--	stops parsing options

Recognized environment variables

LUA_INIT	if this holds a string in the form @*filename* loads and executes *filename*, else executes the string itself
LUA_PATH	defines search path for Lua modules, with "?" replaced by the module name
LUA_CPATH	defines search path for dynamic libraries (e.g. .so or .dll files), with "?" replaced by the module name
_PROMPT[2]	set the prompts for interactive mode

Special Lua variables

arg	**nil** if no arguments on the command line, else a table containing command line *arguments* starting from **arg[1]** while #**arg** is the number of *arguments*; **arg[0]** holds the script name as given on the command line; **arg[-1]** and lower indexes contain the fields of the command line preceding the script name.
_PROMPT[2]	contain the prompt for interactive mode; can be changed by assigning a new value.

The compiler

Command line syntax

luac [*options*] [*filenames*]

Options

-	compiles from standard input
-l	produces a listing of the compiled bytecode
-o *filename*	sends output to **filename** [default: **luac.out**]
-p	performs syntax and integrity checking only, does not output bytecode
-s	strips debug information; line numbers and local names are lost.
-v	prints version information
--	stops parsing options

Note: compiled chunks are portable between machines having the same word size.

Lua is a language designed and implemented by Roberto Ierusalimschy, Luiz Henrique de Figueiredo and Waldemar Celes; for details see lua.org.
Drafts of this reference card (for Lua 5.0) were produced by Enrico Colombini <erix@erix.it> in 2004 and updated by Thomas Lauer <thomas.lauer@gmail.com> in 2007, 2008 and 2009. Comments, praise or blame please to the lua-l mailing list.

The Lua language (v5.1)

Reserved identifiers and comments

and	**break**	**do**	**else**	**elseif**	**end**	**false**	**for**	**function**	**if**	**in**
local	**nil**	**not**	**or**	**repeat**	**return**	**then**	**true**	**until**	**while**	

-- ...	comment to end of line	**--[=[ ]=]**	multi line comment (zero or multiple '=' are valid)
_X is "reserved" (by convention) for constants (with X being any sequence of uppercase letters)		#!	usual Unix shebang; Lua ignores whole first line if this starts the line.

Types (the string values are the possible results of base library function type())

"nil"	**"boolean"**	**"number"**	**"string"**	**"table"**	**"function"**	**"thread"**	**"userdata"**

Note: for type boolean, **nil** and **false** count as false; everything else is true (including 0 and "").

Strings and escape sequences

'...' and **"..."**	string delimiters; interpret escapes.	**[=[...]=]**	multi line string; escape sequences are ignored.

\a bell	\b backspace	\f form feed	\n newline	\r return	\t horiz. tab	\v vert. tab
\\ backslash	\" d. quote	\' quote	\[sq. bracket	\] sq. bracket	\ddd decimal (up to 3 digits)	

Operators, decreasing precedence

^ (right associative, math library required)		
not	# (length of strings and tables)	- (unary)
*****	/	**%**
+	-	
.. (string concatenation, right associative)		

<	>	<=	>=	~=	==

and (stops on **false** or **nil**, returns last evaluated value)
or (stops on **true** (not **false** or **nil**), returns last evaluated value)

Assignment and coercion

a = 5 b= "hi" **local a = a**	simple assignment; variables are not typed and can hold different types. Local variables are lexically scoped; their scope begins after the full declaration (so that local **a** = 5).
a, b, c = 1, 2, 3	multiple assignments are supported
a, b = b, a	swap values: right hand side is evaluated before assignment takes place
a, b = 4, 5, "6"	excess values on right hand side ("6") are evaluated but discarded
a, b = "there"	for missing values on right hand side **nil** is assumed
a = nil	destroys **a**; its contents are eligible for garbage collection if unreferenced.
a = z	if **z** is not defined it is **nil**, so **nil** is assigned to **a** (destroying it)
a = "3" + "2"	numbers expected, strings are converted to numbers (a = 5)
a = 3 .. 2	strings expected, numbers are converted to strings (a = "32")

Control structures

do *block* **end**	block; introduces local scope.
if *exp* **then** *block* {**elseif** *exp* **then** *block*} [**else** *block*] **end**	conditional execution
while *exp* **do** *block* **end**	loop as long as *exp* is true
repeat *block* **until** *exp*	exits when *exp* becomes true; *exp* is in loop scope.
for *var* = *start*, *end* [, *step*] **do** *block* **end**	numerical for loop; *var* is local to loop.
for *vars* **in** *iterator* **do** *block* **end**	iterator based for loop; *vars* are local to loop.
break	exits loop; must be last statement in block.

Table constructors

t = {}	creates an empty table and assigns it to **t**
t = {"yes", "no", "?"}	simple array; elements are **t[1]**, **t[2]**, **t[3]**.
t = { [1] = "yes", [2] = "no", [3] = "?" }	same as above, but with explicit fields
t = {[-900] = 3, [900] = 4}	sparse array with just two elements (no space wasted)
t = {x=5, y=10}	hash table, fields are **t["x"]**, **t["y"]** (or **t.x**, **t.y**)
t = {x=5, y=10; "yes", "no"}	mixed, fields/elements are **t.x**, **t.y**, **t[1]**, **t[2]**
t = {msg = "choice", {"yes", "no", "?"}}	tables can contain others tables as fields

Function definition

function *name* **(** *args* **)** *body* [**return** *values*] **end**	defines function and assigns to global variable **name**
local function *name* **(** *args* **)** *body* [**return** *values*] **end**	defines function as local to chunk
f = function (*args* **)** *body* [**return** *values*] **end**	anonymous function assigned to variable **f**
function ([*args*,] **...)** *body* [**return** *values*] **end**	variable argument list, in *body* accessed as **...**
function *t.name* **(** *args* **)** *body* [**return** *values*] **end**	shortcut for *t.name* = **function ...**
function *obj***:***name* **(** *args* **)** *body* [**return** *values*] **end**	object function, gets *obj* as additional first argument **self**

Function call

f (x)	simple call, possibly returning one or more values
f "hello"	shortcut for **f("hello")**
f 'goodbye'	shortcut for **f('goodbye')**

f [[see you soon]]	shortcut for **f([[see you soon]])**
f {x = 3, y = 4}	shortcut for **f({x = 3, y = 4})**
t.f (x)	calling a function assigned to field **f** of table **t**
x:move (2, -3)	object call: shortcut for **x.move(x, 2, -3)**

Metatable operations (base library required)

setmetatable (t, mt)	sets **mt** as metatable for **t**, unless **t**'s metatable has a **__metatable** field, and returns **t**
getmetatable (t)	returns **__metatable** field of **t**'s metatable or **t**'s metatable or **nil**
rawget (t, i)	gets **t[i]** of a table without invoking metamethods
rawset (t, i, v)	sets **t[i] = v** on a table without invoking metamethods
rawequal (t1, t2)	returns boolean **(t1 == t2)** without invoking metamethods

Metatable fields (for tables and userdata)

__add, __sub	sets handler **h(a, b)** for '+' and for binary '-'	**__mul, __div**	sets handler **h(a, b)** for '*' and for '/'
__mod	set handler **h(a, b)** for '%'	**__pow**	sets handler **h(a, b)** for '^'
__unm	sets handler **h(a)** for unary '-'	**__len**	sets handler **h(a)** for the # operator (userdata)
__concat	sets handler **h(a, b)** for '..'	**__eq**	sets handler **h(a, b)** for '==', '~='
__lt	sets handler **h(a, b)** for '<', '>' and possibly '<=', '>=' (if no **__le**)	**__le**	sets handler **h(a, b)** for '<=', '>='
__index	sets handler **h(t, k)** for access to non-existing field	**__newindex**	sets handler **h(t, k, v)** for assignment to non-existing field
__call	sets handler **h(f, ...)** for function call (using the object as a function)	**__tostring**	sets handler **h(a)** to convert to string, e.g. for **print()**
__gc	sets finalizer **h(ud)** for userdata (has to be set from C)	**__mode**	table mode: **'k'** = weak keys; **'v'** = weak values; **'kv'** = both.
__metatable	sets value to be returned by **getmetatable()**		

The base library [no prefix]

Environment and global variables

getfenv ([f])	if **f** is a function, returns its environment; if **f** is a number, returns the environment of function at level **f** (1 = current [default], 0 = global); if the environment has a field **__fenv**, returns that instead.
setfenv (f, t)	sets environment for function **f** (or function at level **f**, 0 = current thread); if the original environment has a field **__fenv**, raises an error. Returns function **f** if **f** ~= 0.
_G	global variable whose value is the global environment (that is, **_G._G == _G**)
_VERSION	global variable containing the interpreter's version (e.g. **"Lua 5.1"**)

Loading and executing

require (pkgname)	loads a package, raises error if it can't be loaded
dofile ([filename])	loads and executes the contents of **filename** [default: standard input]; returns its returned values.
load (func [, chunkname])	loads a chunk (with chunk name set to **name**) using function **func** to get its pieces; returns compiled chunk as function (or **nil** and error message).
loadfile (filename)	loads file **filename**; return values like **load()**.
loadstring (s [, name])	loads string **s** (with chunk name set to **name**); return values like **load()**.
pcall (f [, *args*])	calls **f()** in protected mode; returns **true** and function results or **false** and error message.
xpcall (f, h)	as **pcall()** but passes error handler **h** instead of extra args; returns as **pcall()** but with the result of **h()** as error message, if any.

Simple output and error feedback

print (*args*)	prints each of the passed *args* to stdout using **tostring()** (see below)
error (msg [, n])	terminates the program or the last protected call (e.g. **pcall()**) with error message **msg** quoting level **n** [default: 1, current function]
assert (v [, msg])	calls **error(msg)** if **v** is **nil** or **false** [default **msg**: **"assertion failed!"**]

Information and conversion

select (index, ...)	returns the arguments after argument number **index** or (if index is "#") the total number of arguments it received after **index**
type (x)	returns the type of **x** as a string (e.g. **"nil"**, **"string"**); see *Types* above.
tostring (x)	converts **x** to a string, using **t**'s metatable's **__tostring** if available
tonumber (x [, b])	converts string **x** representing a number in base **b** [2..36, default: 10] to a number, or **nil** if invalid; for base 10 accepts full format (e.g. "1.5e6").
unpack (t)	returns **t[1]**..**t[n]** (n = **#t**) as separate values

Iterators

ipairs (t)	returns an iterator getting **index, value** pairs of array **t** in numerical order
pairs (t)	returns an iterator getting **key, value** pairs of table **t** in an unspecified order
next (t [, inx])	if **inx** is **nil** [default] returns first **index, value** pair of table **t**; if **inx** is the previous index returns next **index, value** pair or **nil** when finished.

Time formatting directives (most used, portable features):

%c	date/time (locale)		
%x	date only (locale)	**%X**	time only (locale)
%y	year (nn)	**%Y**	year (yyyy)
%j	day of year (001..366)		
%m	month (01..12)		
%b	abbreviated month name (locale)	**%B**	full name of month (locale)
%d	day of month (01..31)		
%U	week number (01..53), Sunday-based	**%W**	week number (01..53), Monday-based
%w	weekday (0..6), 0 is Sunday		
%a	abbreviated weekday name (locale)	**%A**	full weekday name (locale)
%H	hour (00..23)	**%I**	hour (01..12)
%p	either AM or PM		
%M	minute (00..59)		
%S	second (00..61)		
%Z	time zone name, if any		

The debug library [debug]

Basic functions

debug.debug ()	enters interactive debugging shell (type **cont** to exit); local variables cannot be accessed directly.
debug.getinfo (f [, w])	returns a table with information for function **f** or for function at level **f** [1 = caller], or **nil** if invalid level (see *Result fields for getinfo* below); characters in string **w** select one or more groups of fields [default: all] (see *Options for getinfo* below).
debug.getlocal (n, i)	returns name and value of local variable at index **i** (from 1, in order of appearance) of the function at stack level **n** (1= caller); returns **nil** if **i** is out of range, raises error if **n** is out of range.
debug.getupvalue (f, i)	returns name and value of upvalue at index **i** (from 1, in order of appearance) of function **f**; returns **nil** if **i** is out of range.
debug.traceback ([msg])	returns a string with traceback of call stack, prepended by **msg**
debug.setlocal (n, i, v)	assigns value **v** to the local variable at index **i** (from 1, in order of appearance) of the function at stack level **n** (1= caller); returns **nil** if **i** is out of range, raises error if **n** is out of range.
debug.setupvalue (f, i, v)	assigns value **v** to the upvalue at index **i** (from 1, in order of appearance) of function **f**; returns **nil** if **i** is out of range.
debug.sethook ([h, m [, n]])	sets function **h** as hook, called for events given in string (mask) **m**: "c" = function call, "r" = function return, "l" = new code line; also, a number **n** will call **h()** every **n** instructions; **h()** will receive the event type as first argument: "call", "return", "tail return", "line" (line number as second argument) or "count"; use **debug.getinfo(2)** inside **h()** for info (not for "tail_return").
debug.gethook ()	returns current hook function, mask and count set with **debug.sethook()**

Note: the debug library functions are not optimised for efficiency and should not be used in normal operation.

Result fields for debug.getinfo

source	name of file (prefixed by '@') or string where the function was defined
short_src	short version of **source**, up to 60 characters
linedefined	line of source where the function was defined
what	"Lua" = Lua function, "C" = C function, "main" = part of main chunk
name	name of function, if available, or a reasonable guess if possible
namewhat	meaning of **name**: "global", "local", "method", "field" or ""
nups	number of upvalues of the function
func	the function itself

Options for debug.getinfo (character codes for argument w)

n	returns fields **name** and **namewhat**	**l**	returns field **currentline**
f	returns field **func**	**u**	returns field **nup**
S	returns fields **source**, **short_src**, **what** and **linedefined**		

The stand-alone interpreter

Command line syntax

lua [*options*] [*script* [*arguments*]]

Options

-	loads and executes **script** from standard input (no args allowed)
-e *stats*	executes the Lua statements in the literal string *stats*, can be used multiple times on the same line
-l *filename*	requires *filename* (loads and executes if not already done)
-i	enters interactive mode after loading and executing *script*
-v	prints version information

file**:write** (*values*)	writes each of the *values* (strings or numbers) to **file**, with no added separators. Numbers are written as text, strings can contain binary data (in this case, **file** may need to be opened in binary mode on some systems).
file**:seek** ([p] [, of])	sets the current position in **file** relative to **p** ("set" = start of file [default], "cur" = current, "end" = end of file) adding offset **of** [default: zero]; returns new current position in **file**.
file**:flush** ()	flushes any data still held in buffers to **file**

Simple I/O

io.input ([file])	sets **file** as default input file; **file** can be either an open file object or a file name; in the latter case the file is opened for reading in text mode. Returns a file object, the current one if no **file** given; raises error on failure.
io.output ([file])	sets **file** as default output file (the current output file is not closed); **file** can be either an open file object or a file name; in the latter case the file is opened for writing in text mode. Returns a file object, the current one if no **file** given; raises error on failure.
io.close ([file])	closes **file** (a file object) [default: closes the default output file]
io.read (*formats*)	reads from the default input file, usage as **file:read()**
io.lines ([fn])	opens the file with name **fn** for reading and returns an iterator function to read line by line; the iterator closes the file when finished. If no **fn** is given, returns an iterator reading lines from the default input file.
io.write (*values*)	writes to the default output file, usage as **file:write()**
io.flush ()	flushes any data still held in buffers to the default output file

Standard files and utility functions

io.stdin, io.stdout, io.stderr	predefined file objects for stdin, stdout and stderr streams
io.popen ([prog [, mode]])	starts program **prog** in a separate process and returns a file handle that you can use to read data from (if **mode** is "r", default) or to write data to (if **mode** is "w")
io.type (x)	returns the string "file" if **x** is an open file, "closed file" if **x** is a closed file or **nil** if **x** is not a file object
io.tmpfile ()	returns a file object for a temporary file (deleted when program ends)

Note: unless otherwise stated, the I/O functions return **nil** and an error message on failure; passing a closed file object raises an error instead.

The operating system library [os]

System interaction

os.execute (cmd)	calls a system shell to execute the string **cmd** as a command; returns a system-dependent status code.
os.exit ([code])	terminates the program returning **code** [default: success]
os.getenv (var)	returns a string with the value of the environment variable **var** or **nil** if no such variable exists
os.setlocale (s [, c])	sets the locale described by string **s** for category **c**: "all", "collate", "ctype", "monetary", "numeric" or "time" [default: "all"]; returns the name of the locale or **nil** if it can't be set.
os.remove (fn)	deletes the file **fn**; in case of error returns **nil** and error description.
os.rename (of, nf)	renames file **of** to **nf** ; in case of error returns **nil** and error description.
os.tmpname ()	returns a string usable as name for a temporary file; subject to name conflicts, use **io.tmpfile()** instead.

Date/time

os.clock ()	returns an approximation of the amount in seconds of CPU time used by the program
os.time ([tt])	returns a system-dependent number representing date/time described by table **tt** [default: current]. **tt** must have fields **year**, **month**, **day**; can have fields **hour**, **min**, **sec**, **isdst** (daylight saving, boolean). On many systems the returned value is the number of seconds since a fixed point in time (the "epoch").
os.date ([fmt [, t]])	returns a table or a string describing date/time **t** (should be a value returned by **os.time()** [default: current date/time]), according to the format string **fmt** [default: date/time according to locale settings]; if **fmt** is "*t" or "!*t", returns a table with fields **year** (yyyy), **month** (1..12), **day** (1..31), **hour** (0..23), **min** (0..59), **sec** (0..61), **wday** (1..7, Sunday = 1), **yday** (1..366), **isdst** (true = daylight saving), else returns the **fmt** string with formatting directives beginning with '**%**' replaced according to *Time formatting directives* (see below). In either case a leading "!" requests UTC (Coordinated Universal Time).
os.difftime (t2, t1)	returns the difference between two values returned by **os.time()**

Garbage collection

collectgarbage (opt [, arg])	generic interface to the garbage collector; **opt** defines function performed.

Modules and the package library [package]

module (name, ...)	creates module **name.** If there is a table in **package.loaded[name]**, this table is the module. Otherwise, if there is a global table **name**, this table is the module. Otherwise creates a new table and sets it as the value of the global **name** and the value of **package.loaded[name]**. Optional arguments are functions to be applied over the module.
package.loadlib (lib, func)	loads dynamic library **lib** (e.g. .so or .dll) and returns function **func (**or **nil** and error message)
package.path, package.cpath	contains the paths used by **require()** to search for a Lua or C loader, respectively
package.loaded	a table used by require to control which modules are already loaded (see module)
package.preload	a table to store loaders for specific modules (see require)
package.seeall (module)	sets a metatable for **module** with its **__index** field referring to the global environment

The coroutine library [coroutine]

coroutine.create (f)	creates a new coroutine with Lua function **f()** as body and returns it
coroutine.resume (co, *args*)	starts or continues running coroutine **co**, passing *args* to it; returns **true** (and possibly values) if **co** calls **coroutine.yield()** or terminates or **false** and an error message.
coroutine.yield (*args*)	suspends execution of the calling coroutine (not from within C functions, metamethods or iterators); any *args* become extra return values of **coroutine.resume()**.
coroutine.status (co)	returns the status of coroutine **co**: either **"running"**, **"suspended"** or **"dead"**
coroutine.running ()	returns the running coroutine or **nil** when called by the main thread
coroutine.wrap (f)	creates a new coroutine with Lua function **f** as body and returns a function; this function will act as **coroutine.resume()** without the first argument and the first return value, propagating any errors.

The table library [table]

table.insert (t, [i,] v)	inserts **v** at numerical index **i** [default: after the end] in table **t**
table.remove (t [, i])	removes element at numerical index **i** [default: last element] from table **t**; returns the removed element or **nil** on empty table.
table.maxn (t)	returns the largest positive numerical index of table **t** or zero if **t** has no positive indices
table.sort (t [, cf])	sorts (in place) elements from **t[1]** to #**t**, using compare function **cf(e1, e2)** [default: '<']
table.concat (t [, s [, i [, j]]])	returns a single string made by concatenating table elements **t[i]** to **t[j]** [default: **i =1**, **j = #t**] separated by string **s**; returns empty string if no elements exist or **i** > **j**.

The mathematical library [math]

Basic operations

math.abs (x)	returns the absolute value of **x**
math.mod (x, y)	returns the remainder of **x** / **y** as a rounded-down integer, for **y** ~= 0
math.floor (x)	returns **x** rounded down to the nearest integer
math.ceil (x)	returns **x** rounded up to the nearest integer
math.min (*args*)	returns the minimum value from the *args* received
math.max (*args*)	returns the maximum value from the *args* received

Exponential and logarithmic

math.sqrt (x)	returns the square root of **x**, for **x** >= 0
math.pow (x, y)	returns **x** raised to the power of **y**, i.e. **x**^**y**; if **x** < 0, **y** must be integer.
__pow (x, y)	global function added by the math library to make operator '^' work
math.exp (x)	returns e (base of natural logs) raised to the power of **x**, i.e. e^**x**
math.log (x)	returns the natural logarithm of **x**, for **x** >= 0
math.log10 (x)	returns the base-10 logarithm of **x**, for **x** >= 0

Trigonometrical

math.deg (a)	converts angle **a** from radians to degrees
math.rad (a)	converts angle **a** from degrees to radians
math.pi	constant containing the value of pi
math.sin (a)	returns the sine of angle **a** (measured in radians)
math.cos (a)	returns the cosine of angle **a** (measured in radians)
math.tan (a)	returns the tangent of angle **a** (measured in radians)
math.asin (x)	returns the arc sine of **x** in radians, for **x** in [-1, 1]
math.acos (x)	returns the arc cosine of **x** in radians, for **x** in [-1, 1]
math.atan (x)	returns the arc tangent of **x** in radians
math.atan2 (y, x)	similar to **math.atan(y / x)** but with quadrant and allowing x = 0

Splitting on powers of 2

math.frexp (x)	splits **x** into normalized fraction and exponent of 2 and returns both
math.ldexp (x, y)	returns **x** * (2 ^ **y**) with **x** = normalized fraction, **y** = exponent of **2**

Pseudo-random numbers

math.random ([n [, m])	returns a pseudo-random number in range [0, 1] if no arguments given; in range [1, **n**] if **n** is given, in range [**n**, **m**] if both **n** and **m** are passed.
math.randomseed (n)	sets a seed **n** for random sequence (same seed = same sequence)

The string library [string]

Note: string indexes extend from 1 to #string, or from end of string if negative (index -1 refers to the last character).
Note: the string library sets a metatable for strings where the __index field points to the string table. String functions can be used in object-oriented style, e.g. string.len(s) can be written s:len(); literals have to be enclosed in parentheses, e.g. ("xyz"):len().

Basic operations

string.len (s)	returns the length of string **s**, including embedded zeros (see also # operator)
string.sub (s, i [, j])	returns the substring of **s** from position **i** to **j** [default: -1] inclusive
string.rep (s, n)	returns a string made of **n** concatenated copies of string **s**
string.upper (s)	returns a copy of **s** converted to uppercase according to locale
string.lower (s)	returns a copy of **s** converted to lowercase according to locale

Character codes

string.byte (s [, i [, j]])	returns the platform-dependent numerical code (e.g. ASCII) of characters **s**[**i**], **s**[**i**+1], ···,**s**[**j**]. The default value for **i** is 1; the default value for **j** is **i**.
string.char (*args*)	returns a string made of the characters whose platform-dependent numerical codes are passed as *args*

Function storage

string.dump (f)	returns a binary representation of function **f()**, for later use with **loadstring()** (**f()** must be a Lua function with no upvalues)

Formatting

string.format (s [, *args*])	returns a copy of **s** where formatting directives beginning with '**%**' are replaced by the value of arguments *args*, in the given order (see *Formatting directives* below)

Formatting directives for string.format

% [*flags*] [*field_width*] [**.***precision*] *type*

Formatting field types

%d	decimal integer
%o	octal integer
%x	hexadecimal integer, uppercase if **%X**
%f	floating-point in the form [-]nnnn.nnnn
%e	floating-point in exp. Form [-]n.nnnn e [+|-]nnn, uppercase if **%E**
%g	floating-point as **%e** if exp. < -4 or >= precision, else as **%f**; uppercase if **%G**.
%c	character having the (system-dependent) code passed as integer
%s	string with no embedded zeros
%q	string between double quotes, with all special characters escaped
%%	'**%**' character

Formatting flags

-	left-justifies within **field_width** [default: right-justify]
+	prepends sign (only applies to numbers)
(**space**)	prepends sign if negative, else blank space
#	adds "0x" before **%x**, force decimal point for **%e**, **%f**, leaves trailing zeros for **%g**

Formatting field width and precision

n	puts at least **n** (<100) characters, pad with blanks
0n	puts at least **n** (<100) characters, left-pad with zeros
.n	puts at least **n** (<100) digits for integers; rounds to **n** decimals for floating-point; puts no more than **n** (<100) characters for strings.

Formatting examples

string.format("results: %d, %d", 13, 27)	results: 13, 27
string.format("<%5d>", 13)	< 13>
string.format("<%-5d>", 13)	<13 >
string.format("<%05d>", 13)	<00013>
string.format("<%06.3d>", 13)	< 013>
string.format("<%f>", math.pi)	<3.141593>
string.format("<%e>", math.pi)	<3.141593e+00>
string.format("<%.4f>", math.pi)	<3.1416>
string.format("<%9.4f>", math.pi)	< 3.1416>
string.format("<%c>", 64)	<@>
string.format("<%.4s>", "goodbye")	<good>
string.format("%q", [[she said "hi"]])	"she said \"hi\""

Finding, replacing, iterating (for the Patterns see below)

string.find (s, p [, i [, d]])	returns first and last position of pattern **p** in string **s**, or **nil** if not found, starting search at position **i** [default: 1]; returns captures as extra results. If **d** is true, treat pattern as plain string.
string.gmatch (s, p)	returns an iterator getting next occurrence of pattern **p** (or its captures) in string **s** as substring(s) matching the pattern.
string.gsub (s, p, r [, n])	returns a copy of **s** with up to **n** [default: all] occurrences of pattern **p** (or its captures) replaced by **r** if **r** is a string (**r** can include references to captures in the form **%***n*). If **r** is a function **r()** is called for each match and receives captured substrings; it should return the replacement string. If **r** is a table, the captures are used as fields into the table. The function returns the number of substitutions made as second result.
string.match (s, p [, i])	returns captures of pattern **p** in string **s** (or the whole match if **p** specifies no captures) or **nil** if **p** does not match **s**; starts search at position **i** [default: 1].

Patterns and pattern items

General pattern format: *pattern_item* [*pattern_items*]

cc	matches a single character in the class *cc* (see *Pattern character classes* below)
*cc******	matches zero or more characters in the class *cc*; matchest longest sequence (greedy).
*cc***-**	matches zero or more characters in the class *cc*; matchest shortest sequence (non-greedy).
*cc***+**	matches one or more characters in the class *cc*; matchest longest sequence (greedy).
*cc***?**	matches zero or one character in the class *cc*
%*n*	matches the *n*-th captured string (*n* = 1..9, see *Pattern captures*)
%b*xy*	matches the balanced string from character *x* to character *y* (e.g. **%b()** for nested parentheses)
^	anchors pattern to start of string, must be the first item in the pattern
$	anchors pattern to end of string, must be the last item in the pattern

Captures

(*pattern*)	stores substring matching *pattern* as capture **%1**..**%9**, in order of opening parentheses
()	stores current string position as capture

Pattern character classes

.	any character		
%a	any letter	**%A**	any non-letter
%c	any control character	**%C**	any non-control character
%d	any digit	**%D**	any non-digit
%l	any lowercase letter	**%L**	any non-(lowercase letter)
%p	any punctuation character	**%P**	any non-punctuation character
%s	any whitespace character	**%S**	any non-whitespace character
%u	any uppercase letter	**%U**	any non-(uppercase letter)
%w	any alphanumeric character	**%W**	any non-alphanumeric character
%x	any hexadecimal digit	**%X**	any non-(hexadecimal digit)
%z	the byte value zero	**%Z**	any non-zero character
%*x*	if *x* is a symbol the symbol itself	*x*	if *x* not in ^$()%.[]*+-? the character itself
[*set* **]**	any character in any of the given classes; can also be a range **[***c1*-*c2***]**, e.g. [a-z].	**[** ^*set* **]**	any character not in *set*

Pattern examples

string.find("Lua is great!", "is")	5	6
string.find("Lua is great!", "%s")	4	4
string.gsub("Lua is great!", "%s", "-")	Lua-is-great!	2
string.gsub("Lua is great!", "[%s%l]", "*")	L***********!	11
string.gsub("Lua is great!", "%a+", "*")	* * *!	3
string.gsub("Lua is great!", "(.)", "%1%1")	LLuuaa iiss ggrreeaatt!!	13
string.gsub("Lua is great!", "%but", "")	L!	1
string.gsub("Lua is great!", "^.-a", "LUA")	LUA is great!	1
string.gsub("Lua is great!", "^.-a", function(s) return string.upper(s) end)	LUA is great!	1

The I/O library [io]

Complete I/O

io.open (fn [, m])	opens file with name **fn** in mode **m**: "r" = read [default], "w" = write", "a" = append, "r+" = update-preserve, "w+" = update-erase, "a+" = update-append (add trailing "b" for binary mode on some systems); returns a file object (a userdata with a C handle).
file**:close** ()	closes **file**
file**:read** (*formats*)	returns a value from **file** for each of the passed *formats*: "*n" = reads a number, "*a" = reads the whole **file** as a string from current position (returns "" at end of file), "*l" = reads a line (**nil** at end of file) [default], *n* = reads a string of up to *n* characters (**nil** at end of file)
file**:lines** ()	returns an iterator function for reading **file** line by line; the iterator does not close the file when finished.