

# The `luatex` package

Heiko Oberdiek\*

<heiko.oberdiek at googlemail.com>

2019/07/25 v0.7

## Abstract

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

## Contents

|          |   |          |
|----------|---|----------|
| <b>1</b> | <b>Documentation</b>  | <b>2</b> |
| 1.1      | Introduction . . . . .                                      | 2        |
| 1.1.1    | LaTeX . . . . .   | 2        |
| 1.1.2    | plain TeX . . . . .   | 2        |
| 1.2      | Register allocation . . . . .                               | 3        |
| 1.2.1    | Register with 16 bit . . . . .                              | 3        |
| 1.2.2    | Insertions . . . . .  | 3        |
| 1.3      | Attributes . . . . .  | 3        |
| 1.4      | Catcode tables . . . . .                                    | 4        |
| 1.4.1    | Interface proposal . . . . .                                | 4        |
| 1.5      | Lua module loading . . . . .                                | 5        |
| 1.5.1    | Package <code>luatex-loader</code> . . . . .                | 6        |
| <b>2</b> | <b>Implementation</b>                                       | <b>6</b> |
| 2.1      | Reload check and package identification . . . . .           | 6        |
| 2.2      | Catcodes . . . . .  | 7        |
| 2.3      | Check for LuaTeX . . . . .                                  | 8        |
| 2.4      | Provide LuaTeX primitives . . . . .                         | 8        |
| 2.5      | Inherit support for $\epsilon$ -TeX . . . . .               | 9        |
| 2.6      | Adaption of $\epsilon$ -TeX's register allocation . . . . . | 10       |
| 2.7      | plain TeX compatibility . . . . .                           | 10       |
| 2.8      | Attributes . . . . .  | 12       |
| 2.8.1    | Allocation . . . . .  | 12       |
| 2.8.2    | Interface . . . . .   | 12       |
| 2.9      | Catcode tables . . . . .                                    | 13       |
| 2.9.1    | Allocation . . . . .  | 13       |
| 2.9.2    | <code>\SetCatcodeRange</code> . . . . .                     | 14       |
| 2.9.3    | Predefined catcode tables . . . . .                         | 14       |
| 2.9.4    | Number stack . . . . .                                      | 15       |
| 2.9.5    | Catcode regime macros . . . . .                             | 15       |
| 2.10     | Lua module loader . . . . .                                 | 15       |
| 2.11     | Lua script . . . . .  | 17       |

---

\*Please report any issues at <https://github.com/ho-tex/oberdiek/issues>

|                   |                                       |           |
|-------------------|---------------------------------------|-----------|
| <b>3</b>          | <b>Test</b>                           | <b>18</b> |
| 3.1               | Catcode checks for loading            | 18        |
| 3.2               | Catcode tables                        | 20        |
| 3.2.1             | Predefined catcode tables             | 20        |
| 3.2.2             | Catcode table number stack            | 20        |
| 3.2.3             | Catcode table stack                   | 21        |
| 3.2.4             | Catcode regime macros                 | 21        |
| 3.3               | Attribute allocation                  | 22        |
| 3.4               | Short test for plain T <sub>E</sub> X | 22        |
| <b>4</b>          | <b>Installation</b>                   | <b>23</b> |
| 4.1               | Download                              | 23        |
| 4.2               | Bundle installation                   | 23        |
| 4.3               | Package installation                  | 23        |
| 4.4               | Refresh file name databases           | 24        |
| 4.5               | Some details for the interested       | 24        |
| <b>5</b>          | <b>Catalogue</b>                      | <b>24</b> |
| <b>6</b>          | <b>History</b>                        | <b>25</b> |
| [2007/12/12 v0.1] |                                       | 25        |
| [2009/04/10 v0.2] |                                       | 25        |
| [2009/12/02 v0.3] |                                       | 25        |
| [2010/03/09 v0.4] |                                       | 25        |
| [2016/05/10 v0.5] |                                       | 25        |
| [2016/05/16 v0.6] |                                       | 25        |
| [2019/07/25 v0.7] |                                       | 25        |
| <b>7</b>          | <b>Index</b>                          | <b>25</b> |

# 1 Documentation

## 1.1 Introduction

T<sub>E</sub>X 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 T<sub>E</sub>X or L<sup>A</sup>T<sub>E</sub>X implement an allocation scheme for registers. A package reserves with `\newcount` an unused register number for its own exclusive use.

Nowadays T<sub>E</sub>X is not alone anymore:  $\varepsilon$ -T<sub>E</sub>X, pdfT<sub>E</sub>X and other compilers for T<sub>E</sub>X are developed that extend and add new features and resources.

Now LuaT<sub>E</sub>X has reached beta state. It inherits most of pdfT<sub>E</sub>X's features including  $\varepsilon$ -T<sub>E</sub>X. Also it implements new concepts such as attributes or catcode tables.

### 1.1.1 L<sup>A</sup>T<sub>E</sub>X

Since 2015 LuaL<sup>A</sup>T<sub>E</sub>X includes support for luatex by default and so this package is essentially obsolete now, however it is kept for backwards compatibility.

### 1.1.2 plain T<sub>E</sub>X

L<sup>A</sup>T<sub>E</sub>X has inherited its resource handling from plain T<sub>E</sub>X. The interface is basically the same: `\newcount`, ...Therefore this package tries to follow this tradition by providing compatibility to plain T<sub>E</sub>X. It can be loaded with plain T<sub>E</sub>X and defines at least some of the features that this packages provides for L<sup>A</sup>T<sub>E</sub>X.

## 1.2 Register allocation

### 1.2.1 Register with 16 bit

Because LuaTeX is a super set of  $\varepsilon$ -TeX regarding registers, the register allocation scheme should not conflict with package `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 `etex` before uses the local allocation variants. This will prevent the extension for this register class. If more registers are needed, just load package `luatex` earlier.

### 1.2.2 Insertions

Insertions need four registers `\count`, `\dimen`, `\skip`, and `\box` with the same number. Usually they are allocated downwards from 254, 253, ...Also `\newcount`, `\newdimen`, ...fill up these register numbers from below before switching to higher register numbers by package `etex`. When this occurs, no insertions can be allocated anymore.

Therefore `\newcount`, `\newdimen`, `\newskip`, and `\newbox` are replaced by their global variants (`\globcount`, ...) that use the higher numbers immediately, leaving the room for insertions. There should not be an efficiency penalty because LuaTeX stores the registers of a class in the same Lua table unlike  $\varepsilon$ -TeX, where registers below 256 are stored in an array and higher numbers are put in a tree structure.

## 1.3 Attributes

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  $2^{31}$  are available.

`\newattribute {⟨cmd⟩}`

Macro `\newattribute` defines command `⟨cmd⟩` using `\attributedef` using an new attribute number. The new attribute is initially unset.

`\setattribute {⟨cmd⟩} {⟨value⟩}`

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

`\unsetattribute {⟨cmd⟩}`

Macro `\unsetattribute` clears the attribute command `⟨cmd⟩`.

## 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 `LATEX` package: The package must not be surprised by changed catcodes and must not surprise by changing catcodes accidentally. 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 `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 `\loc` variants are not used in T<sub>E</sub>X 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-T<sub>E</sub>X's catcodes.

`\CatcodeTableIniTeX`  
`\CatcodeTableString`  
`\CatcodeTableOther`  
`\CatcodeTableLaTeX`

These are catcode tables and must not be changed. `\CatcodeTableIniTeX` contains the catcode settings of ini-T<sub>E</sub>X. `\CatcodeTableString` follows T<sub>E</sub>X's convention of `\string`, `\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.

```
\PushCatcodeTableNumStack
\PopCatcodeTableNumStack
```

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 creates and uses a fresh catcode table on the stack that is initialized by `<catcodetable>`:

```
\PushCatcodeTableNumStack
\catcodetable<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  $\text{\LaTeX}$  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 {<from>} {<to>} {<catcode>}
```

The catcodes of characters in range from `<from>` to inclusive `<to>` are set to `<catcode>`.

## 1.5 Lua module loading

Currently  $\text{\LuaTeX}$  (version 0.20) does not support Lua script files inside `TDS:scripts//`, because Lua's mechanism for module loading does not use the `kpathsea` library. Therefore this package appends a `kpse` loader to the list of Lua's module loaders. It finds the module `<module>` by

```
kpse.find_file("<module>.lua", "texmfscripts")
```

Unhappily `kpathsea` does not support directory components in a file name. Therefore 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 found in:

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

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 T<sub>E</sub>X and L<sup>A</sup>T<sub>E</sub>X are supported.

## 2 Implementation

```
1 (*package)
```

### 2.1 Reload check and package identification

Reload check, especially if the package is not used with L<sup>A</sup>T<sub>E</sub>X.

```
2 \begingroup\catcode61\catcode48\catcode32=10\relax%
3 \catcode13=5 % ^^M
4 \endlinechar=13 %
5 \catcode35=6 % #
6 \catcode39=12 % '
7 \catcode44=12 % ,
8 \catcode45=12 % -
9 \catcode46=12 % .
10 \catcode58=12 % :
11 \catcode64=11 % @
12 \catcode123=1 % {
13 \catcode125=2 % }
14 \expandafter\let\expandafter\x\csname ver@luatex.sty\endcsname
15 \ifx\x\relax % plain-TeX, first loading
16 \else
17 \def\empty{}%
18 \ifx\x\empty % LaTeX, first loading,
19 % variable is initialized, but \ProvidesPackage not yet seen
20 \else
21 \expandafter\ifx\csname PackageInfo\endcsname\relax
22 \def\x#1#2{%
23 \immediate\write-1{Package #1 Info: #2.}%
24 }%
25 \else
26 \def\x#1#2{\PackageInfo{#1}{#2, stopped}}%
27 \fi
28 \x{luatex}{The package is already loaded}%
29 \aftergroup\endinput
30 \fi
31 \fi
32 \endgroup%
```

Package identification:

```
33 \begingroup\catcode61\catcode48\catcode32=10\relax%
34 \catcode13=5 % ^^M
35 \endlinechar=13 %
36 \catcode35=6 % #
37 \catcode39=12 % '
38 \catcode40=12 % (
39 \catcode41=12 % )
```

```

40 \catcode44=12 % ,
41 \catcode45=12 % -
42 \catcode46=12 % .
43 \catcode47=12 % /
44 \catcode58=12 % :
45 \catcode64=11 % @
46 \catcode91=12 % [
47 \catcode93=12 % ]
48 \catcode123=1 % {
49 \catcode125=2 % }
50 \expandafter\ifx\csname ProvidesPackage\endcsname\relax
51 \def\x#1#2#3[#4]{\endgroup
52 \immediate\write-1{Package: #3 #4}%
53 \xdef#1{#4}%
54 }%
55 \else
56 \def\x#1#2[#3]{\endgroup
57 #2[#{#3}]%
58 \ifx#1\@undefined
59 \xdef#1{#3}%
60 \fi
61 \ifx#1\relax
62 \xdef#1{#3}%
63 \fi
64 }%
65 \fi
66 \expandafter\x\csname ver@luatex.sty\endcsname
67 \ProvidesPackage{luatex}%
68 [2019/07/25 v0.7 LuaTeX basic definition package (HO)]%

```

## 2.2 Catcodes

```

69 \begingroup\catcode61\catcode48\catcode32=10\relax%
70 \catcode13=5 % ^^M
71 \endlinechar=13 %
72 \catcode123=1 % {
73 \catcode125=2 % }
74 \catcode64=11 % @
75 \def\x{\endgroup
76 \expandafter\edef\csname LuT@AtEnd\endcsname{%
77 \endlinechar=\the\endlinechar\relax
78 \catcode13=\the\catcode13\relax
79 \catcode32=\the\catcode32\relax
80 \catcode35=\the\catcode35\relax
81 \catcode61=\the\catcode61\relax
82 \catcode64=\the\catcode64\relax
83 \catcode123=\the\catcode123\relax
84 \catcode125=\the\catcode125\relax
85 }%
86 }%
87 \x\catcode61\catcode48\catcode32=10\relax%
88 \catcode13=5 % ^^M
89 \endlinechar=13 %
90 \catcode35=6 % #
91 \catcode64=11 % @
92 \catcode123=1 % {
93 \catcode125=2 % }
94 \def\TMP@EnsureCode#1#2{%
95 \edef\LuT@AtEnd{%
96 \LuT@AtEnd
97 \catcode#1=\the\catcode#1\relax
98 }%

```

```

99 \catcode#1=#2\relax
100 }
101 \TMP@EnsureCode{10}{12}% ^^J
102 \TMP@EnsureCode{34}{12}% "
103 \TMP@EnsureCode{36}{3}% $
104 \TMP@EnsureCode{39}{12}% '
105 \TMP@EnsureCode{40}{12}% (
106 \TMP@EnsureCode{41}{12}% )
107 \TMP@EnsureCode{42}{12}% *
108 \TMP@EnsureCode{43}{12}% +
109 \TMP@EnsureCode{44}{12}% ,
110 \TMP@EnsureCode{45}{12}% -
111 \TMP@EnsureCode{46}{12}% .
112 \TMP@EnsureCode{47}{12}% /
113 \TMP@EnsureCode{60}{12}% <
114 \TMP@EnsureCode{62}{12}% >
115 \TMP@EnsureCode{91}{12}% [
116 \TMP@EnsureCode{93}{12}% ]
117 \TMP@EnsureCode{95}{12}% _ (other!)
118 \TMP@EnsureCode{96}{12}% `
119 \edef\LuT@AtEnd{\LuT@AtEnd\noexpand\endinput}

```

## 2.3 Check for LuaTeX

Without LuaTeX there is no point in using this package.

```

120 \begingroup\expandafter\expandafter\expandafter\endgroup
121 \expandafter\ifx\csname RequirePackage\endcsname\relax
122 \input infwarerr.sty\relax
123 \input ifluatex.sty\relax
124 \else
125 \RequirePackage{infwarerr}[2007/09/09]%
126 \RequirePackage{ifluatex}[2009/04/10]%
127 \fi
128 \ifluatex
129 \else
130 \@PackageError{luatex}{%
131 This package may only be run using LuaTeX%
132 }\@ehc
133 \expandafter\LuT@AtEnd
134 \fi%

```

## 2.4 Provide LuaTeX primitives

```

135 \ifnum\luatexversion<36 %
136 \def\LuT@MakePrimitive#1{%
137 \expandafter\let\csname luatex#1\expandafter\endcsname
138 \csname #1\endcsname
139 }%
140 \else
141 \def\LuT@MakeLuatexPrimitive#1{%
142 \begingroup\expandafter\expandafter\expandafter\endgroup
143 \expandafter\ifx\csname luatex#1\endcsname\relax
144 \begingroup\expandafter\expandafter\expandafter\endgroup
145 \expandafter\ifx\csname #1\endcsname\relax
146 \else
147 \expandafter\let
148 \csname luatex#1\expandafter\endcsname
149 \csname #1\endcsname
150 \fi
151 \fi
152 \begingroup\expandafter\expandafter\expandafter\endgroup
153 \expandafter\ifx\csname luatex#1\endcsname\relax

```



```

154 \begingroup
155 \expandafter\let\csname luatex#1\endcsname\@undefined
156 \ifnum0%
157 \directlua{%
158 if tex.enableprimitives then %
159 tex.enableprimitives('luatex',{ '#1'})%
160 tex.print('1')%
161 end%
162 }%
163 \expandafter\ifx\csname luatex#1\endcsname\relax\else1\fi
164 =11 %
165 \global\expandafter\let
166 \csname luatex#1\expandafter\endcsname
167 \csname luatex#1\endcsname
168 \else
169 \@PackageError{luatex}{%
170 tex.enableprimitives failed for `#1'%
171 }\@ehc
172 \fi
173 \endgroup
174 \fi
175 }%
176 \def\LuT@MakePrimitive#1{%
177 \begingroup\expandafter\expandafter\expandafter\endgroup
178 \expandafter\ifx\csname#1\endcsname\relax
179 \begingroup
180 \expandafter\let\csname#1\endcsname\@undefined
181 \ifnum0%
182 \directlua{%
183 if tex.enableprimitives then %
184 tex.enableprimitives('',{ '#1'})%
185 tex.print('1')%
186 end%
187 }%
188 \expandafter\ifx\csname#1\endcsname\relax\else1\fi
189 =11 %
190 \global\expandafter\let
191 \csname#1\expandafter\endcsname
192 \csname#1\endcsname
193 \else
194 \@PackageError{luatex}{%
195 tex.enableprimitives failed for `#1'%
196 }\@ehc
197 \fi
198 \endgroup
199 \fi
200 }%
201 \fi
202 \LuT@MakeLuatexPrimitive{attribute}
203 \LuT@MakeLuatexPrimitive{attributedef}
204 \LuT@MakeLuatexPrimitive{catcodetable}
205 \LuT@MakeLuatexPrimitive{initcatcodetable}
206 \LuT@MakeLuatexPrimitive{luaescapestring}
207 \LuT@MakeLuatexPrimitive{savecatcodetable}
208 \LuT@MakePrimitive{numexpr}

```

## 2.5 Inherit support for $\varepsilon$ -TEX

Package `etex` is not compatible for plain `TEX`. But it could be present if a format is used that is based on `etex.src`. Therefore we only load the package in case of `LaTEX` and tests its presence independently of the format by looking for `\et@xins`.

```

209 \begingroup\expandafter\expandafter\expandafter\endgroup
210 \expandafter\ifx\csname RequirePackage\endcsname\relax

```

```

211 \else
212 \RequirePackage{etex}[1998/03/26]%
213 \fi

```

## 2.6 Adaption of $\varepsilon$ -T<sub>E</sub>X's register allocation

$\varepsilon$ -T<sub>E</sub>X has increased the number of T<sub>E</sub>X registers from  $2^8$  (256) to  $2^{15}$  (32768) for a register class. LuaT<sub>E</sub>X extends the limit further to  $2^{16}$  (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.

```

214 \begingroup\expandafter\expandafter\expandafter\endgroup
215 \expandafter\ifx\csname et@xins\endcsname\relax
216 \PackageWarningNoLine{luatex}{%
217   Support for eTeX is not loaded (etex.src)%
218 }%
219 \else
220 \def\LuT@temp#1{%
221   \ifnum\count27#1=32768 %
222     \count27#1=65536 %
223   \fi
224 }%
225 \LuT@temp0%
226 \LuT@temp1%
227 \LuT@temp2%
228 \LuT@temp3%
229 \LuT@temp4%
230 \LuT@temp5%
231 \LuT@temp6%

```

$\varepsilon$ -T<sub>E</sub>X uses an array for the first 256 registers and then a tree structure. LuaT<sub>E</sub>X 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.

```

232 \let\newcount\globcount
233 \let\newdimen\globdimen
234 \let\newskip\globskip
235 \let\newbox\globbox
236 \fi

```

## 2.7 plain T<sub>E</sub>X compatibility

```

\@empty
237 \expandafter\ifx\csname @empty\endcsname\relax
238 \def\@empty{}%
239 \fi

\@gobble
240 \expandafter\ifx\csname @gobble\endcsname\relax
241 \long\def\@gobble#1{}%
242 \fi

\@firstofone
243 \expandafter\ifx\csname @firstofone\endcsname\relax
244 \long\def\@firstofone#1{#1}%
245 \fi

\@firstoftwo
246 \expandafter\ifx\csname @firstoftwo\endcsname\relax
247 \long\def\@firstoftwo#1#2{#1}%
248 \fi

```

```

\@car
249 \expandafter\ifx\csname @car\endcsname\relax
250 \def\@car#1#2\@nil{#1}%
251 \fi

\@cdr
252 \expandafter\ifx\csname @cdr\endcsname\relax
253 \def\@cdr#1#2\@nil{#2}%
254 \fi

\@ifstar
255 \expandafter\ifx\csname @ifstar\endcsname\relax
256 \def\@ifstar#1{%
257 \@ifnextchar*\@firstoftwo{#1}}%
258 }%

\@ifnextchar
259 \long\def\@ifnextchar#1#2#3{%
260 \let\reserved@d=#1%
261 \def\reserved@a{#2}%
262 \def\reserved@b{#3}%
263 \futurelet\@let@token\@ifnch
264 }%

\@ifnch
265 \def\@ifnch{%
266 \ifx\@let@token\@sptoken
267 \let\reserved@c\@xifnch
268 \else
269 \ifx\@let@token\reserved@d
270 \let\reserved@c\reserved@a
271 \else
272 \let\reserved@c\reserved@b
273 \fi
274 \fi
275 \reserved@c
276 }%

\@sptoken
277 \let\LuT@temp\:%
278 \def\:{\let\@sptoken=}%
279 \: % explicit space

\@xifnch
280 \def\:{\@xifnch}%
281 \expandafter\def\:{%
282 \futurelet\@let@token\@ifnch
283 }%
284 \let\:\LuT@temp
285 \fi

\@tempcnta
286 \expandafter\ifx\csname @tempcnta\endcsname\relax
287 \csname newcount\endcsname\@tempcnta
288 \fi

\@tempcntb
289 \expandafter\ifx\csname @tempcntb\endcsname\relax
290 \csname newcount\endcsname\@tempcntb
291 \fi

```

\LuT@newcommand

```

292 \begingroup\expandafter\expandafter\expandafter\endgroup
293 \expandafter\ifx\csname newcommand\endcsname\relax
294 \def\LuT@newcommand#1[#2]#3{%
295   \ifx#1\@undefined
296     \let#1\relax
297   \else
298     \ifx#1\relax
299     \else
300       \@PackageError{luatex}{%
301         \string#1 is already defined.\MessageBreak
302         Redefinition is skipped%
303       }\@ehc
304     \fi
305   \fi
306   \ifx#1\relax
307     \ifcase#2 %
308       \def#1{#3}%
309     \or
310       \def#1##1{#3}%
311     \or
312       \def#1##1##2{#3}%
313     \or
314       \def#1##1##2##3{#3}%
315     \or
316       \@INTERNAL@ERROR
317     \fi
318   \fi
319 }%
320 \else
321 \def\LuT@newcommand{\newcommand*}%
322 \fi

```

## 2.8 Attributes

### 2.8.1 Allocation

\LuT@AllocAttribute

```

323 \newcount\LuT@AllocAttribute
324 \LuT@AllocAttribute=\m@ne

```

\newattribute

```

325 \ifx\newattribute\@undefined
326 \LuT@newcommand\newattribute[1]{%
327   \ifnum\LuT@AllocAttribute<65535 %
328     \global\advance\LuT@AllocAttribute\@ne
329     \allocationnumber\LuT@AllocAttribute
330     \global\luatexattributedef#1=\allocationnumber
331     \unsetattribute{#1}%
332     \wlog{\string#1=\string\attribute\the\allocationnumber}%
333   \else
334     \errmessage{No room for a new \string\attribute}%
335   \fi
336 }
337 \fi

```

### 2.8.2 Interface

\setattribute

```

338 \ifx\setattribute\@undefined
339 \LuT@newcommand\setattribute[2]{%
340   #1=\numexpr#2\relax

```

```

341 }
342 \fi

\unsetattribute

343 \ifx\unsetattribute\@undefined
344 \ifnum\luatexversion<37
345   \LuT@newcommand\LuT@UnsetAttributeValue[0]{}%
346   \let\LuT@UnsetAttributeValue\m@ne
347 \else
348   \LuT@newcommand\LuT@UnsetAttributeValue[0]{-2147483647 }%
349 \fi
350 \LuT@newcommand\unsetattribute[1]{%
351   #1=\LuT@UnsetAttributeValue
352 }
353 \fi

```

## 2.9 Catcode tables

### 2.9.1 Allocation

```

\LuT@AllocCatcodeTable

354 \newcount\LuT@AllocCatcodeTable
355 \LuT@AllocCatcodeTable=\m@ne
356 \newcount\CatcodeTableStack
357 \CatcodeTableStack=\z@

\newcatcodetable

358 \ifx\newcatcodetable\@undefined
359 \LuT@newcommand\newcatcodetable[1]{%
360   \ifnum\LuT@AllocCatcodeTable<1114110 % 0x10FFFF is maximal \chardef
361     % or < 268435455 % 2^28 - 1
362     \global\advance\LuT@AllocCatcodeTable by\tw@
363     \allocationnumber=\LuT@AllocCatcodeTable
364     \global\chardef#1=\allocationnumber
365     \wlog{%
366       \string#1=\string\catcodetable\the\allocationnumber
367     }%
368   \else
369     \errmessage{No room for a new \string\catcodetable}%
370   \fi
371 }%
372 \fi

\IncCatcodeTableStack

373 \LuT@newcommand\IncCatcodeTableStack[0]{%
374   \ifnum\CatcodeTableStack<268435454 %
375     \global\advance\CatcodeTableStack by\tw@
376   \else
377     \@PackageError{luatex}{%
378       Catcode table stack overflow%
379     }\@ehd
380   \fi
381 }

\DecCatcodeTableStack

382 \LuT@newcommand\DecCatcodeTableStack[0]{%
383   \ifnum\CatcodeTableStack>\z@
384     \global\advance\CatcodeTableStack by-2 %
385   \else
386     \@PackageError{luatex}{%
387       Catcode table stack is empty%
388     }\@ehd

```

```

389 \fi
390 }

```

## 2.9.2 \SetCatcodeRange

\SetCatcodeRange

```

391 \LuT@newcommand\SetCatcodeRange[3]{%
392 \edef\LuT@temp{%
393 \noexpand\@tempcnta=\the\@tempcnta
394 \noexpand\@tempcntb=\the\@tempcntb
395 \noexpand\count@=\the\count@
396 \relax
397 }%
398 \@tempcnta=\numexpr#1\relax
399 \@tempcntb=\numexpr#2\relax
400 \count@=\numexpr#3\relax
401 \loop
402 \unless\ifnum\@tempcnta>\@tempcntb
403 \catcode\@tempcnta=\count@
404 \advance\@tempcnta by \@ne
405 \repeat
406 \LuT@temp
407 }

```

## 2.9.3 Predefined catcode tables

```

408 \newcatcodetable\CatcodeTableIniTeX
409 \newcatcodetable\CatcodeTableString
410 \newcatcodetable\CatcodeTableOther
411 \newcatcodetable\CatcodeTableLaTeX

412 \luatexinitcatcodetable\CatcodeTableIniTeX
413 \begingroup
414 \def\@makeother#1{\catcode#1=12\relax}%
415 \@firstofone{%
416 \luatexcatcodetable\CatcodeTableIniTeX
417 \begingroup
418 \SetCatcodeRange{0}{8}{15}%
419 \catcode9=10 % tab
420 \catcode11=15 %
421 \catcode12=13 % form feed
422 \SetCatcodeRange{14}{31}{15}%
423 \catcode35=6 % hash
424 \catcode36=3 % dollar
425 \catcode38=4 % ampersand
426 \catcode94=7 % circumflex
427 \catcode95=8 % underscore
428 \catcode123=1 % brace left
429 \catcode125=2 % brace right
430 \catcode126=13 % tilde
431 \catcode127=15 %
432 \luatexsavecatcodetable\CatcodeTableLaTeX
433 \endgroup
434 \@makeother{0}% nul
435 \@makeother{13}% carriage return
436 \@makeother{37}% percent
437 \@makeother{92}% backslash
438 \@makeother{127}%
439 \SetCatcodeRange{65}{90}{12}% A-Z
440 \SetCatcodeRange{97}{122}{12}% a-z
441 \luatexsavecatcodetable\CatcodeTableString
442 \@makeother{32}% space
443 \luatexsavecatcodetable\CatcodeTableOther

```

```

444 \endgroup
445 }%

```

#### 2.9.4 Number stack

`\LuT@NumStackEmpty` A special empty stack value because of `\@cdr`'s brace removal.

```

446 \def\LuT@NumStackEmpty{0}

```

`\LuT@NumStack`

```

447 \let\LuT@NumStack\LuT@NumStackEmpty

```

`\PushCatcodeTableNumStack`

```

448 \LuT@newcommand\PushCatcodeTableNumStack[0]{%
449 \xdef\LuT@NumStack{%
450 {\the\luatexcatcodetable}\LuT@NumStack
451 }%
452 }

```

`\PopCatcodeTableNumStack`

```

453 \LuT@newcommand\PopCatcodeTableNumStack[0]{%
454 \ifx\LuT@NumStack\LuT@NumStackEmpty
455 \@PackageWarning{luatex}{Empty catcode table number stack}%
456 \luatexcatcodetable\z@
457 \else
458 \luatexcatcodetable=\expandafter\@car\LuT@NumStack\@nil\relax
459 \xdef\LuT@NumStack{%
460 \expandafter\@cdr\LuT@NumStack\@nil
461 }%
462 \fi
463 }

```

#### 2.9.5 Catcode regime macros

`\BeginCatcodeRegime`

```

464 \LuT@newcommand\BeginCatcodeRegime[1]{%
465 \PushCatcodeTableNumStack
466 \luatexcatcodetable=\numexpr#1\relax
467 \IncCatcodeTableStack
468 \luatexsavecatcodetable\CatcodeTableStack
469 \luatexcatcodetable\CatcodeTableStack
470 }

```

`\EndCatcodeRegime`

```

471 \LuT@newcommand\EndCatcodeRegime[0]{%
472 \DecCatcodeTableStack
473 \PopCatcodeTableNumStack
474 }

```

### 2.10 Lua module loader

```

475 \begingroup\expandafter\expandafter\expandafter\endgroup
476 \expandafter\ifx\csname RequirePackage\endcsname\relax
477 \input luatex-loader.sty\relax
478 \else
479 \RequirePackage{luatex-loader}[2010/03/09]%
480 \fi

481 \LuT@AtEnd%
482 </package>

483 <*/loader>

```

Reload check, especially if the package is not used with L<sup>A</sup>T<sub>E</sub>X.

```

484 \begingroup\catcode61\catcode48\catcode32=10\relax%

```

```

485 \catcode13=5 % ^^M
486 \endlinechar=13 %
487 \catcode35=6 % #
488 \catcode39=12 % '
489 \catcode44=12 % ,
490 \catcode45=12 % -
491 \catcode46=12 % .
492 \catcode58=12 % :
493 \catcode64=11 % @
494 \catcode123=1 % {
495 \catcode125=2 % }
496 \expandafter\let\expandafter\x\csname ver@luatex-loader.sty\endcsname
497 \ifx\x\relax % plain-TeX, first loading
498 \else
499 \def\empty{}%
500 \ifx\x\empty % LaTeX, first loading,
501 % variable is initialized, but \ProvidesPackage not yet seen
502 \else
503 \expandafter\ifx\csname PackageInfo\endcsname\relax
504 \def\x#1#2{%
505 \immediate\write-1{Package #1 Info: #2.}%
506 }%
507 \else
508 \def\x#1#2{\PackageInfo{#1}{#2, stopped}}%
509 \fi
510 \x{luatex-loader}{The package is already loaded}%
511 \aftergroup\endinput
512 \fi
513 \fi
514 \endgroup%

```

Package identification:

```

515 \begingroup\catcode61\catcode48\catcode32=10\relax%
516 \catcode13=5 % ^^M
517 \endlinechar=13 %
518 \catcode35=6 % #
519 \catcode39=12 % '
520 \catcode40=12 % (
521 \catcode41=12 % )
522 \catcode44=12 % ,
523 \catcode45=12 % -
524 \catcode46=12 % .
525 \catcode47=12 % /
526 \catcode58=12 % :
527 \catcode64=11 % @
528 \catcode91=12 % [
529 \catcode93=12 % ]
530 \catcode123=1 % {
531 \catcode125=2 % }
532 \expandafter\ifx\csname ProvidesPackage\endcsname\relax
533 \def\x#1#2#3[#4]{\endgroup
534 \immediate\write-1{Package: #3 #4}%
535 \xdef#1{#4}%
536 }%
537 \else
538 \def\x#1#2[#3]{\endgroup
539 #2[#{#3}]%
540 \ifx#1\@undefined
541 \xdef#1{#3}%
542 \fi
543 \ifx#1\relax
544 \xdef#1{#3}%
545 \fi

```



```

546 }%
547 \fi
548 \expandafter\x\csname ver@luatex-loader.sty\endcsname
549 \ProvidesPackage{luatex-loader}%
550 [2019/07/25 v0.7 Lua module loader (HO)]%
551 \begingroup\catcode61\catcode48\catcode32=10\relax%
552 \catcode13=5\endlinechar=13\relax%
553 \catcode10=12 % ^^J
554 \catcode34=12 % "
555 \catcode39=12 % '
556 \catcode40=12 % (
557 \catcode41=12 % )
558 \catcode44=12 % ,
559 \catcode46=12 % .
560 \catcode60=12 % <
561 \catcode61=12 % =
562 \catcode95=12 % _ (other!)
563 \catcode96=12 % `
564 \catcode123=1 % {
565 \catcode125=2 % }
566 \endlinechar=10 %
567 \ifnum\luatexversion<36 %
568   \directlua0%
569 \else %
570   \expandafter\directlua %
571 \fi %
572 {%
573   do
574     local script = "oberdiek.luatex.lua"
575     local file = kpse.find_file(script, "texmfscripts")
576     if file then
577       texio.write_nl("(" .. file .. ")")
578       dofile(file)
579     else
580       error("File `" .. script .. "' not found")
581     end
582   end
583 }%
584 \endgroup\endinput%
585 \end{loader}

```

## 2.11 Lua script

Currently LuaTeX 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`.

```

586 <lua>

587 local function kpse_module_loader(module)
588   local script = module .. ".lua"
589   local file = kpse.find_file(script, "texmfscripts")
590   if file then
591     local loader, error = loadfile(file)
592     if loader then
593       texio.write_nl("(" .. file .. ")")
594       return loader

```

```

595   end
596   return "\n\t[oiberdiek.luatex.kpse_module_loader] Loading error:\n\t"
597   .. error
598   end
599   return "\n\t[oiberdiek.luatex.kpse_module_loader] Search failed"
600 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.

```

601 table.insert(package.searchers or package.loaders, kpse_module_loader)
602 </lua>

```

### 3 Test

```

603 <*test2>
604 \documentclass{article}
605 \def\LoadCommand{%
606   \RequirePackage{luatex}[2010/03/09]%
607 }
608 </test2>
609 <*test3>
610 \documentclass{article}
611 \def\LoadCommand{%
612   \RequirePackage{luatex-loader}[2010/03/09]%
613 }
614 </test3>

```

#### 3.1 Catcode checks for loading

```

615 <*test1>
616 \catcode`\{=1 %
617 \catcode`\}=2 %
618 \catcode`\#=6 %
619 \catcode`\@=11 %
620 \expandafter\ifx\csname count@\endcsname\relax
621   \countdef\count@=255 %
622 \fi
623 \expandafter\ifx\csname @gobble\endcsname\relax
624   \long\def\@gobble#1{}%
625 \fi
626 \expandafter\ifx\csname @firstofone\endcsname\relax
627   \long\def\@firstofone#1{#1}%
628 \fi
629 \expandafter\ifx\csname loop\endcsname\relax
630   \expandafter\@firstofone
631 \else
632   \expandafter\@gobble
633 \fi
634 {%
635   \def\loop#1\repeat{%
636     \def\body{#1}%
637     \iterate
638   }%
639   \def\iterate{%
640     \body
641     \let\next\iterate
642   \else
643     \let\next\relax
644   \fi
645   \next

```

```

646 }%
647 \let\repeat=\fi
648 }%
649 \def\RestoreCatcodes{}
650 \count@=0 %
651 \loop
652 \edef\RestoreCatcodes{%
653   \RestoreCatcodes
654   \catcode\the\count@=\the\catcode\count@\relax
655 }%
656 \ifnum\count@<255 %
657   \advance\count@ 1 %
658 \repeat
659
660 \def\RangeCatcodeInvalid#1#2{%
661   \count@=#1\relax
662   \loop
663     \catcode\count@=15 %
664     \ifnum\count@<#2\relax
665       \advance\count@ 1 %
666     \repeat
667 }
668 \def\RangeCatcodeCheck#1#2#3{%
669   \count@=#1\relax
670   \loop
671     \ifnum#3=\catcode\count@
672     \else
673       \errmessage{%
674         Character \the\count@\space
675         with wrong catcode \the\catcode\count@\space
676         instead of \number#3%
677       }%
678     \fi
679     \ifnum\count@<#2\relax
680       \advance\count@ 1 %
681     \repeat
682 }
683 \def\space{ }
684 \expandafter\ifx\csname LoadCommand\endcsname\relax
685   \def\LoadCommand{\input luatex.sty\relax}%
686 \fi
687 \def\Test{%
688   \RangeCatcodeInvalid{0}{47}%
689   \RangeCatcodeInvalid{58}{64}%
690   \RangeCatcodeInvalid{91}{96}%
691   \RangeCatcodeInvalid{123}{255}%
692   \catcode`\@=12 %
693   \catcode`\=\0 %
694   \catcode`\%=14 %
695   \LoadCommand
696   \RangeCatcodeCheck{0}{36}{15}%
697   \RangeCatcodeCheck{37}{37}{14}%
698   \RangeCatcodeCheck{38}{47}{15}%
699   \RangeCatcodeCheck{48}{57}{12}%
700   \RangeCatcodeCheck{58}{63}{15}%
701   \RangeCatcodeCheck{64}{64}{12}%
702   \RangeCatcodeCheck{65}{90}{11}%
703   \RangeCatcodeCheck{91}{91}{15}%
704   \RangeCatcodeCheck{92}{92}{0}%
705   \RangeCatcodeCheck{93}{96}{15}%
706   \RangeCatcodeCheck{97}{122}{11}%
707   \RangeCatcodeCheck{123}{255}{15}%

```

```

708 \RestoreCatcodes
709 }
710 \Test
711 \csname @@end\endcsname
712 \end
713 </test1>

```

## 3.2 Catcode tables

### 3.2.1 Predefined catcode tables

```

714 /*test4>
715 \NeedsTeXFormat{LaTeX2e}

```

Remember L<sup>A</sup>T<sub>E</sub>X's initial catcodes in count registers starting at `\TestLaTeX`.

```

716 \count0=0 %
717 \chardef\TestLaTeX=1000 %
718 \chardef\TestMax=300 %
719 \loop
720 \count\numexpr\TestLaTeX+\count0\relax=\catcode\count0 %
721 \ifnum\count0<\TestMax
722 \advance\count0 by 1 %
723 \repeat
724 \documentclass{minimal}
725 \usepackage{luatex}[2010/03/09]
726 \usepackage{qstest}
727 \IncludeTests{*}
728 \LogTests{log}{*}{*}
729 \makeatletter
730 \def\Check#1{%
731 \Expect*{\the\count@=\the\catcode\count@}%
732 *{\the\count@=#1}%
733 }
734 \newcount\scratch
735 \def\Test#1#2{%
736 \begin{qstest}{CatcodeTable#1}{CatcodeTable#1}%
737 \luatexcatcodetable\csname CatcodeTable#1\endcsname
738 \count@=\z@
739 \loop
740 \scratch=#2\relax
741 \Expect*{\the\count@=\the\catcode\count@}%
742 *{\the\count@=\the\scratch}%
743 \ifnum\count@<\TestMax
744 \advance\count@\@ne
745 \repeat
746 \end{qstest}%
747 }
748 \begingroup
749 % luatex-unicode-letters.tex makes some slots to letters
750 \def\TestMax{169}%
751 \Test{LaTeX}{\the\count\numexpr\TestLaTeX+\count@}%
752 \endgroup
753 \Test{String}{\ifnum\count@=32 10\else 12\fi}
754 \Test{Other}{12}
755 \luatexinitcatcodetable99 %
756 \Test{IniTeX}{%
757 0\relax
758 \begingroup
759 \luatexcatcodetable99 %
760 \global\scratch=\the\catcode\count@
761 \endgroup
762 }

```

### 3.2.2 Catcode table number stack

```

763 \begin{qstest}{CatcodeTableNumStack}{CatcodeTableNumStack}
764   \def\TestStack#1{%
765     \Expect*{\LuT@NumStack}{#1}%
766   }%
767   \TestStack{0}%
768   \PushCatcodeTableNumStack
769   \TestStack{{0}0}%
770   \@firstofone{%
771     \begingroup
772       \luatexinitcatcodetable12 %
773       \luatexcatcodetable12 %
774       \PushCatcodeTableNumStack
775       \TestStack{{12}{0}0}%
776       \PopCatcodeTableNumStack
777       \TestStack{{0}0}%
778       \PopCatcodeTableNumStack
779       \TestStack{0}%
780       \def\TestWarning{Missing empty stack warning}%
781       \def\@PackageWarning#1#2{\def\TestWarning{empty stack}}%
782       \PopCatcodeTableNumStack
783       \TestStack{0}%
784       \Expect*{\TestWarning}{empty stack}%
785     \endgroup
786   }%
787 \end{qstest}

```

### 3.2.3 Catcode table stack

```

788 \begin{qstest}{CatcodeTableStack}{CatcodeTableStack}
789   \def\TestStack#1{%
790     \Expect*{\the\CatcodeTableStack}{#1}%
791   }%
792   \TestStack{0}%
793   \IncCatcodeTableStack
794   \TestStack{2}%
795   \IncCatcodeTableStack
796   \TestStack{4}%
797   \begingroup
798     \IncCatcodeTableStack
799     \TestStack{6}%
800   \endgroup
801   \TestStack{6}%
802   \begingroup
803     \DecCatcodeTableStack
804     \TestStack{4}%
805   \endgroup
806   \TestStack{4}%
807   \DecCatcodeTableStack
808   \TestStack{2}%
809   \DecCatcodeTableStack
810   \TestStack{0}%
811   \begingroup
812     \def\TestError{Missing error}%
813     \def\@PackageError#1#2#3{%
814       \def\TestError{Empty stack}%
815     }%
816     \DecCatcodeTableStack
817     \TestStack{0}%
818     \Expect*{\TestError}{Empty stack}%
819   \endgroup
820 \end{qstest}

```

### 3.2.4 Catcode regime macros

```

821 \begin{qstest}{CatcodeRegime}{CatcodeRegime}
822   \def\TestStacks#1#2#3{%
823     \Expect*{\the\luatexcatcodetable}{#1}%
824     \Expect*{\the\CatcodeTableStack}{#2}%
825     \Expect*{\LuT@NumStack}{#3}%
826   }%
827   \TestStacks{0}{0}{0}%
828   \catcode`\|=7 %
829   \BeginCatcodeRegime\CatcodeTableLaTeX
830   \TestStacks{2}{2}{0}0}%
831   \Expect*{\the\catcode`\|}{12}%
832   \EndCatcodeRegime
833   \TestStacks{0}{0}{0}%
834   \Expect*{\the\catcode`\|}{7}%
835 \end{qstest}

```

### 3.3 Attribute allocation

```

836 \begin{qstest}{Attributes}{Attributes}
837   \newattribute\TestAttr
838   \Expect*{\meaning\TestAttr}%
839   *{\string\attribute\number\allocationnumber}%
840   \Expect*{\the\allocationnumber}{0}%
841   \begingroup
842     \newattribute\TestAttr
843     \Expect*{\the\allocationnumber}{1}%
844   \endgroup
845   \Expect*{\the\allocationnumber}{0}%
846   \Expect*{\meaning\TestAttr}*{\string\attribute1}%
847   \Expect*{\the\TestAttr}*{\number\LuT@UnsetAttributeValue}%
848   \def\Test#1{%
849     \setattribute\TestAttr{#1}%
850     \Expect*{\the\TestAttr}{#1}%
851   }%
852   \Test{0}%
853   \Test{1}%
854   \Test{-1}%
855   \Test{123}%
856   \unsetattribute\TestAttr
857   \Expect*{\the\TestAttr}*{\number\LuT@UnsetAttributeValue}%
858   \begingroup
859     \Expect*{\the\TestAttr}*{\number\LuT@UnsetAttributeValue}%
860     \Test{1234}%
861   \endgroup
862   \Expect*{\the\TestAttr}*{\number\LuT@UnsetAttributeValue}%
863 \end{qstest}

864 @@end
865 \end{test4}

```

### 3.4 Short test for plain T<sub>E</sub>X

```

866 \test5)
867 \input luatex.sty\relax
868 \newattribute\TestAttr
869 \setattribute\TestAttr{10}
870 \unsetattribute\TestAttr
871 \newcatcodetable\TestCTa
872 \begingroup
873   \SetCatcodeRange{`A}{`Z}{12}%
874 \endgroup
875 \BeginCatcodeRegime\CatcodeTableLaTeX
876 \EndCatcodeRegime
877 \end
878 \end{test5}

```

## 4 Installation

### 4.1 Download

**Package.** This package is available on CTAN<sup>1</sup>:

[CTAN:macros/latex/contrib/oberdiek/luatex.dtx](#) The source file.

[CTAN:macros/latex/contrib/oberdiek/luatex.pdf](#) Documentation.

**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.

[CTAN:install/macros/latex/contrib/oberdiek.tds.zip](#)

*TDS* refers to the standard “A Directory Structure for  $\TeX$  Files” ([CTAN:tds/tds.pdf](#)). Directories with `texmf` in their name are usually organized this way.

### 4.2 Bundle installation

**Unpacking.** Unpack the `oberdiek.tds.zip` in the TDS tree (also known as `texmf` tree) of your choice. Example (linux):

```
unzip oberdiek.tds.zip -d ~/texmf
```

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

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

### 4.3 Package installation

**Unpacking.** The `.dtx` file is a self-extracting `docstrip` archive. The files are extracted by running the `.dtx` through plain  $\TeX$ :

```
tex luatex.dtx
```

**TDS.** Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

|                                    |   |
|------------------------------------|---|
| <code>luatex.sty</code>            | → <code>tex/generic/oberdiek/luatex.sty</code>          |
| <code>luatex-loader.sty</code>     | → <code>tex/generic/oberdiek/luatex-loader.sty</code>   |
| <code>oberdiek.luatex.lua</code>   | → <code>scripts/oberdiek/oberdiek.luatex.lua</code>     |
| <code>luatex.pdf</code>            | → <code>doc/latex/oberdiek/luatex.pdf</code>            |
| <code>test/luatex-test1.tex</code> | → <code>doc/latex/oberdiek/test/luatex-test1.tex</code> |
| <code>test/luatex-test2.tex</code> | → <code>doc/latex/oberdiek/test/luatex-test2.tex</code> |
| <code>test/luatex-test3.tex</code> | → <code>doc/latex/oberdiek/test/luatex-test3.tex</code> |
| <code>test/luatex-test4.tex</code> | → <code>doc/latex/oberdiek/test/luatex-test4.tex</code> |
| <code>test/luatex-test5.tex</code> | → <code>doc/latex/oberdiek/test/luatex-test5.tex</code> |
| <code>luatex.dtx</code>            | → <code>source/latex/oberdiek/luatex.dtx</code>         |

If you have a `docstrip.cfg` that configures and enables `docstrip`’s TDS installing feature, then some files can already be in the right place, see the documentation of `docstrip`.

---

<sup>1</sup><http://ctan.org/pkg/luatex>

## 4.4 Refresh file name databases

If your  $\text{T}_{\text{E}}\text{X}$  distribution (te $\text{T}_{\text{E}}\text{X}$ , mik $\text{T}_{\text{E}}\text{X}$ , ...) relies on file name databases, you must refresh these. For example, te $\text{T}_{\text{E}}\text{X}$  users run `texhash` or `mktextlsr`.

## 4.5 Some details for the interested

**Unpacking with  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ .** The `.dtx` chooses its action depending on the format:

**plain  $\text{T}_{\text{E}}\text{X}$ :** Run `docstrip` and extract the files.

**$\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ :** Generate the documentation.

If you insist on using  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$  for `docstrip` (really, `docstrip` does not need  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ ), then inform the autodetect routine about your intention:

```
latex \let\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:

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

An example follows how to generate the documentation with pdf $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ :

```
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  [\$\text{T}\_{\text{E}}\text{X}\$  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`.

```
879 (*catalogue)
880 <?xml version='1.0' encoding='us-ascii'?>
881 <!DOCTYPE entry SYSTEM 'catalogue.dtd'>
882 <entry datestamp='$Date$' modifier='$Author$' id='luatex'>
883   <name>luatex</name>
884   <caption>The LuaTeX engine.</caption>
885   <authorref id='auth:oberdiek'>
886     <copyright owner='Heiko Oberdiek' year='2007,2009,2010'>/>
887     <license type='lppl1.3'>/>
888     <version number='0.6'>/>
889     <description>
890       LuaTeX is an extended version of pdfTeX using Lua as an embedded
891       scripting language. The LuaTeX project's main objective
892       is to provide an open and configurable variant of TeX while at the
893       same time offering downward compatibility.
894     <p/>
895     LuaTeX uses Unicode (as UTF-8) as its default input encoding, and
896     is able to use modern (OpenType) fonts (for both text and mathematics).
897     <p/>
898     It should be noted that LuaTeX is still under development; its
899     specification has been declared stable, but absolute stability
900     may not in practice be assumed.
```



```

901 <p/>
902 The package is part of the <xref refid='oberdiek'>oberdiek</xref> bundle.
903 </description>
904 <documentation details='Package documentation'
905 href='ctan:/macros/latex/contrib/oberdiek/luatex.pdf'/>
906 <ctan file='true' path='/macros/latex/contrib/oberdiek/luatex.dtx'/>
907 <miktex location='oberdiek'/>
908 <texlive location='oberdiek'/>
909 <install path='/macros/latex/contrib/oberdiek/oberdiek.tds.zip'/>
910 </entry>
911 </catalogue>

```

## 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 LuaTeX 0.36.

[2009/12/02 v0.3]

- Unsetting of attributes updated for LuaTeX 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 LuaLaTeX format.

[2016/05/16 v0.6]

- Documentation updates.

[2019/07/25 v0.7]

- remove uses of module function, see PR70

## 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.

| Symbols               |   |
|-----------------------|---|
| <code>\#</code> ..... | <code>\@</code> ..... 619, 692          |
| <code>\%</code> ..... | <code>\@@end</code> ..... 864           |
| <code>\:</code> ..... | <code>\@INTERNAL@ERROR</code> ..... 316 |
| <code>\%</code> ..... | <code>\@PackageError</code> .....       |

|  |  |
|--|--|
| . 130, 169, 194, 300, 377, 386, 813            | \CatcodeTableIniTeX . 4, 408, 412, 416     |
| \@PackageWarning . . . . . 455, 781            | \CatcodeTableLaTeX 411, 432, 829, 875      |
| \@PackageWarningNoLine . . . . . 216           | \CatcodeTableOther . . . . . 410, 443      |
| \@car . . . . . 249, 458                       | \CatcodeTableStack 4, 356, 357, 374,       |
| \@cdr . . . . . 252, 460                       | 375, 383, 384, 468, 469, 790, 824          |
| \@ehc . . . . . 132, 171, 196, 303             | \CatcodeTableString . . . . . 409, 441     |
| \@ehd . . . . . 379, 388                       | \chardef . . . . . 360, 364, 717, 718      |
| \@empty . . . . . 237                          | \Check . . . . . 730                       |
| \@firstofone . . . . . 243, 415, 627, 630, 770 | \count . 221, 222, 716, 720, 721, 722, 751 |
| \@firstoftwo . . . . . 246, 257                | \count@ . . . . . 395, 400, 403,           |
| \@gobble . . . . . 240, 624, 632               | 621, 650, 654, 656, 657, 661,              |
| \@ifnch . . . . . 263, 265, 282                | 663, 664, 665, 669, 671, 674,              |
| \@ifnextchar . . . . . 257, 259                | 675, 679, 680, 731, 732, 738,              |
| \@ifstar . . . . . 255                         | 741, 742, 743, 744, 751, 753, 760          |
| \@let@token . . . . . 263, 266, 269, 282       | \countdef . . . . . 621                    |
| \@makeother . . . . .                          | \csname . . . . . 14, 21, 50, 66,          |
| . 414, 434, 435, 436, 437, 438, 442            | 76, 121, 137, 138, 143, 145, 148,          |
| \@ne . . . . . 328, 404, 744                   | 149, 153, 155, 163, 166, 167,              |
| \@nil . . . . . 250, 253, 458, 460             | 178, 180, 188, 191, 192, 210,              |
| \@sptoken . . . . . 266, 277                   | 215, 237, 240, 243, 246, 249,              |
| \@tempcnta 286, 393, 398, 402, 403, 404        | 252, 255, 286, 287, 289, 290,              |
| \@tempcntb . . . . . 289, 394, 399, 402        | 293, 476, 496, 503, 532, 548,              |
| \@undefined . . . . . 58, 155,                 | 620, 623, 626, 629, 684, 711, 737          |
| 180, 295, 325, 338, 343, 358, 540              |  |
| \@xifnch . . . . . 267, 280                    | <b>D</b>                                   |
| \\ . . . . . 693                               | \DecCatcodeTableStack . . . . .            |
| \{ . . . . . 616                               | . . . . . 382, 472, 803, 807, 809, 816     |
| \} . . . . . 617                               | \directlua . . . . . 157, 182, 568, 570    |
| \  . . . . . 828, 831, 834                     | \documentclass . . . . . 604, 610, 724     |
| <b>A</b>                                       |  |
| \advance . . . . . 328, 362, 375,              |  |
| 384, 404, 657, 665, 680, 722, 744              |  |
| \aftergroup . . . . . 29, 511                  |  |
| \allocationnumber . . . 329, 330, 332,         |  |
| 363, 364, 366, 839, 840, 843, 845              |  |
| \attribute . . . . . 332, 334, 839, 846        |  |
| <b>B</b>                                       |  |
| \begin . . . . . 736, 763, 788, 821, 836       |  |
| \BeginCatcodeRegime . 5, 464, 829, 875         |  |
| \body . . . . . 636, 640                       |  |
| <b>C</b>                                       |  |
| \catcode . . . . . 2, 3, 5,                    |  |
| 6, 7, 8, 9, 10, 11, 12, 13, 33, 34,            |  |
| 36, 37, 38, 39, 40, 41, 42, 43, 44,            |  |
| 45, 46, 47, 48, 49, 69, 70, 72, 73,            |  |
| 74, 78, 79, 80, 81, 82, 83, 84, 87,            |  |
| 88, 90, 91, 92, 93, 97, 99, 403,               |  |
| 414, 419, 420, 421, 423, 424,                  |  |
| 425, 426, 427, 428, 429, 430,                  |  |
| 431, 484, 485, 487, 488, 489,                  |  |
| 490, 491, 492, 493, 494, 495,                  |  |
| 515, 516, 518, 519, 520, 521,                  |  |
| 522, 523, 524, 525, 526, 527,                  |  |
| 528, 529, 530, 531, 551, 552,                  |  |
| 553, 554, 555, 556, 557, 558,                  |  |
| 559, 560, 561, 562, 563, 564,                  |  |
| 565, 616, 617, 618, 619, 654,                  |  |
| 663, 671, 675, 692, 693, 694,                  |  |
| 720, 731, 741, 760, 828, 831, 834              |  |
| \catcodetable . . . . . 366, 369               |  |
| <b>E</b>                                       |  |
| \empty . . . . . 17, 18, 499, 500              |  |
| \end . . 712, 746, 787, 820, 835, 863, 877     |  |
| \EndCatcodeRegime . . . 471, 832, 876          |  |
| \endcsname . . . . . 14, 21, 50, 66,           |  |
| 76, 121, 137, 138, 143, 145, 148,              |  |
| 149, 153, 155, 163, 166, 167,                  |  |
| 178, 180, 188, 191, 192, 210,                  |  |
| 215, 237, 240, 243, 246, 249,                  |  |
| 252, 255, 286, 287, 289, 290,                  |  |
| 293, 476, 496, 503, 532, 548,                  |  |
| 620, 623, 626, 629, 684, 711, 737              |  |
| \endinput . . . . . 29, 119, 511, 584          |  |
| \endlinechar . . . . . 4,                      |  |
| 35, 71, 77, 89, 486, 517, 552, 566             |  |
| \errmessage . . . . . 334, 369, 673            |  |
| \Expect . . . . . 731, 741,                    |  |
| 765, 784, 790, 818, 823, 824,                  |  |
| 825, 831, 834, 838, 840, 843,                  |  |
| 845, 846, 847, 850, 857, 859, 862              |  |
| <b>F</b>                                       |  |
| \futurelet . . . . . 263, 282                  |  |
| <b>G</b>                                       |  |
| \globbox . . . . . 235                         |  |
| \globcount . . . . . 232                       |  |
| \globdimen . . . . . 233                       |  |
| \globskip . . . . . 234                        |  |
| <b>I</b>                                       |  |
| \ifcase . . . . . 307                          |  |
| \ifuatex . . . . . 128                         |  |

|   |  |
|---|--|
| <code>\ifnum</code> . . . . .                           | 135, 156, 181, 221, 327,<br>344, 360, 374, 383, 402, 567,<br>656, 664, 671, 679, 721, 743, 753   |
| <code>\ifx</code> . . . . .                             | 15, 18, 21,<br>50, 58, 61, 121, 143, 145, 153,<br>163, 178, 188, 210, 215, 237,<br>240, 243, 246, 249, 252, 255,<br>266, 269, 286, 289, 293, 295,<br>298, 306, 325, 338, 343, 358,<br>454, 476, 497, 500, 503, 532,<br>540, 543, 620, 623, 626, 629, 684 |
| <code>\immediate</code> . . . . .                       | 23, 52, 505, 534   |
| <code>\IncCatcodeTableStack</code> . . . . .            | 373, 467, 793, 795, 798  |
| <code>\IncludeTests</code> . . . . .                    | 727  |
| <code>\input</code> . . . . .                           | 122, 123, 477, 685, 867  |
| <code>\iterate</code> . . . . .                         | 637, 639, 641  |
| <b>L</b>  |  |
| <code>\LoadCommand</code> . . .                         | 605, 611, 685, 695   |
| <code>\LogTests</code> . . . . .                        | 728  |
| <code>\loop</code> . .                                  | 401, 635, 651, 662, 670, 719, 739  |
| <code>\luatexattributedef</code> . . . . .              | 330  |
| <code>\luatexcatcodetable</code> . .                    | 416, 450, 456,<br>458, 466, 469, 737, 759, 773, 823  |
| <code>\luatexinitcatcodetable</code> . .                | 412, 755, 772  |
| <code>\luatexsavecatcodetable</code> . . . . .          | 432, 441, 443, 468   |
| <code>\luatexversion</code> . . . . .                   | 135, 344, 567  |
| <code>\LuT@AllocAttribute</code> 323, 327, 328, 329     |  |
| <code>\LuT@AllocCatcodeTable</code> . . . . .           | 354, 360, 362, 363   |
| <code>\LuT@AtEnd</code> . . . . .                       | 95, 96, 119, 133, 481  |
| <code>\LuT@MakeLuatexPrimitive</code> . . . . .         | 141, 202, 203, 204, 205, 206, 207  |
| <code>\LuT@MakePrimitive</code> . . .                   | 136, 176, 208  |
| <code>\LuT@newcommand</code> . . . . .                  | 292,<br>326, 339, 345, 348, 350, 359,<br>373, 382, 391, 448, 453, 464, 471   |
| <code>\LuT@NumStack</code> . . . . .                    | 447, 449,<br>450, 454, 458, 459, 460, 765, 825   |
| <code>\LuT@NumStackEmpty</code> . .                     | 446, 447, 454  |
| <code>\LuT@temp</code> .                                | 220, 225, 226, 227, 228,<br>229, 230, 231, 277, 284, 392, 406  |
| <code>\LuT@UnsetAttributeValue</code> . . .             | 345,<br>346, 348, 351, 847, 857, 859, 862  |
| <b>M</b>  |  |
| <code>\m@ne</code> . . . . .                            | 324, 346, 355  |
| <code>\makeatletter</code> . . . . .                    | 729  |
| <code>\meaning</code> . . . . .                         | 838, 846   |
| <code>\MessageBreak</code> . . . . .                    | 301  |
| <b>N</b>  |  |
| <code>\n</code> . . . . .                               | 596, 599   |
| <code>\NeedsTeXFormat</code> . . . . .                  | 715  |
| <code>\newattribute</code> . . . .                      | 3, 325, 837, 842, 868  |
| <code>\newbox</code> . . . . .                          | 235  |
| <code>\newcatcodetable</code> . . . . .                 | 4, 358, 408, 409, 410, 411, 871  |
| <code>\newcommand</code> . . . . .                      | 321  |
| <code>\newcount</code> . . . . .                        | 232, 323, 354, 356, 734  |
| <code>\newdimen</code> . . . . .                        | 233  |
| <code>\newskip</code> . . . . .                         | 234  |
| <code>\next</code> . . . . .                            | 641, 643, 645  |
| <code>\number</code> . .                                | 676, 839, 847, 857, 859, 862   |
| <code>\numexpr</code> 340, 398, 399, 400, 466, 720, 751 |  |
| <b>P</b>  |  |
| <code>\PackageInfo</code> . . . . .                     | 26, 508  |
| <code>\PopCatcodeTableNumStack</code> . . . . .         | 453, 473, 776, 778, 782  |
| <code>\ProvidesPackage</code> . . . .                   | 19, 67, 501, 549   |
| <code>\PushCatcodeTableNumStack</code> . . . . .        | 5, 448, 465, 768, 774  |
| <b>R</b>  |  |
| <code>\RangeCatcodeCheck</code> . . . . .               | 668, 696, 697, 698, 699, 700,<br>701, 702, 703, 704, 705, 706, 707   |
| <code>\RangeCatcodeInvalid</code> . . . . .             | 660, 688, 689, 690, 691  |
| <code>\repeat</code> . . . . .                          | 405,<br>635, 647, 658, 666, 681, 723, 745  |
| <code>\RequirePackage</code> . . . . .                  | 125, 126, 212, 479, 606, 612   |
| <code>\reserved@a</code> . . . . .                      | 261, 270   |
| <code>\reserved@b</code> . . . . .                      | 262, 272   |
| <code>\reserved@c</code> . . . . .                      | 267, 270, 272, 275   |
| <code>\reserved@d</code> . . . . .                      | 260, 269   |
| <code>\RestoreCatcodes</code> . .                       | 649, 652, 653, 708   |
| <b>S</b>  |  |
| <code>\scratch</code> . . . . .                         | 734, 740, 742, 760   |
| <code>\setattribute</code> . . . . .                    | 3, 338, 849, 869   |
| <code>\SetCatcodeRange</code> . . . . .                 | 5, 391, 418, 422, 439, 440, 873  |
| <code>\space</code> . . . . .                           | 674, 675, 683  |
| <b>T</b>  |  |
| <code>\t</code> . . . . .                               | 596, 599   |
| <code>\Test</code> . .                                  | 687, 710, 735, 751, 753, 754,<br>756, 848, 852, 853, 854, 855, 860   |
| <code>\TestAttr</code> . . . . .                        | 837,<br>838, 842, 846, 847, 849, 850,<br>856, 857, 859, 862, 868, 869, 870   |
| <code>\TestCTa</code> . . . . .                         | 871  |
| <code>\TestError</code> . . . . .                       | 812, 814, 818  |
| <code>\TestLaTeX</code> . . . . .                       | 717, 720, 751  |
| <code>\TestMax</code> . . . . .                         | 718, 721, 743, 750   |
| <code>\TestStack</code> . .                             | 764, 767, 769, 775, 777,<br>779, 783, 789, 792, 794, 796,<br>799, 801, 804, 806, 808, 810, 817   |
| <code>\TestStacks</code> . . . . .                      | 822, 827, 830, 833   |
| <code>\TestWarning</code> . . . . .                     | 780, 781, 784  |
| <code>\the</code> . . . . .                             | 77, 78, 79, 80,<br>81, 82, 83, 84, 97, 332, 366, 393,<br>394, 395, 450, 654, 674, 675,<br>731, 732, 741, 742, 751, 760,<br>790, 823, 824, 831, 834, 840,<br>843, 845, 847, 850, 857, 859, 862  |
| <code>\TMP@EnsureCode</code> . . . . .                  | 94, 101, 102, 103, 104, 105,<br>106, 107, 108, 109, 110, 111,<br>112, 113, 114, 115, 116, 117, 118   |
| <code>\tw@</code> . . . . .                             | 362, 375   |

| U               |                       | X   |                                   |
|-----------------|-----------------------|-----|-----------------------------------|
| \unless         | 402                   | \x  | 14, 15, 18, 22, 26,               |
| \unsetattribute | 3, 331, 343, 856, 870 |     | 28, 51, 56, 66, 75, 87, 496, 497, |
| \usepackage     | 725, 726              |     | 500, 504, 508, 510, 533, 538, 548 |
| W               |                       | Z   |                                   |
| \wlog           | 332, 365              |     |                                   |
| \write          | 23, 52, 505, 534      | \z@ | 357, 383, 456, 738                |