

Lua & Erlang

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History

- ▶ Created in 1993 by members of Computer Graphics Technology Group at PUC-Rio.
- ▶ Born from data description languages.

Features

- ▶ Embedded scripting language
- ▶ Lightweight
- ▶ Imperative, object-oriented, dynamically-typed
- ▶ Garbage-collection
- ▶ First-class functions, closures, tail-call optimization



Hello, factorial!

```
1  — defines a factorial function
2  function fact (n)
3      if n == 0 then
4          return 1
5      else
6          return n * fact(n-1)
7      end
8  end
9
10 print("enter a number:")
11 a = io.read("*number")           — read a number
12 print(fact(a))
```

Tables and Functions

```
1  network = {  
2      {name = "grauna",   IP = "210.26.30.34"},  
3      {name = "arraial",  IP = "210.26.30.23"},  
4      {name = "lua",      IP = "210.26.23.12"},  
5      {name = "derain",   IP = "210.26.23.20"},  
6  }  
7  
8  table.sort(network, function (a,b)  
9      return (a.name > b.name)  
10 end)
```

The Stack

- ▶ All Lua C functions operate on a stack.
 - ▶ Static type vs. dynamic type
 - ▶ Manual memory management vs. dynamic w/ garbage collection

```
1 void lua_pushnil (lua_State *L);
2 void lua_pushboolean (lua_State *L, int bool);
3 void lua_pushnumber (lua_State *L, double n);
4 void lua_pushstring (lua_State *L, const char *s);
5
6 int lua_toboolean (lua_State *L, int index);
7 double lua_tonumber (lua_State *L, int index);
8 const char *lua_tostring (lua_State *L, int index);
9 size_t lua_strlen (lua_State *L, int index);
```

Example

```
1  — configuration file for program 'pp'
2  — define window size
3  width = 200
4  height = 300
```

Example

```
1  #include <lua.h>
2  #include <luaolib.h>
3  #include <lualib.h>
4
5  void load (char *filename, int *width, int *height) {
6      lua_State *L = lua_open();
7      luaL_openlibs(L);
8
9      if (luaL_loadfile(L, filename) || lua_pcall(L, 0, 0, 0))
10         error(L, "cannot run configuration file: %s",
11             lua_tostring(L, -1));
12
13     lua_getglobal(L, "width");
14     lua_getglobal(L, "height");
15     if (!lua_isnumber(L, -2))
16         error(L, "'width' should be a number\n");
17     if (!lua_isnumber(L, -1))
18         error(L, "'height' should be a number\n");
19     *width = (int)lua_tonumber(L, -2);
20     *height = (int)lua_tonumber(L, -1);
21
22     lua_close(L);
23 }
```

Example

```
1  — configuration file for program 'pp'
2  if getenv("DISPLAY") == ":0.0" then
3      width = 300; height = 300
4  else
5      width = 200; height = 200
6  end
```

Calling Functions

```
1 function f (x, y)
2   return (x^2 * math.sin(y))/(1 - x)
3 end
```

Calling Functions

```
1  /* call a function 'f' defined in Lua */
2  double f (double x, double y) {
3      double z;
4
5      /* push functions and arguments */
6      lua_getglobal(L, "f"); /* function to be called */
7      lua_pushnumber(L, x);   /* push 1st argument */
8      lua_pushnumber(L, y);   /* push 2nd argument */
9
10     /* do the call (2 arguments, 1 result) */
11     if (lua_pcall(L, 2, 1, 0) != 0)
12         error(L, "error running function 'f': %s",
13              lua_tostring(L, -1));
14
15     /* retrieve result */
16     if (!lua_isnumber(L, -1))
17         error(L, "function 'f' must return a number");
18     z = lua_tonumber(L, -1);
19     lua_pop(L, 1); /* pop returned value */
20     return z;
21 }
```

History

- ▶ Created in 1986 by Ericsson for distributed, fault-tolerant, non-stop applications.
- ▶ Aimed to simplify concurrent-programming.
- ▶ Released as open source in 1998.

Features

- ▶ Functional
- ▶ Strict-evaluation
- ▶ Single assignment
- ▶ Dynamic typing



```
1  module(temps).
2  export([format_temps/1]).
3
4  %% Only this function is exported
5  format_temps([]) ->                                % No output for an empty list
6      ok;
7  format_temps([City | Rest]) ->
8      print_temp(convert_to_celsius(City)),
9      format_temps(Rest).
10
11 convert_to_celsius({Name, {c, Temp}}) -> % No conversion needed
12     {Name, {c, Temp}};
13 convert_to_celsius({Name, {f, Temp}}) -> % Do the conversion
14     {Name, {c, (Temp - 32) * 5 / 9}}.
15
16 print_temp({Name, {c, Temp}}) ->
17     io:format("~15w~w~c~n", [Name, Temp]).
```

```
1  35> c(temps).
2  {ok, temps}
3  36> temps:format_temps([moscow, {c, -10}], cape_town, {f, 70}],
4  {stockholm, {c, -4}}, paris, {f, 28}], london, {f, 36}]).
5  moscow          -10 c
6  cape_town       21.111111111111111 c
7  stockholm       -4 c
8  paris           -2.222222222222223 c
9  london          2.222222222222223 c
10 ok
```

```

1  -module(chat).
2
3  -export([start/0, ping/1, pong/0]).
4
5  ping(0) ->
6      pong ! finished,
7      io:format("ping finished~n", []);
8
9  ping(N) ->
10     pong ! {ping, self()},
11     receive
12         pong ->
13             io:format("Ping received pong~n", [])
14     end,
15     ping(N - 1).
16
17  pong() ->
18     receive
19         finished ->
20             io:format("Pong finished~n", []);
21         {ping, Ping_PID} ->
22             io:format("Pong received ping~n", []),
23             Ping_PID ! pong,
24             pong()
25     end.
26
27  start() ->
28     register(pong, spawn(chat, pong, [])),
29     spawn(chat, ping, [3]).

```



Ericsson AB.

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