

A Taste of the Lua Programming Language

Greer Programmers Meetup

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Lua Background

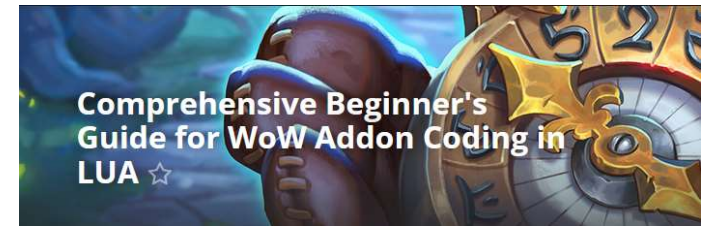
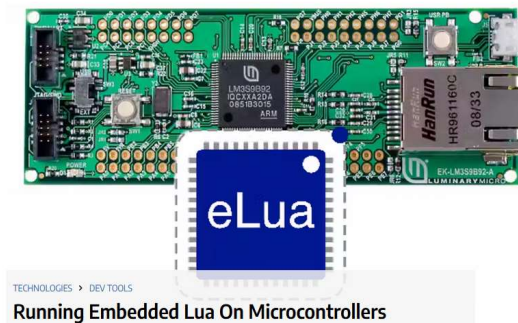
- Lua was created in 1992 by Roberto Ierusalimsky, Luiz Henrique de Figueiredo, and Waldemar Celes, members of the Computer Graphics Technology Group (Tecgraf) at the Pontifical Catholic University of Rio de Janeiro, in Brazil.
- Lua (Moon in Portuguese) precursor was SOL (simple object language) think SUN/MOON.
- Goal: Lua was intended to be a general embeddable extension language, the designers of Lua focused on improving its speed, portability, extensibility, and ease-of-use in development.
 - Simplicity: only a few powerful mechanisms that can address several different needs.
 - Small Size: The entire implementation of Lua consists of 25,000 lines of C code; the binary for 64-bit Linux has 200k bytes.
 - Portability: Lua is implemented in ISO C and runs in virtually any system with as little as 300k bytes of memory.
 - Embedding: Interoperable with other languages and systems.
- Lua interpreter compiles source to byte codes, that are then “interpreted”
 - Similar to Java, Python, Cpython
 - Vs C, C++... that are compiled to object modules (machine code), then linked to an executable
- Lua is free
- Lua Frameworks
 - Love2d – simple graphics oriented game framework
 - <https://developer.roblox.com/en-us/>
 - Corona/Solar2D
 - Many more

Lua Application Space

- Used in game programming
 - Not the most popular language used. C++ is cited as most used for example. Many others.
 - Lua used as a script language on top of C++ implementation
 - WOW – add on scripting for other games (178 listed in Wikipedia page)

[https://en.wikipedia.org/wiki/Category:Lua_\(programming_language\)-scripted_video_games](https://en.wikipedia.org/wiki/Category:Lua_(programming_language)-scripted_video_games)

- Other apps that utilize Lua features such as portability, simplicity etc.
- https://en.wikipedia.org/wiki/List_of_applications_using_Lua



Showcase

Lua is used in many products and projects around the world. Here are some highlights. A different selection is shown every day.



Adobe Photoshop Lightroom is mostly written in Lua. Lightroom also supports Lua plug-ins.



Cisco IP Cameras can be controlled using Lua.



Volvo cars like the V40 Cross Country embed Lua in their combined instrument panel.



Wikipedia uses Lua as its template scripting language. Read the announcement.



The widely popular game Angry Birds is mostly written in Lua. See a talk by Jaakko Luukkainen at the Game Design Expo 2011.



LuaTeX, the engine behind most modern installations of TeX, uses Lua as its embedded scripting language.



Celestia is a real-time 3D visualization of space that can be scripted with Lua.



LOVE is a free framework for making 2D games in Lua.



Unleash Lightroom Classic with Lua

The Adobe Lightroom software development kit (SDK) gives you a clean, fast, lightweight toolkit for enhancing and extending the capabilities of Lightroom. Build plug-ins in Lua, the scripting language built into Lightroom.

Start building today



darktable is an open source photography workflow application and raw developer. A virtual lighttable and darkroom for photographers. It manages your digital negatives in a database, lets you view them through a zoomable lighttable and enables you to develop raw images and enhance them.

Lua Language

- Language features
 - Control flow: If/then/else, while, until, for loops
 - Dynamically typed language, variables do not have types; only values do
 - Eight basic types in Lua: *nil*, *boolean*, *number*, *string*, *function*, *userdata*, *thread*, and *table*
 - Lua performs automatic memory management
 - *UserData*: Most useful for data from C managed by Lua
 - *Nonpreemptive, lightweight threads and coroutines are supported*
 - First class functions (functions treated like a variables)
 - Tables: Associative arrays or maps. (key, value)
 - There are ways to emulate objects/classes/inheritance with tables and metamethods
 - Package as zip file (love2d)

Love2d framework

```
main.lua x
main.lua
1  function love.load()
2      love.graphics.setFont(love.graphics.newFont(20))
3      myfunc = love.graphics.print
4      myargs = {"test", 100, 100}
5  end
6
7  function love.update(dt)
8
9  end
10
11 function love.draw()
12     myfunc(unpack(myargs))
13 end
14
```

Called once

Called 60
frames/second

- **Update** – used to update state, calc etc. “DT” is time between calls.
- **Draw** – where any “drawing” happens on the canvas

Web and Mobile

- **TannerRogalsky/love.js**
 - Port of love 0.10.0, older version of python as well
 - **000webhost – free tier ++**
- Mobile (Love2d)
 - Simple mapping: Mouse clicks = touch
 - Can add touch pressure, multi touch
 - Recipe and Tools exist to create APK and run on Android device
 - iOS path exists, did not try
 - MAC, xcode, apple developer

Mobile applications: adjusting for screen size

```
function love.load()

    coreWidth = 720
    coreHeight = 960
    scale = 1
    shiftDown = 0
    osString = love.system.getOS()
    if osString == "Android" or osString == "iOS" then
        scale = love.graphics.getWidth()/coreWidth
        shiftDown = (love.graphics.getHeight() - (coreHeight * scale)
    else
        scale = 0.6
    end
```

```
function love.draw()

    love.graphics.scale(scale)
    love.graphics.draw.sprites.bg, -10, -10

    -- Uncomment to visually see the collider boxes
    -- world:draw()
```

Code example from Kyle Schaub

Summary (Lua, Love2d)

- Love2d framework easy to install, learn, use, Lua as well, packaging is easy (zip file).
 - Low effort learning curve
- Tools and platforms: vscode with extensions, windows or mac
- Great for learning graphics/imaging, gui, interactive.. programming
- Good for games and scripting, interface to C, C++, embedded
- Not good for web (maybe more Love2d vs Lua)
- Mobile
 - Easy to use for Android
 - Love2d might be more involved for iOS (partly due to Apple)
- Did not look at large program development
 - There is a “require” (similar to Python import) keyword

References

- Article on language design
 - <https://cacm.acm.org/magazines/2018/11/232214-a-look-at-the-design-of-lua/fulltext>
- Language manual
 - <https://www.lua.org/manual/5.4>
- Lua frameworks – long “kitchen sink” list, not checked out
 - <https://github.com/uhub/awesome-lua>
- Love2d framework: love2d.org
 - Recommend Kyle Schaub YouTube video. Install (windows), some example Love2d/Lua programs.
 - <https://www.youtube.com/watch?v=wttKHL90Ank>
 - Also has a udemy course