

# penlightplus

## Additions to the Penlight Lua Libraries

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## Package Options and Set-Up

This package first loads the LaTeX `penlight[import]` package (<https://ctan.org/pkg/penlight?lang=en>). Documentation for the Lua package can be found here: <https://lunarmodules.github.io/Penlight/index.html>.

The `pl` option may be passed to this package to create an alias for `penlight`.

The following global Lua variables are defined:

`__SKIP_TEX__` If using the `penlightplus` package with `texlua` (good for troubleshooting), set this global before loading `penlight`

`__PL_GLOBALS__` If using this package with `texlua` and you want to set some functions as globals (described in next sections), set this variable to `true` before loading `penlight`

`__PL_NO_HYPERREF__` a flag used to change the behaviour of some functions, depending on if you don't use the `hyperref` package

`__PDFmetadata__` a table used to store PDF meta-data for `pdfx` package.

### globals option

Since this package uses the `penlight import` option, all `stringx` functions are injected into the `string` meta-table and you can use them like so: `'first name':upfirst()`. But if the package option `globals` is used, many additional globals are set for easier scripting. `pl.hasval`, `pl.COMP`, `pl.utils.kpairs`, `pl.utils.npairs` become globals. `pl.tablex` is aliased as `pl.tbx` and `tbx` (which also includes all native Lua table functions), and `pl.array2d` is aliased as `pl.a2d` and `a2d`.

## texlua usage

If you want to use `penlightplus.lua` with the `texlua` interpreter (no document is made, but useful for testing your Lua code), you can access it by setting `__SKIP_TEX__ = true` before loading. For example:

```
package.path = package.path .. ';' .. 'path/to/texmf/tex/lualatex/penlightplus/?.lua'
package.path = package.path .. ';' .. 'path/to/texmf/tex/lualatex/penlight/?.lua'
penlight = require'penlight'

__SKIP_TEX__ = true --only required if you want to use
                    --penlightplus without a LaTeX run
__PL_GLOBALS__ = true -- optional, include global definitions

require'penlightplus'
```

## penlight additions

Some functionality is added to penlight and Lua.

### General Additions

`pl.hasval(x)` Python-like boolean testing

`COMP'xyz'()` Python-like comprehensions:

<https://lunarmodules.github.io/Penlight/libraries/pl.comprehension.html>

`_Gdot(s)` Return a global (may contain dots) from string

`clone_function(f)` returns a cloned function

`operator.strgt(a,b)` compares strings a greater than b (useful for sorting)

`operator.strlt(a,b)` compares strings a less than b (useful for sorting)

`math.mod(n,d)`, `math.mod2(n)` math modulus

`pl.utils.filterfiles(dir,filt,rec)` Get files from dir and apply glob-like filters. Set `rec` to `true` to include sub directories

`pl.char(n)` return letter corresponding to 1=a, 2=b, etc.  
`pl.Char(n)` return letter corresponding to 1=A, 2=B, etc.

## string additions

`string.upfirst(s)` uppercase first letter  
`string.delspace(s)` delete all spaces  
`string.trimfl(s)` remove first and last chars  
`string.splitstrip(s, sp, st)` split by `sp` (default comma) followed by strip (default whitespace)  
`string.split2(s, sep1, sep2, st)` split a string twice (creates a 2d array), first by `sep1` (default comma), then by `sep2` (default =), with option to strip (default true)  
`string.appif(s, append, bool, alternate)`  
`string.gfirst(s, t)` return first matched pattern from an array of patterns `t`  
`string.gextract(s)` extract a pattern from a string (returns capture and new string with capture removed)  
`string.totable(s)` string a table of characters  
`string.tolist(s)` string a table of characters  
`string.containsany(s,t)` checks if any of the array of strings `t` are in `s` using `string.find`  
`string.containsanycase(s,t)` case-insensitive version  
`string.delspace(s)` clear spaces from string  
`string.subpar(s, c)` replaces `\\par` with a character of your choice default is space  
`string.fmt(s, t, fmt)` format a string like `format_operator`, but with a few improvements. `t` can be an array (reference items like `\\$1` in the string), and `fmt` can be a table of formats (keys correspond to those in `t`), or a string that is processed by `luakeys`.  
`string.parsekv(s, opts)` parse a string using a `luakeys` instance (`penlight.luakeys`). A kv-string or table can be used for `opts`.  
`string.hasnoalpha(s)` string has no letters  
`string.hasnonum(s)` string has no numbers  
`string.isvarlike(s)` string is 'variable-like', starts with a letter or underscore and then is alphanumeric or has underscores after

## tablex additions

`tablex.fmt(t, f)` format a table with table or key-value string `f`  
`tablex.list2comma(t)` Use oxford comma type listing, e.g. A, B, and C  
`tablex.strinds(t)` convert integer indexes to string indices (1 -> '1')  
`tablex.filterstr(t,e,case)` keep only values in table `t` that contain expression `e`, case insensitive by default.  
`tablex.mapslice(f,t,i1,i2)` map a function to elements between `i1` and `i2`

`tablex.listcontains(t,v)` checks if a value is in a array-style list  
`tablex.kkeys(t)` returns keys that are non-numeric (like kpairs)

## List additions

`List:inject(l2, pos)` injects a list (l2) into a list at position. Set `pos=0` to inject at end.

## seq additions

A syntax to produce sequences or a 'train' of numbers is provided. This may be useful for including pages from a pdf, or selecting rows of a table with a concise syntax.

`seq.train(trn, len)` produces a `pl.List` according to the arguments

`seq.itrain(trn, len)` produces an iterator according to the arguments.

`seq.tbltrain(tbl, trn)` produces an iterator over a table

An example syntax for `trn` is `'i1, i2, r1:r2'`, etc. where `i1` and `i2` are individual indexes/elements, separated by `,` and `r1:r2` is a range (inclusive of end-point) denoted with a `:`. The range format follows python's numpy indexing, and a 'stride' can be given by including a second colon like `::2` -> is `1,3,5,...`, or `2::3` -> `2,5,8,...`. Negative numbers can be used to index relative to the length of the table, eg, `-1` -> `len`, but if length is not given, negative indexing cannot be used and a number after the first colon must be provided. A missing left-number on the colon assumes 1, and missing right number assumes `len`. A missing 'stride' (number after the optional second colon) assumes a value of 1.

Variable-like strings can be given in place of numbers, which are assumed to be keys for a table instead.

For `tbltrain` a `*` can be passed to iterate over all keys.

The default colon and comma separators for ranges and elements can be set with `seq.train_range_sep` and `seq.train_element_sep`, respectively.

```

1 \begin{luacode*}
2   for i in
3     pl.seq.itrain('1, :, 6, 0::2, -3 ',
4                 5) do
5     tex.print(i..' ')
6   end
7   local t = {'n1', 'n2', a='A', b='B', c='C'}
8   for k, v in
9     pl.seq.tbltrain(t, '*,c,1') do
10    tex.print(tostring(k).. '=' .. tostring(v) <-
11             ..'; ')
12 \end{luacode*}

```

1, 1, 2, 3, 4, 5, 6, 0, 2, 4, 3, a=A; b=B;  
c=C; c=C; 1=n1;

## A pl.tex. module is added

`add_bkt_cnt(n)`, `close_bkt_cnt(n)`, `reset_bkt_cnt` functions to keep track of adding curly brackets as strings. `add` will return `n` (default 1) `{`'s and increment a counter. `close` will return `n` `}`'s (default will close all brackets) and decrement.

`_NumBkts` internal integer for tracking the number of brackets

`opencmd(cs)` prints `\cs {` and adds to the bracket counters.

`openenv(env,opts)` prints a `\begin {env}[opts]`, and stores the environment in a list so it can be later closed with `closeenv{num}`

`xNoValue,xTrue,xFalse`: xparse equivalents for commands

`prt(x)`, `prtn(x)` print without or with a newline at end. Tries to help with special characters or numbers printing.

`prt1(l)`, `prtt(t)` print a literal string, or table

`wrt(x)`, `wrtn(x)` write to log

`wrth(s1, s2)` pretty-print something to console. `S2` is a flag to help you find., alias is `help_wrt`, also in `pl.wrth`

`prt_array2d(tt)` pretty print a 2d array

`pkgwarn(pkg, msg1, msg2)` throw a package warning

`pkgerror(pkg, msg1, msg2, stop)` throw a package error. If `stop` is true, immediately ceases compile.

`defcmd(cs, val)` like `\gdef`, but note that no special chars allowed in `cs`(eg. `@`)

`defmacro(cs, val)` like `\gdef`, allows special characters, but any tokens in `val` must be pre-defined (this uses `token.set_macro` internally)

`newcmd(cs, val)` like `\newcommand`

`renewcmd(cs, val)` like `\renewcommand`

`prvcmd(cs, val)` like `\providecommand`

`deccmd(cs, dft, overwrite)` declare a command. If `dft` (default) is `nil`, `cs` is set to a package warning saying '`cs`' was declared and used in document, but never set. If `overwrite` is true, it will overwrite an existing command (using `defcmd`), otherwise, it will throw error like `newcmd`.

`get_ref_info(l)` accesses the `\r @label` and returns a table

## Recording LaTeX input as a lua variable

`penlight.tex.startrecording()` start recording input buffer without printing to latex

`penlight.tex.stoprecording()` stop recording input buffer

`penlight.tex.readbuf()` internal-use function that interprets the buffer. This will ignore an environment ending (eg. `end{envir}`)

`penlight.tex.recordedbuf` the string variable where the recorded buffer is stored

## penlightplus LaTeX Macros

### Macro helpers

`\MakeluastringCommands [def]{spec}` will let `\pllustring (A|B|C..)` be `\luastring (N|O|T|F)` based on the letters that `spec` is set to (or `def(ault)` if nothing is provided) This is useful if you want to write a command with flexibility on argument expansion. The user can specify `n`, `o`, `t`, and `f` (case insensitive) if they want none, once, twice, or full expansion.

Variants of `luastring` are added:

`\luastringF {m} = \luastring {m}`

`\luastringT {m}`, expand the first token of `m` twice

For example, we can control the expansion of args 2 and 3 with arg 1:

```
\NewDocumentCommand{\splittocomma}{ 0{nn} m m }{%
  \MakeluastringCommands [nn]{#1}%
  \luadirect{penlight.tex.split2comma(\pllustringA{#2},\pllustringB{#3})}%
}
```

### Lua boolean expressions

`\ifluax {<Lua expr>}{<do if true>}{<do if false>}` and

`\ifluaxv {<Lua expr>}{<do if true>}{<do if false>}` for truthy (uses `penlight.hasval`).

The argument is expanded.

1	<code>\ifluax{3^3 == 27}{3*3*3 is 27}[WRONG]\\</code>	<code>3*3*3 is 27</code>
2	<code>\ifluax{abc123 == nil}{Var is nil}[WRONG]\\</code>	<code>Var is nil</code>
3	<code>\ifluax{not true}{tRuE}[fAlSe]\\</code>	<code>fAlSe</code>
4	<code>\ifluax{' '}{TRUE}[FALSE]\\</code>	<code>TRUE</code>
5	<code>\ifluaxv{' '}{true}[false]\\</code>	<code>false</code>
6	<code>\def\XXX{8}</code>	<code>Yes</code>
7	<code>\ifluax{\XXX == 8}{Yes}[No]</code>	<code>Yes</code>

## Case-switch for Conditionals

`\caseswitch {case}{key-val choices}` The starred version will throw an error if the case is not found. Use `___` as a placeholder for a case that isn't matched. The case is fully expanded and interpreted as a lua string.

```
1 \def\caseswitchexample{\caseswitch{\mycase}{dog=DOG, cat=CAT, ↵
   ___=INVALID}}                                DOG
2 \def\mycase{dog} \caseswitchexample \ \       INVALID
3 \def\mycase{human} \caseswitchexample
```

## Create, modify, and use Lua tables from within LaTeX

This portion of the package has been moved to a another package called `luatbls` (<https://ctan.org/pkg/luatbls>)

### PDF meta data (for pdfx package)

`\writePDFmetadatakv * $[x]$ {kv}` Take a key-value string (eg. `title=whatever, author=me`) and then writes to the `jobname.xmpdata` file, which is used by pdfx. `*` will first clear `__PDFmetadata__` which contains the metadata. The un-starred version updates that table. You can control the expansion of the key-val argument with `[x]`, which is fully expanded by default. Command sequences are ultimately stripped from the values, except for `\and` is converted to `\sep` for pdfx usage (<https://texdoc.org/serve/pdfx/0>).

`\writePDFmetadata` runs the lua function `penlight.tex.writePDFmetadata()`, which pushes the lua variable `__PDFmetadata__` (a table) to the `xmpdata` file. This might be useful if you're updating `__PDFmetadata__` by some other means.

```
1 \writePDFmetadatakv{author=Some One} %
2 \writePDFmetadatakv* $[n]$ {author=Kale \and You\xspace} % Overwrites above. Does not ↵
   expant kv
3 \writePDFmetadatakv{date=2024-02-01}
```