DecCatcodeTableStack
\TestStack{0}%
\begingroup
  \DecCatcodeTableStack
  \TestStack{6}%
  \endgroup
\DecCatcodeTableStack
\TestStack{6}%
\begingroup
  \DecCatcodeTableStack
  \TestStack{4}%
  \endgroup
\DecCatcodeTableStack
\TestStack{2}%
\DecCatcodeTableStack
\TestStack{0}%
\begingroup
  \DecCatcodeTableStack
  \TestStack{6}%
  \endgroup
\DecCatcodeTableStack
\TestStack{6}%
\begingroup
  \DecCatcodeTableStack
  \TestStack{4}%
  \endgroup
\DecCatcodeTableStack
\TestStack{2}%
\DecCatcodeTableStack
\TestStack{0}%
\begingroup
  \DecCatcodeTableStack
  \TestStack{6}%
  \endgroup
\DecCatcodeTableStack
\TestStack{6}%
\begin{qstest}{CatcodeTableStack}{CatcodeTableStack}
\end{qstest}
3.2.4 Catcode regime macros

\begin{qstest}{CatcodeRegime}{CatcodeRegime}
\def\TestStacks#1#2#3{% 
  \Expect*{\the\luatextcatcodetable}{#1}%
  \Expect*{\the\CatcodeTableStack}{#2}%
  \Expect*{\LuT@NumStack}{#3}%
}%
\TestStacks{0}{0}{0}%
\catcode`|=7 %
\BeginCatcodeRegime\CatcodeTableLaTeX
\TestStacks{2}{2}{{0}0}%
\Expect*{\the\catcode`|}{12}%
\EndCatcodeRegime
\TestStacks{0}{0}{0}%
\Expect*{\the\catcode`|}{7}%
\end{qstest}

3.3 Attribute allocation

\begin{qstest}{Attributes}{Attributes}
\newattribute\TestAttr
\Expect*{\meaning\TestAttr}*
  \string\attribute\number\allocationnumber%
\Expect*{\the\allocationnumber}{0}%
\begingroup
\newattribute\TestAttr
\Expect*{\the\allocationnumber}{1}%
\endgroup
\Expect*{\the\allocationnumber}{0}%
\Expect*{\meaning\TestAttr}*
  \string\attribute\number\LuT@UnsetAttributeValue%
\def\Test#1{%
  \setattribute\TestAttr{#1}%
\Expect*{\the\TestAttr}{\number\LuT@UnsetAttributeValue}%
}%
\Test{0}%
\Test{1}%
\Test{-1}%
\Test{123}%
\unsetattribute\TestAttr
\Expect*{\the\TestAttr}*
  \number\LuT@UnsetAttributeValue%
\begingroup
\Expect*{\the\TestAttr}*
  \number\LuT@UnsetAttributeValue%
\Test{1234}%
\endgroup
\Expect*{\the\TestAttr}*
  \number\LuT@UnsetAttributeValue%
\end{qstest}

\@end

3.4 Short test for plain \TeX

\begin{test5}
\input luatex.sty\relax
\newattribute\TestAttr
\setattribute\TestAttr{10}
\unsetattribute\TestAttr
\newcatcodetable\TestCTa
\begingroup
\SetCatcodeRange{`A}{`Z}{12}%
\endgroup
\BeginCatcodeRegime\CatcodeTableLaTeX
\EndCatcodeRegime

\end{test4}
4 Installation

4.1 Download

Package. This package is available on CTAN:\footnote{http://ctan.org/pkg/luatex}

\texttt{CTAN:macros/latex/contrib/oberdiek/luatex.dtx} The source file.

Bundle. All the packages of the bundle ‘oberdiek’ are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

\texttt{CTAN:install/macros/latex/contrib/oberdiek.tds.zip}

TDS refers to the standard “A Directory Structure for \TeX\ Files” (\texttt{CTAN:tds/tds.pdf}). Directories with \texttt{texmf} in their name are usually organized this way.

4.2 Bundle installation

Unpacking. Unpack the \texttt{oberdiek.tds.zip} in the TDS tree (also known as \texttt{texmf} tree) of your choice. Example (linux):

\begin{verbatim}
unzip oberdiek.tds.zip -d ~/texmf
\end{verbatim}

Script installation. Check the directory \texttt{TDS:scripts/oberdiek/} for scripts that need further installation steps. Package \texttt{attachfile2} comes with the Perl script \texttt{pdfatfi.pl} that should be installed in such a way that it can be called as \texttt{pdfatfi}. Example (linux):

\begin{verbatim}
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
\end{verbatim}

4.3 Package installation

Unpacking. The \texttt{.dtx} file is a self-extracting \texttt{docstrip} archive. The files are extracted by running the \texttt{.dtx} through plain \TeX:

\texttt{tex luatex.dtx}

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as \texttt{texmf} tree):

\begin{verbatim}
luatex.sty \rightarrow \text{tex/generic/oberdiek/luatex.sty}
luatex-loader.sty \rightarrow \text{tex/generic/oberdiek/luatex-loader.sty}
oberdiek.luatex.lua \rightarrow \text{scripts/oberdiek/oberdiek.luatex.lua}
luatex.pdf \rightarrow \text{doc/latex/oberdiek/luatex.pdf}
test/luatex-test1.tex \rightarrow \text{doc/latex/oberdiek/test/luatex-test1.tex}
test/luatex-test2.tex \rightarrow \text{doc/latex/oberdiek/test/luatex-test2.tex}
test/luatex-test3.tex \rightarrow \text{doc/latex/oberdiek/test/luatex-test3.tex}
test/luatex-test4.tex \rightarrow \text{doc/latex/oberdiek/test/luatex-test4.tex}
test/luatex-test5.tex \rightarrow \text{doc/latex/oberdiek/test/luatex-test5.tex}
luatex.dtx \rightarrow \text{source/latex/oberdiek/luatex.dtx}
\end{verbatim}

If you have a \texttt{docstrip.cfg} that configures and enables \texttt{docstrip}'s TDS installing feature, then some files can already be in the right place; see the documentation of \texttt{docstrip}.
4.4 Refresh file name databases

If your \TeX\ distribution (\TeX\, \LaTeX, \ldots) relies on file name databases, you must refresh these. For example, \TeX\ users run `texhash` or `mktexlsr`.

4.5 Some details for the interested

**Unpacking with \LaTeX**. The `.dtx` chooses its action depending on the format:

- **\TeX**: Run `docstrip` and extract the files.
- **\LaTeX**: Generate the documentation.

If you insist on using \LaTeX\ for `docstrip` (really, `docstrip` does not need \LaTeX\), then inform the autodetect routine about your intention:

```latex
\texttt{latex \backslash \textbackslash \textbackslash \textbackslash install=y \input{luatex.dtx}}
```

Do not forget to quote the argument according to the demands of your shell.

**Generating the documentation.** You can use both the `.dtx` or the `.drv` to generate the documentation. The process can be configured by the configuration file `ltxdoc.cfg`. For instance, put this line into this file, if you want to have A4 as paper format:

```latex
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdf\LaTeX:\

```latex
pdflatex luatex.dtx
makeindex -s gind.ist luatex.idx
pdflatex luatex.dtx
makeindex -s gind.ist luatex.idx
pdflatex luatex.dtx
```

5 Catalogue

The following XML file can be used as source for the \TeX\ Catalogue. The elements `caption` and `description` are imported from the original XML file from the Catalogue. The name of the XML file in the Catalogue is `luatex.xml`.

```xml
<?xml version='1.0' encoding='us-ascii'?>
<!DOCTYPE entry SYSTEM 'catalogue.dtd'>
<entry datestamp='$Date$' modifier='$Author$' id='luatex'>
  <name>luatex</name>
  <caption>The \LaTeX\ engine.</caption>
  <authorref id='auth:oberdiek'/>
  <copyright owner='Heiko Oberdiek' year='2007,2009,2010'/>
  <license type='lppl1.3'/>
  <version number='0.6'/>
  <description>
  \LaTeX\ is an extended version of \pdf\TeX\ using Lua as an embedded scripting language. The \LaTeX\ project\&#x2019;s main objective is to provide an open and configurable variant of \TeX\ while at the same time offering downward compatibility.
  \LaTeX\ uses Unicode (as UTF-8) as its default input encoding, and is able to use modern (OpenType) fonts (for both text and mathematics).
  It should be noted that \LaTeX\ is still under development; its specification has been declared stable, but absolute stability may not in practice be assumed.
  \end{description}
</entry>
```

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6 History

[2007/12/12 v0.1]

• First public version.

[2009/04/10 v0.2]

• Requires package ifluatex in version 2.0 to ensure \luatexversion.
• Updates the call of \directlua, the syntax has changed in Lua\TeX 0.36.

[2009/12/02 v0.3]

• Unsetting of attributes updated for Lua\TeX 0.37.

[2010/03/09 v0.4]

• Support for lua states removed.
• Calling tex.enableprimitives for used primitives.

[2016/05/10 v0.5]

• Use package.searchers
• only conditionally define commands such as \newcatcodetable that are now defined in the Lua\TeX format.

[2016/05/16 v0.6]

• Documentation updates.

7 Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

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