The Disembedding of a Brazilian Software

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Lua is a programming language developed at the Catholic University in Rio de Janeiro that came to be the leading scripting language in video games, besides being used extensively in many other areas from set-top boxes to Photoshop Lightroom.

```
#include <math.h>

/* computes the square root of 'x' */
#define precision 0.0001

double sqrt (double x)
{
  double r = x;
  while (fabs(x - r * r) > precision)
    r = r - ((r * r) - x) / (2 * r);
  return r;
}
```

```
-- computes the square root of 'x'
precision = 0.0001

sqrt :: Double -> Double
sqrt x = aux x
  where aux r
          | abs(x - r * r) <= precision = r
          | otherwise = aux (r - f')
          where f' = ((r * r) - x) / (2 * r)
```

```
precision = 0.0001

sqrt :: Double -> Double
sqrt x = aux x
  where aux r
          | abs(x - r * r) <= precision = r
          | otherwise = aux (r - f')
          where f' = ((r * r) - x) / (2 * r)
```

A large program may have millions of lines of code like these.

- There are thousands of programming languages in the world
- A few dozen are in general use
  - C, C++, C#, Java, Javascript, Python, Perl, Ruby, Lua, PHP, Objective-C, Basic, Pascal, Fortran, Lisp, Scheme, Forth, Erlang, Prolog, Tcl, Ada, Haskell, …
    - most have been developed in the US
    - a few came from (western) Europe
    - one from Japan
    - one from Brazil

Scripting Languages

- Trade performance/robustness for easy of programming
  - modelling dogh versus masonry
- Frequently used for end-user programming and configuration
- Many of the languages in general use are considered scripting languages
  - Perl, Lua, PHP, Python, Ruby, Tcl, …

Programming Languages

- Long life span
  - Fortran - 1957, Lisp - 1960, C - 1970, Perl - 1989, Java - 1995, Javascrip - 1995
- Evolution
  - hardware changes, programming techniques change, fads change
- Reasonable investment to learn

Choice of a Language

- Main tool for software development
- May be a huge commitment for an organization
- Training
- Code base
  - Adobe has currently more than one million lines of code written in Lua

If you were a manager for a company in Silicon Valley, would you invest so much in an open-source language developed in South America?

The Beginning of Lua

- 1993: Tecgraf - a partnership between PUC-Rio and Petrobras
  - strong culture of tool development
  - inheritance from the Brazilian market reserve
- Two programs with configuration problems
  - each with its own mini-language
  - both languages with severe limitations
- idea: a generic configuration language
  - Lua

Lua at Tecgraf

- Good acceptance
- Language soon spread to several other applications
  - in one year, ~30 programmers
- No impact outside Tecgraf
  - no big *success case* outside Tecgraf
  - “a language from PUC?”

International Exposure

Newsgroups: comp.compilers,comp.lang.misc,comp.programming,comp.lang.c
From: lhf@csg.uwaterloo.ca (Luiz H de Figueiredo)
Organization: Computer Systems Group, University of Waterloo
Keywords: tools, available
Date: Fri, 8 Jul 1994 11:51:45 GMT

This is the first public release of Lua.

* What is Lua?
Lua is a simple, yet powerful, language for extending applications. Lua has been developed by TeCGraf, the Computer Graphics Technology Group of PUC-Rio, the Catholic University of Rio de Janeiro, Brazil. Dozens of industrial products developed by TeCGraf use Lua.
[…]

International Exposure

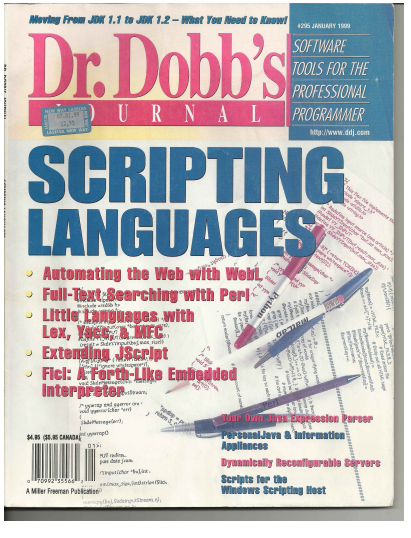
- First Web page in 1995
  - `www.inf.puc-rio.br/~roberto/lua`
- First contacts by email from remote users

Reading “smoke signals” from abroad

- news, blogs, emails
- “Following Lua news from an office in Rio de Janeiro takes some work.”
- many important things are never written down
- the world is not flat

First International Publications

- R. Ierusalimschy, L. H. de Figueiredo, W. Celes. Lua --- an extensible extension language. *Software: Practice & Experience,* 26(6):635-652, 1996.
- L. H. de Figueiredo, R. Ierusalimschy, W. Celes. Lua: an extensible embedded language. *Dr. Dobb's Journal*, 21(12):26-33, 1996.



Lua in Games (the beginning)

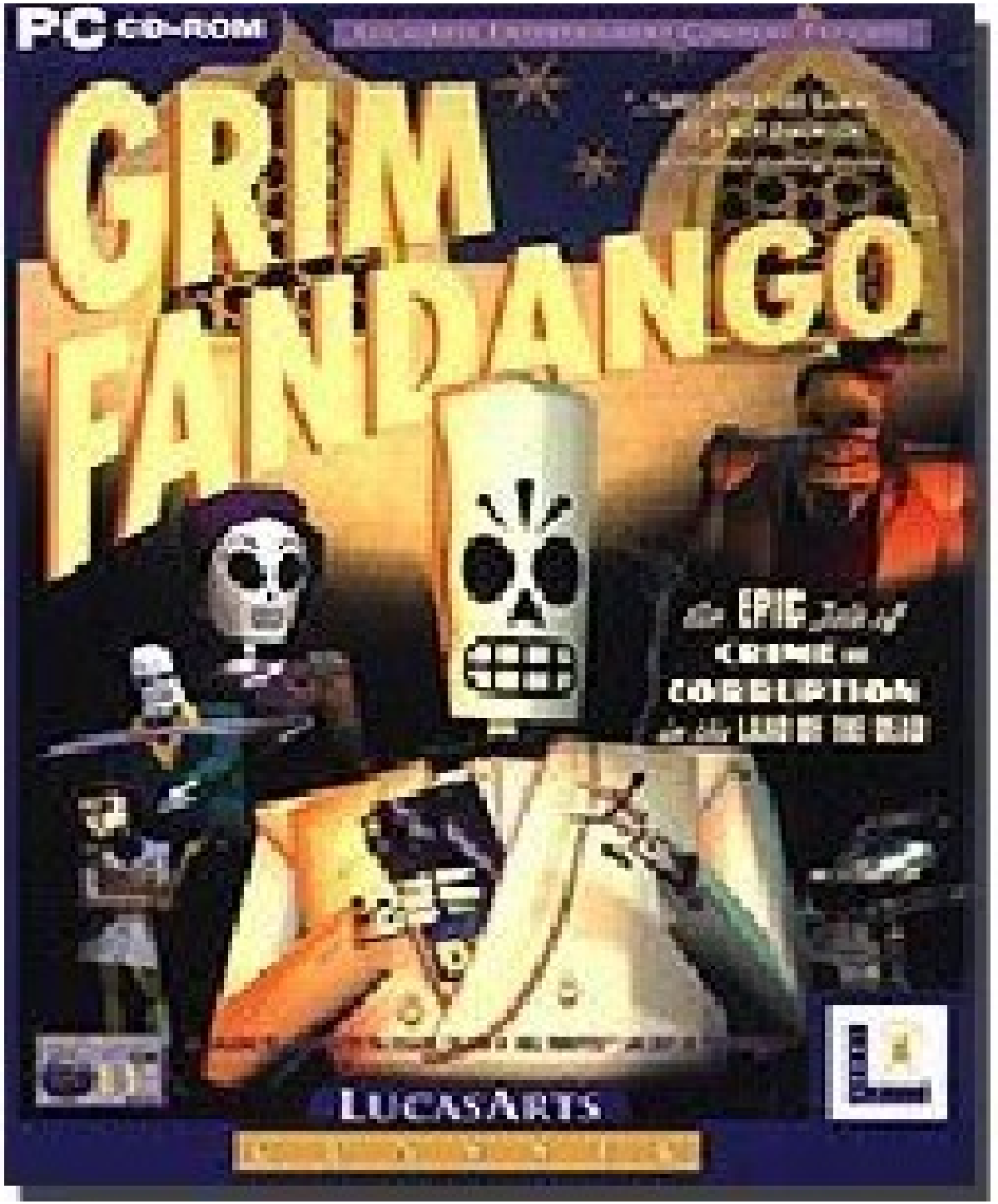
“One naïve programmer fresh out of school....”

Lua in Games (the beginning)

From: Bret Mogilefsky <mogul@lucasarts.com>
To: '"lua@icad.puc-rio.br"' <lua@icad.puc-rio.br>
Subject: LUA rocks! Question, too.
Date: Thu, 9 Jan 1997 13:21:41 -0800

Hi there...
After reading the Dr. Dobbs article on Lua I was very eager to check it out, and so far it has exceeded my expectations in every way! It's elegance and simplicity astound me. Congratulations on developing such a well-thought out language.

Some background: I am working on an adventure game for the LucasArts Entertainment Co., and I want to try replacing our older adventure game scripting language, SCUMM, with Lua.



Lucas Arts, 1998: First AAA game to use Lua

Scripting in Grim Fandango

[The engine] doesn't know anything about adventure games, or talking, or puzzles, or anything else that makes Grim Fandango the game it is. It just knows how to render a set from data that it's loaded and draw characters in that set. […]

The real heroes in the development of Grim Fandango were the scripters. They wrote everything from how to respond to the controls to dialogs to camera scripts to door scripts to the in-game menus and options screens. […]

A TREMENDOUS amount of this game is written in Lua. The engine, including the Lua interpreter, is really just a small part of the finished product.

Bret Mogilefsky

Escape From Monkey Island Screen Shot Gallery [13 of 24]
LUA BAR
Enter door to LUA Bar
CLOSE WINDOW
ESCAPE FROM MONKEY ISLAND
PlayStation.2
13 of 24

In 1998, Cameron Laird wrote in his column in SunWorld magazine:

“Its user base is also small; there might be only a few tens of thousands of Lua programmers in the world. They're very fond of this language, though, and the imminent explosion of ubiquitous embedded processing (computers in your car, in your plumbing, and in your kitchen appliances) can only work in favor of Lua.”

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For us, that “small” user base was much larger than we could imagine!

Spreading the Word

- GDC 1999 (2000?): round table about scripting languages
  - Java × interpreted C++ × not using scripting languages
- 200 miserable people
- “Or you could just use Lua…”
- Furious scribbling

Bret Mogilefsky, Lua workshop 2005

Yindo

- 2000: start-up in San Francisco
- An Internet game platform that combines Lua, OpenGL and OpenAL
  - not totally unlike Flash
- Did not last too long :(

News in Brazil

- “Sistema criado na PUC é usado por empresa do Vale do Silício.” *Gazeta Mercantil*, Sep 29, 2000.
- “Software nacional faz sucesso nos EUA.” *ISTOÉ Dinheiro*, Oct 25, 2000.
- “Linguagem criada na PUC-RJ conquista o Vale do Silício.” *Globo.com - Info & Tech*, Nov 16, 2000.

News in Brazil

Being used by a small startup in Silicon Valley made the news…

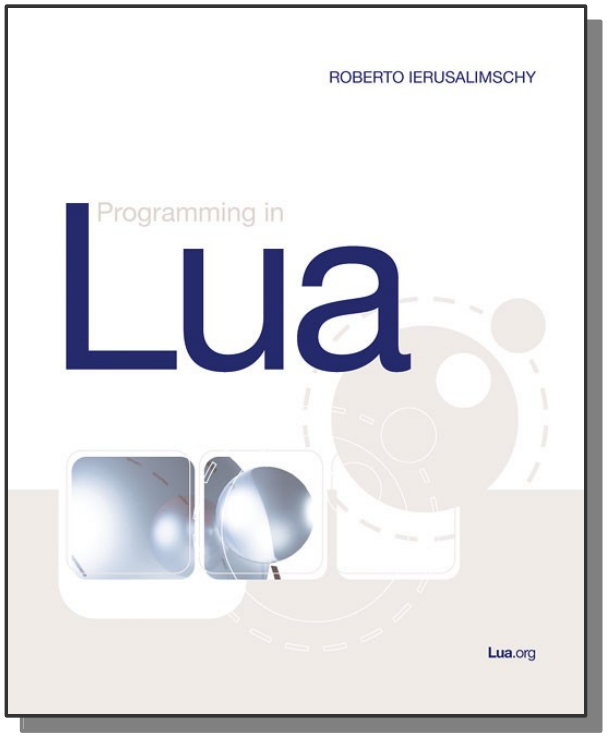
News in Brazil

Being used by a small startup in Silicon Valley made the news…

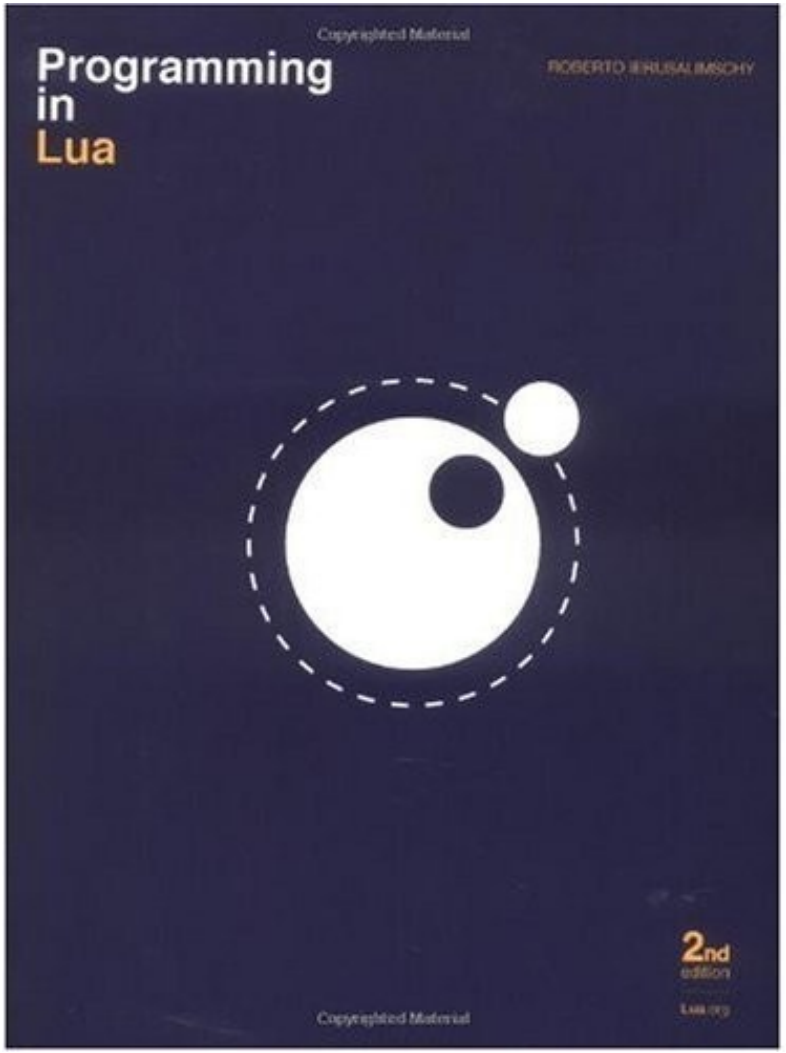
Being used by one of the largest oil companies in the world did not.

The Lua book

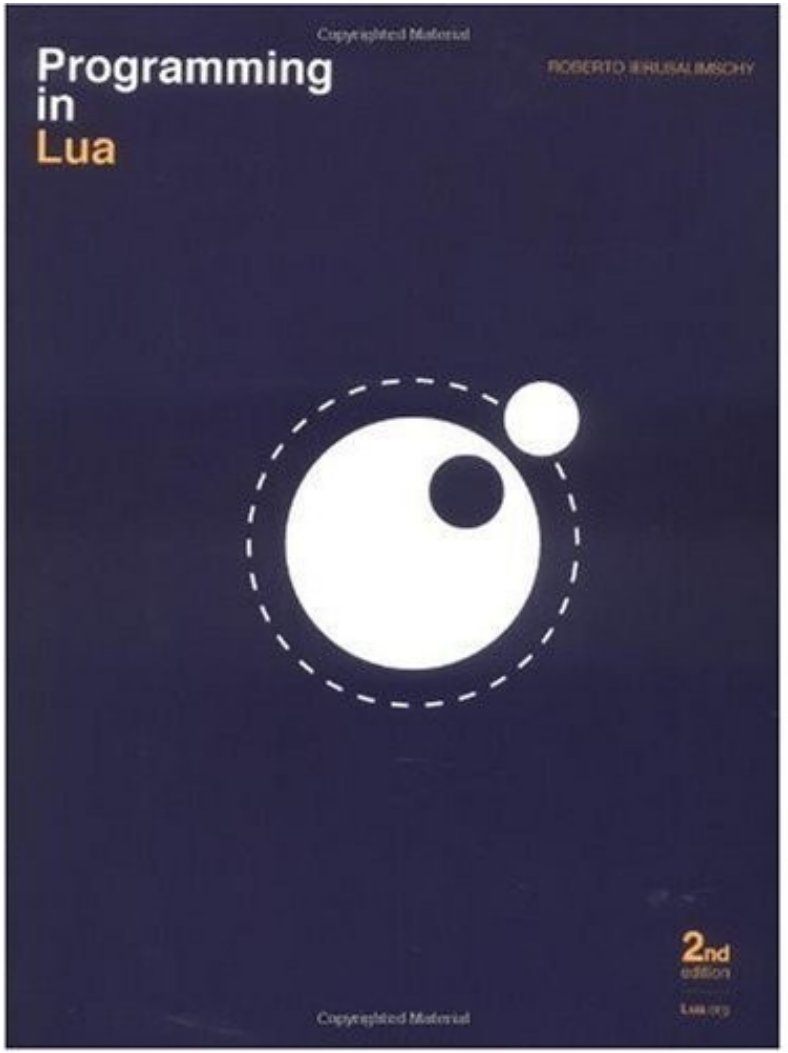
- Started in 1998, published in 2003.
- What language?
  - Portuguese × English
- How to publish?
  - non-academic English publishers

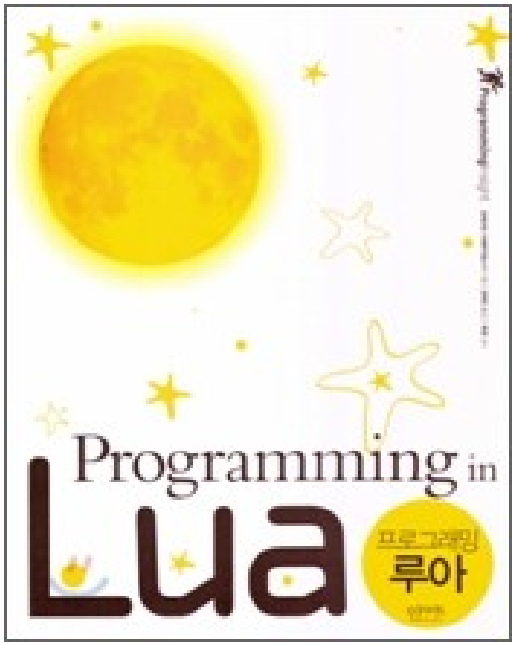


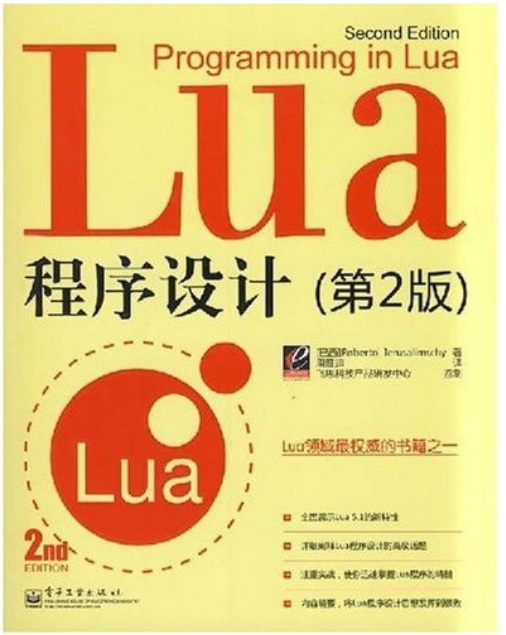
2nd edition, 2006

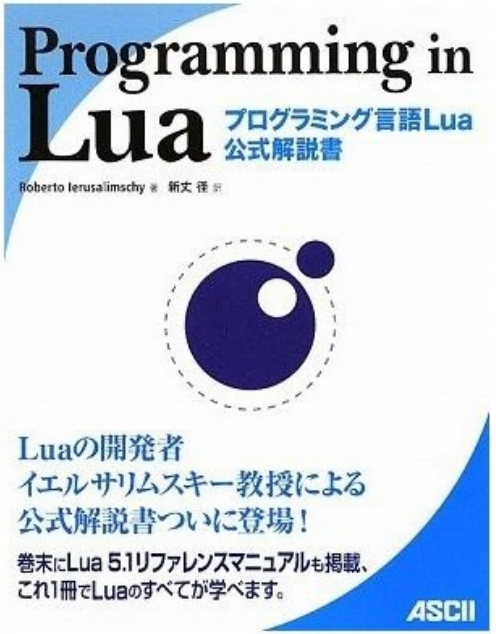


2nd edition, 2006

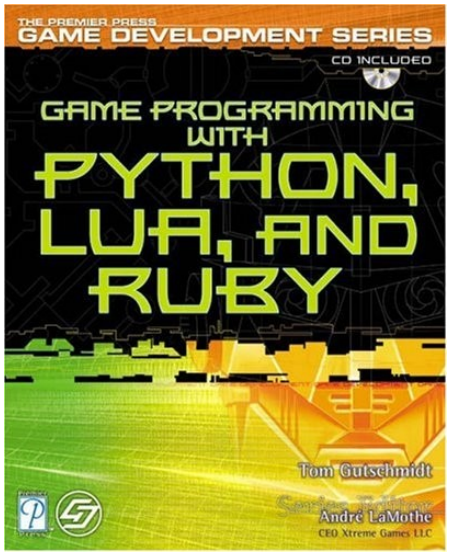




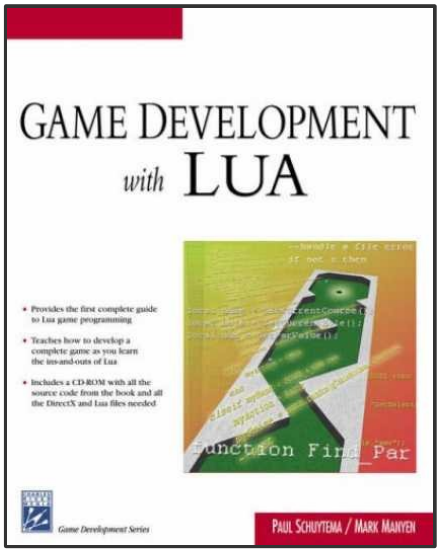




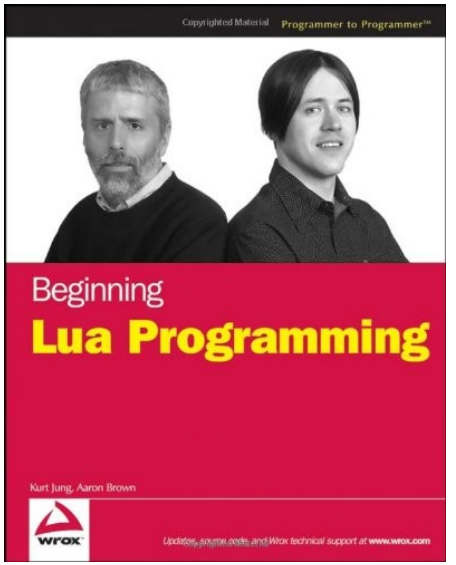
Other books



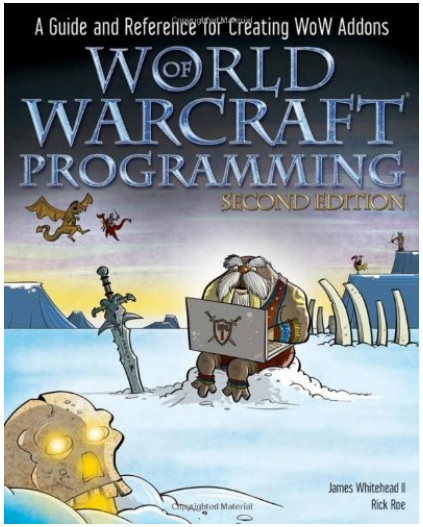
2003



2005

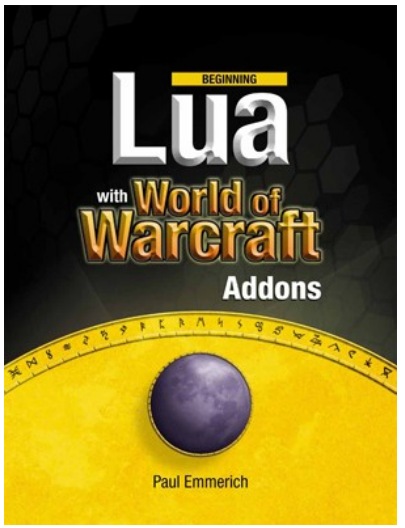


2007



2008

2008



2009

Apple Insider, June 11, 2010

“Apple relaxes iOS SDK terms to allow Lua but block Flash

“Apple's iOS SDK rules for iPhone developers have relaxed the restriction of section 3.3.2 pertaining to interpreted code, enabling Apple to forbid Flash and other middleware platforms while still enabling popular game engines and libraries.”

Slashdot: News for nerds, Feb 1, 2012:

“Wikipedia Chooses Lua As Its New template language”

Slashdot: News for nerds, Feb 1, 2012:

“Wikipedia Chooses Lua As Its New template language”

among the first comments:

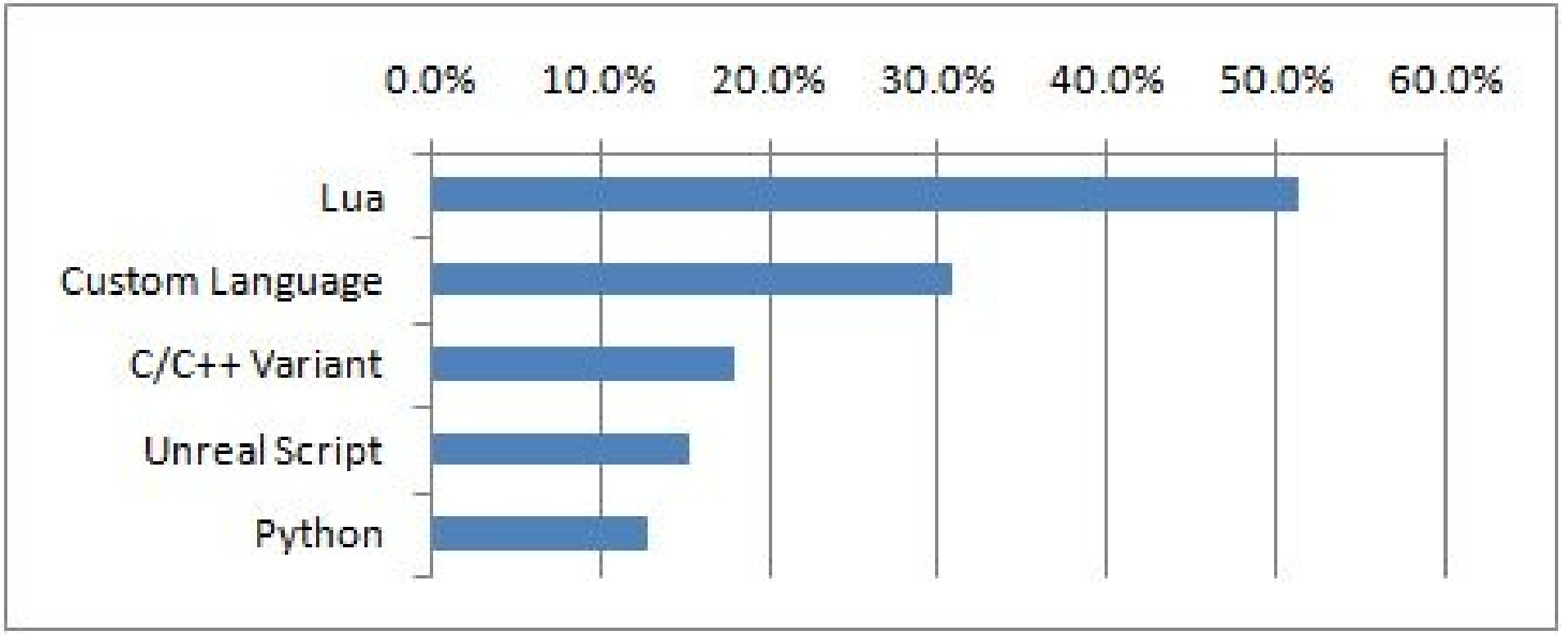
“Lua comes from Brazil. You know what else comes from Brazil? Waxed balls.”

Lua Today

- Used by Samsung (TVs), Cisco (routers), Logiteh (keyboards), Olivetty (printers), Verizon (set-top boxes), Ginga (set-top boxes), Adobe (Lightroom), Sony (Home), Wikipedia
- strong niche in games

Lua in Games

- The Engine Survey (Mark DeLoura, 03/02/09,Gamasutra)
- What script languages are most people using?

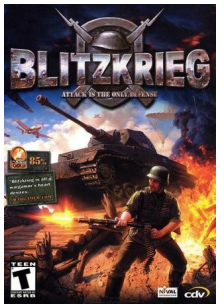


Games for Windows
COMPANY of HEROES
THQ

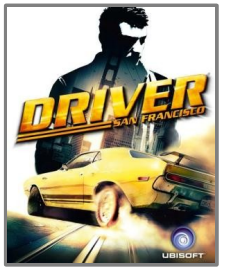
Games for Windows
UNIVERSE AT WAR
SEGA

Games for Windows
DUNGEONS
Kalypso

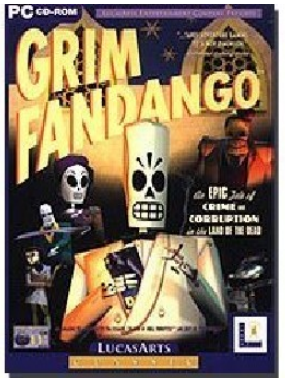
Tap Tap
Revenge

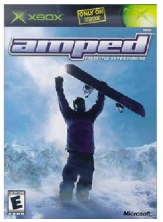

BLITZKRIEG

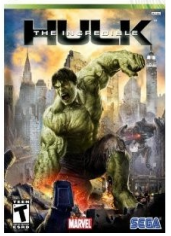
Introducing The World's First Competitive Sim!
MONOPOLY
TYCOON


DRIVER
SAN FRANCISCO
UBISOFT

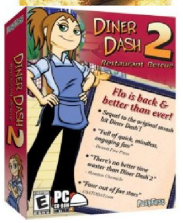
PC DVD
S.T.A.L.K.E.R.
SHADOW OF CHERNOBYL
THQ

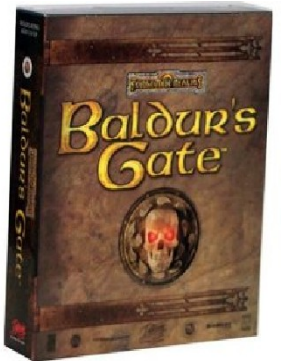

PC CD-ROM
GRIM FANDANGO
LucasArts


XBOX
amped

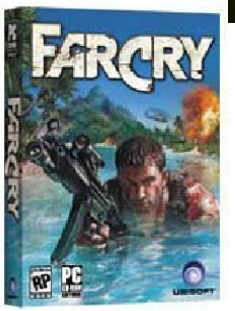

XBOX 360
HULK
SEGA

PlayStation.2
DESTROY ALL HUMANS!
ONE GIANT STEP ON MANKIND
THQ

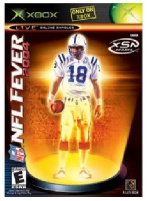

DINER DASH 2
Restaurant Rescue
Flo is back & better than ever!

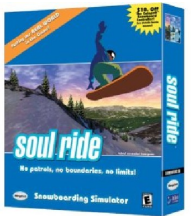

Baldur's Gate

WORLD WARCRAFT


FARCRY
UBISOFT

IMPOSSIBLE CREATURES
Microsoft

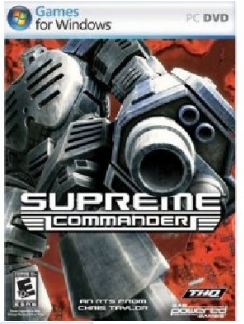

XBOX
NFL FEVER


soul ride
Snowboarding Simulator

ANGRY BIRDS
PLAY

PC CD-ROM
SpellForce

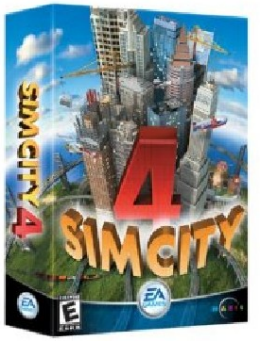
NAPOLEON
TOTAL WAR
16
SEGA


Games for Windows
PC DVD
SUPREME COMMANDER
THQ

XBOX 360
LIVE
FABLE II

PlayStation 3
BUZZ!
Quiz TV

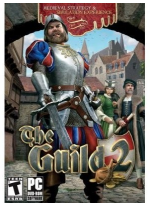
BRUTAL LEGEND

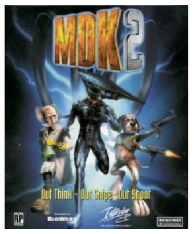

SIMCITY 4

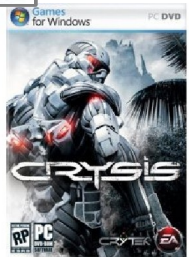
XBOX 360
TOPSPIN 2

XBOX 360
LIVE
SONIC
THE HEDGEHOG
SEGA

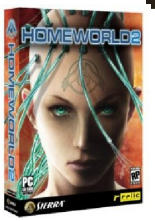
STAR WARS
EMPIRE AT WAR


The Guild 2

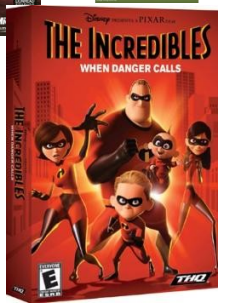

MDK2


Games for Windows
PC DVD
CRYSIS
CRYTEK
EA

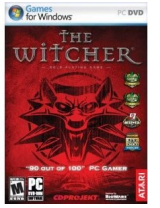
Games for Windows
PC DVD
SUPREME COMMANDER
Forged Alliance


HOMEWORLD 2

PlayStation.2
PSYCHONAUTS


THE INCREDIBLES
WHEN DANGER CALLS
THQ

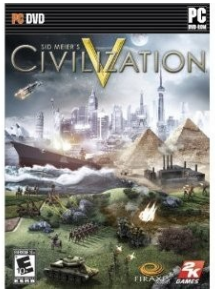
XBOX
Links


Games for Windows
PC DVD
THE WITCHER

XBOX 360
LIVE
CRACKDOWN

EMPIRE
TOTAL WAR
16+
SEGA

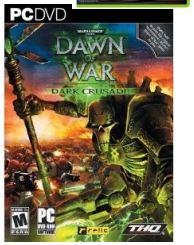
ESCAPE FROM
MONKEY ISLAND


PC DVD
CIVILIZATION V
2K GAMES

plus.+

XBOX 360
LIVE
CRACKDOWN

MIGHT AND MAGIC
HEROES V


PC DVD
DAWN WAR
DARK CRUSADE
THQ

Bubble
Ball

South American Software Development : Using Brazil to take the temperature of the South American software climate. Dr. Dobb's, Jan 2008.

“Although most software developed in South America is created for local use, we should look at one program that is not only a shining example of South American software development, but also a case study in software development in the climate of South American programming.”

Takhteyev, Yuri. Coding Places: Uneven Globalization of Software Work in Rio de Janeiro, Brazil. Ph.D. Dissertation, University of California, Berkeley. May 2009. (also: *Coding Places: Software Practice in a South American City*, MIT Press, Fall 2012.)

“One of the cases explored in depth is Lua, a programming language developed in Rio de Janeiro.”

“This [disembedding] creates difficult questions about what Lua could do for the country and the city where it was developed.”

Could your next IT project come from Brazil? ITPro, May 2010.

“But Brazil’s most popular technology export is Lua. […]
Lua is one of the reasons why [Sergio Rezende, then minister of science and technology] can call Brazil ‘one of the three key IT centres in the world’.”

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