lubyk

lua libraries for live arts

Gaspard Bucher (Buma)
artist, musician, coder

lubyk

is **not** a **framework**

Why lubyk ?

- **Reuse** code from project to project
- **Accelerate** development (live coding)
- **Simple** APIs
- Good **documentation**
- Stability (unit **tests**)

History !

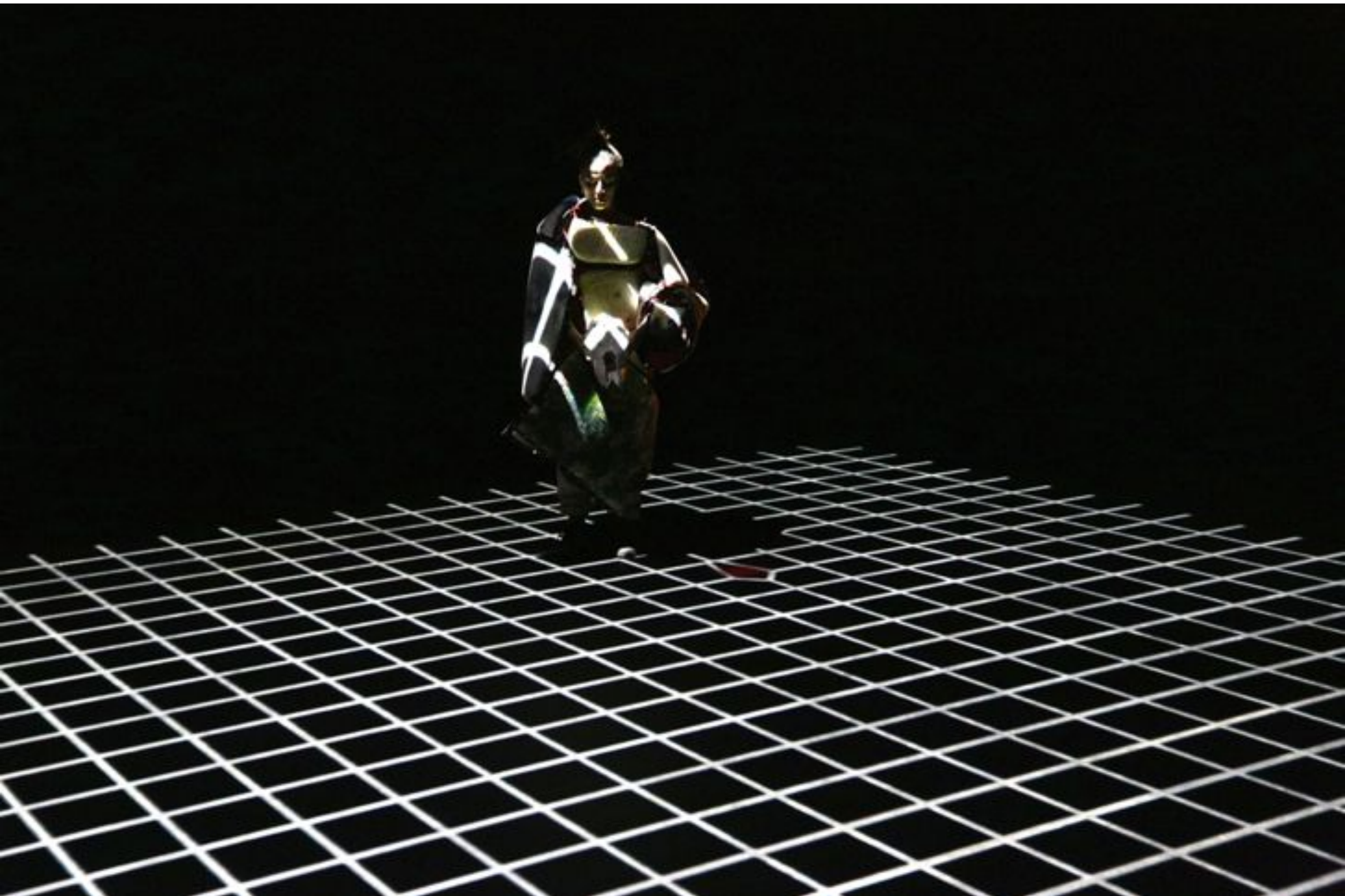
- **2006** First prototype in Ruby
  - Slow, inaccurate, **rubato** music
- **2008** Second pure C++ version, many threads, mutex. Lua scripting. Works when not crashing

2008 “Home” machine learning based movement recognition

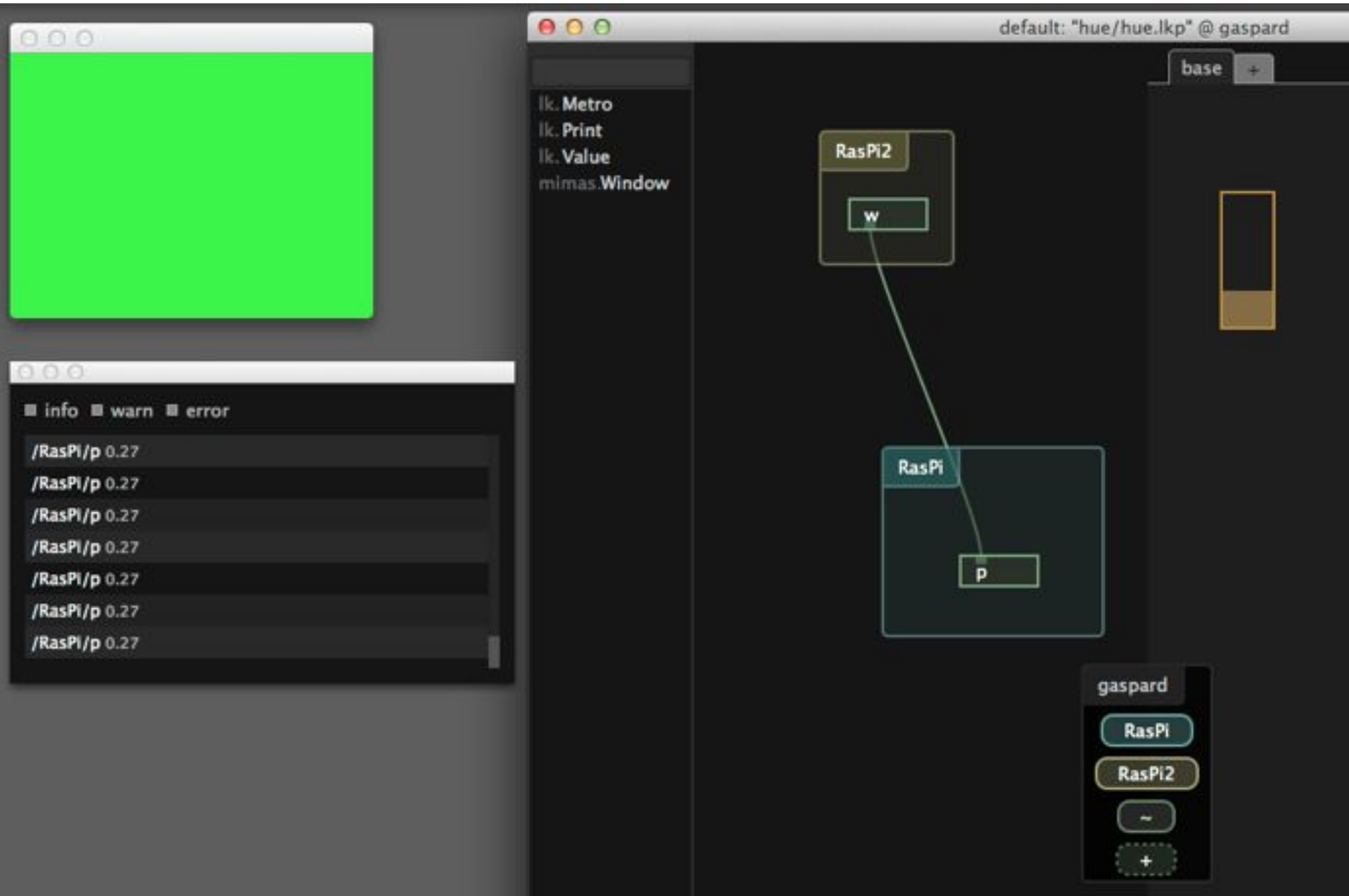
History !

- **2006** First prototype in Ruby
  - Slow, inaccurate, **rubato** music
- **2008** Second pure C++ version, many threads, mutex. Lua scripting. Works when not crashing
- **2011** Third version, pure lua, Qt GUI, multi-process, network distribution (mdns, zeroMQ, Msgpack).

2011 “boats to nowhere”



2011 All written in lua (**dub** made **Qt** bindings)



What was wrong ?

- Did not scale well to larger projects
- Confusing interface
- Hard to work on different parts (shaders, physics, control, music integration, etc).
- Too complex, hard to share modules
- **Complicated GUI takes too much dev time !!**

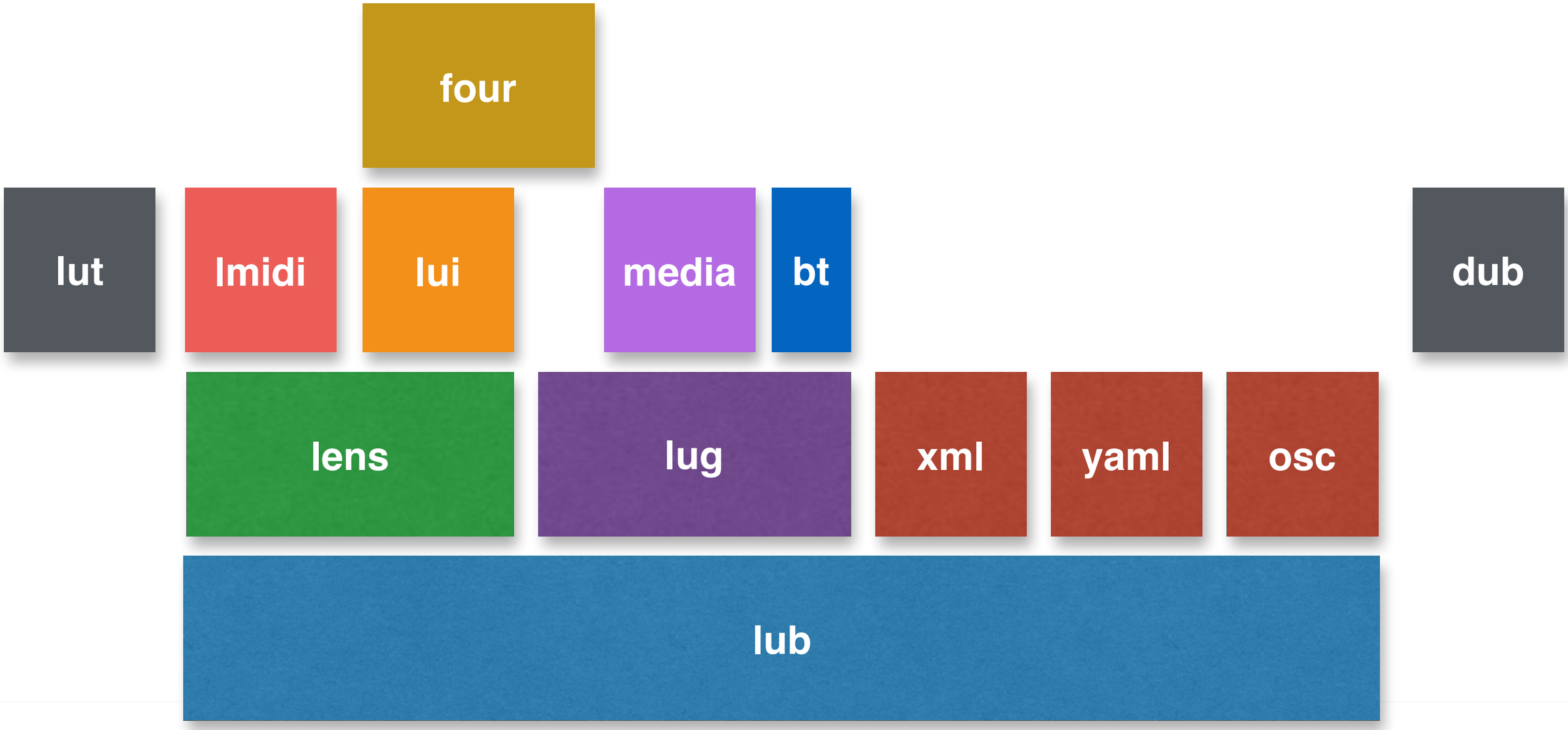
less is **more**

```
local midi = require 'lmidi'
local lens = require 'lens'

lens.run(function() lens.FileWatch() end)

midi_in = midi_in or midi.In(3)
function midi_in:receive(msg)
  print(msg.type)
end
```

History !

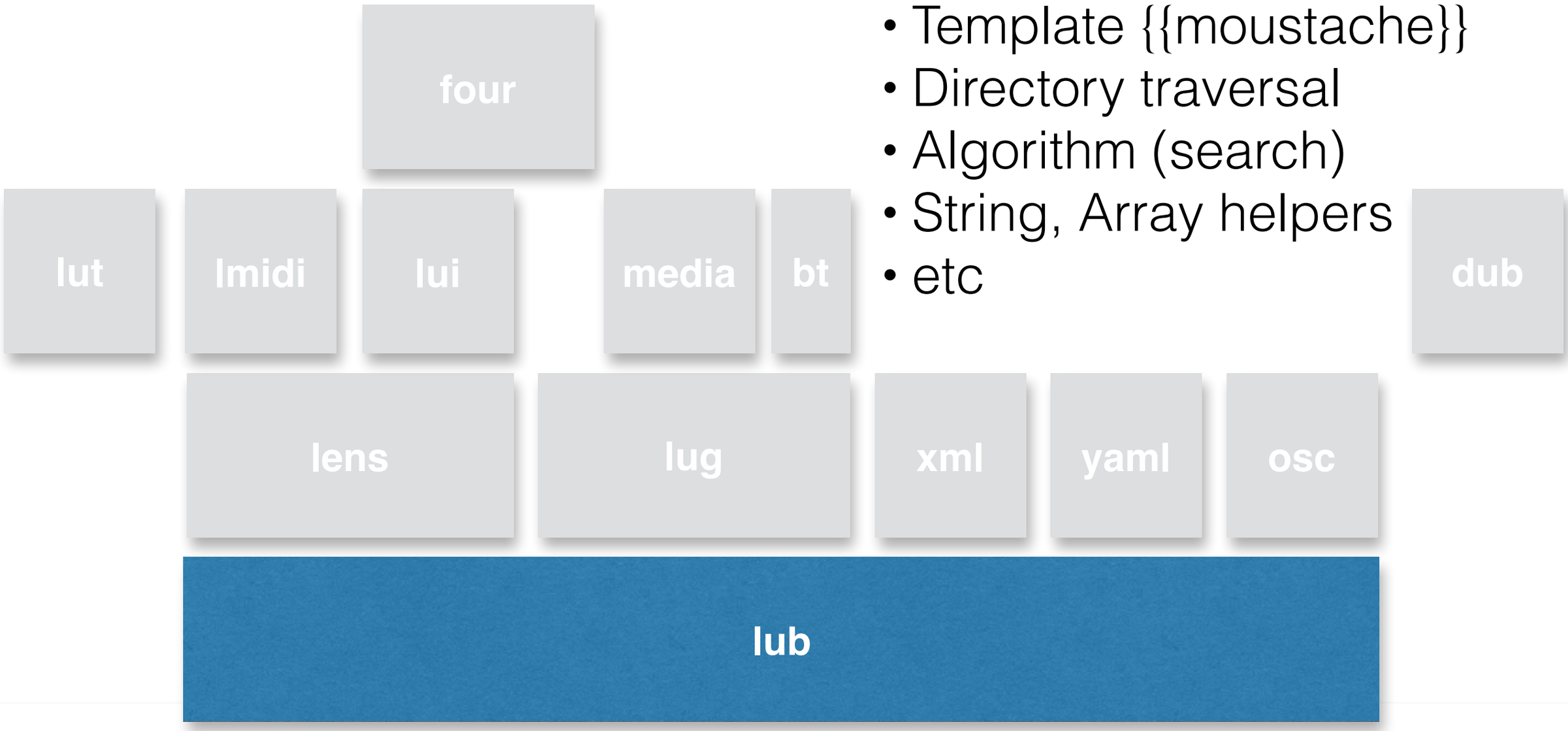
- **2006** First prototype in Ruby
  - Slow, inaccurate, **rubato** music
- **2008** Second pure C++ version, many threads, mutex. Lua scripting. Works when not crashing
- **2011** Third version, pure lua, Qt GUI, multi-process, network distribution (mdns, zeroMQ, Msgpack).
- **2014** Fourth version, modules, tests, doc

Modules

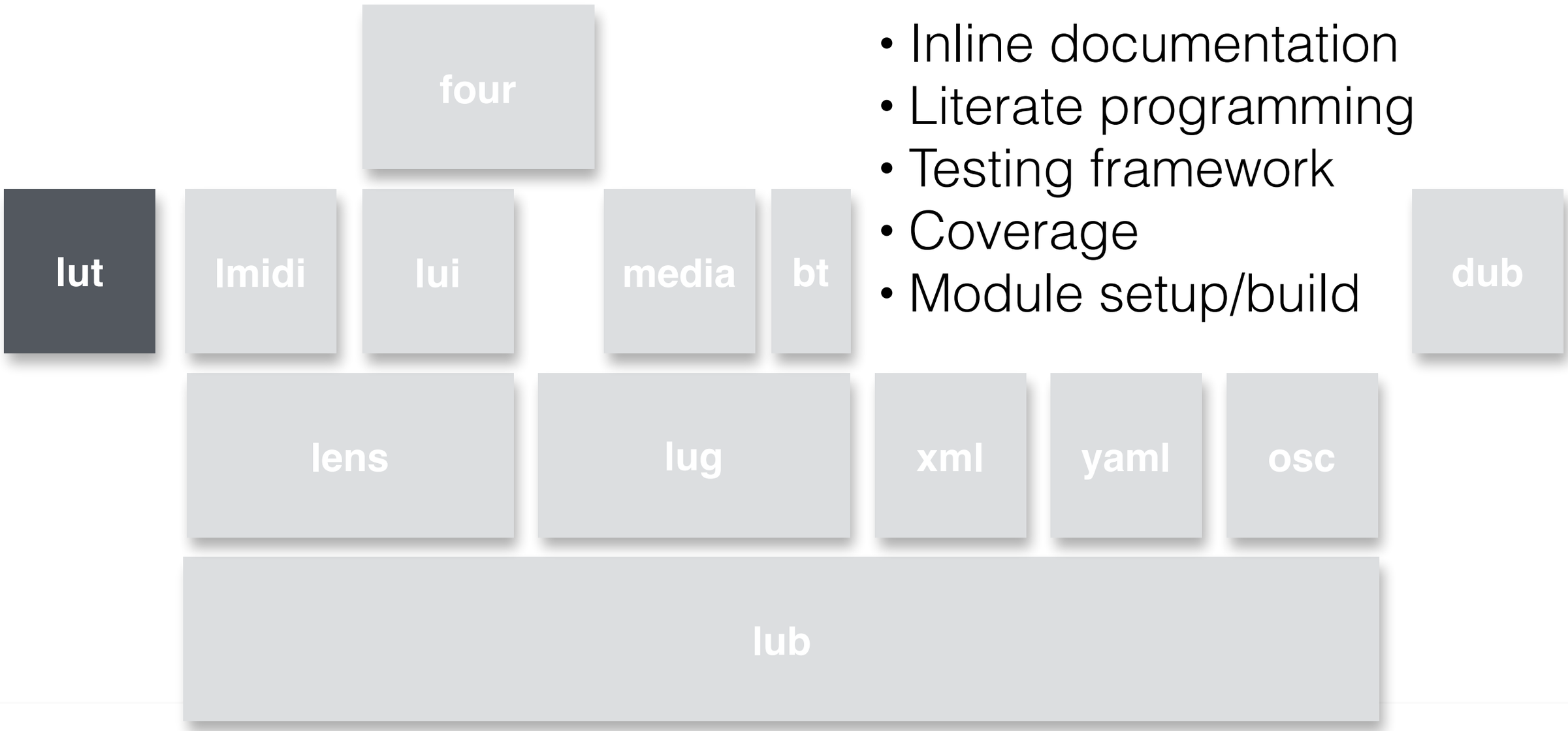


lub

- Class declaration
- Template {{moustache}}
- Directory traversal
- Algorithm (search)
- String, Array helpers
- etc



Documentation, testing



- Inline documentation
- Literate programming
- Testing framework
- Coverage
- Module setup/build

lut.Doc

- lug.V2
- Constructor
- Constants
- Accessors
- Functions
- Taversal
- Predicates
- Operators

:tuple ()

Get `x, y` components as tuple.

:tostring ()

A textual representation of the vector.

Cross references

Functions

Functions neg, add, sub and smul are also accessible through operators:

```
local v  = lug.V2(1,2)
local nv = -v
local w  = v + nv
local n  = 4 * v
local m  = v * 3
```

.neg (v)

Inverse vector $-\mathbf{v}$.

Latex Math

.add (u, v)

Add two vectors: $\mathbf{u} + \mathbf{v}$.

.sub (u, v)

Subtract two vectors: $\mathbf{u} - \mathbf{v}$.

.mul (u, v)

lut.Doc

literate programming

```
--[[----------------------------------------------------------

  # Automatic script reloading (live coding)

  In this tutorial, we show how to use lens.FileWatch to live code a lua script.

  ## Download source

  [LiveCoding.lua](example/lens/LiveCoding.lua)

--]]----------------------------------------------------------
-- doc:lit

-- # Preamble
--
-- Require lens library.
local lens = require 'lens'

-- Start scheduler and setup script reload hook with `lens.FileWatch`. Starting
-- the scheduler at the top of the script and using file reloading is a nice
-- trick that ensures all the code after `lens.run` is only executed within the
-- scope of the scheduler.
lens.run(function() lens.FileWatch() end)

-- This part of the script is executed on the initial `FileWatch` call. This
-- means we are actually within the scheduler loop and we can therefore create
-- threads and timers.

-- # Do something
--
-- Here we create a timer for demonstration purpose but you could as well create
-- a window, a socket or whatever you need to do.
--
```

lut.Doc

literate programming

Automatic script reloading (live coding)

In this tutorial, we show how to use lens.FileWatch to live code a lua script.

Download source

LiveCoding.lua

Preamble

Require lens library.

```
local lens = require 'lens'
```

Start scheduler and setup script reload hook with `lens.FileWatch`. Starting the scheduler at the top of the script and using file reloading is a nice trick that ensures all the code after `lens.run` is only executed within the scope of the scheduler.

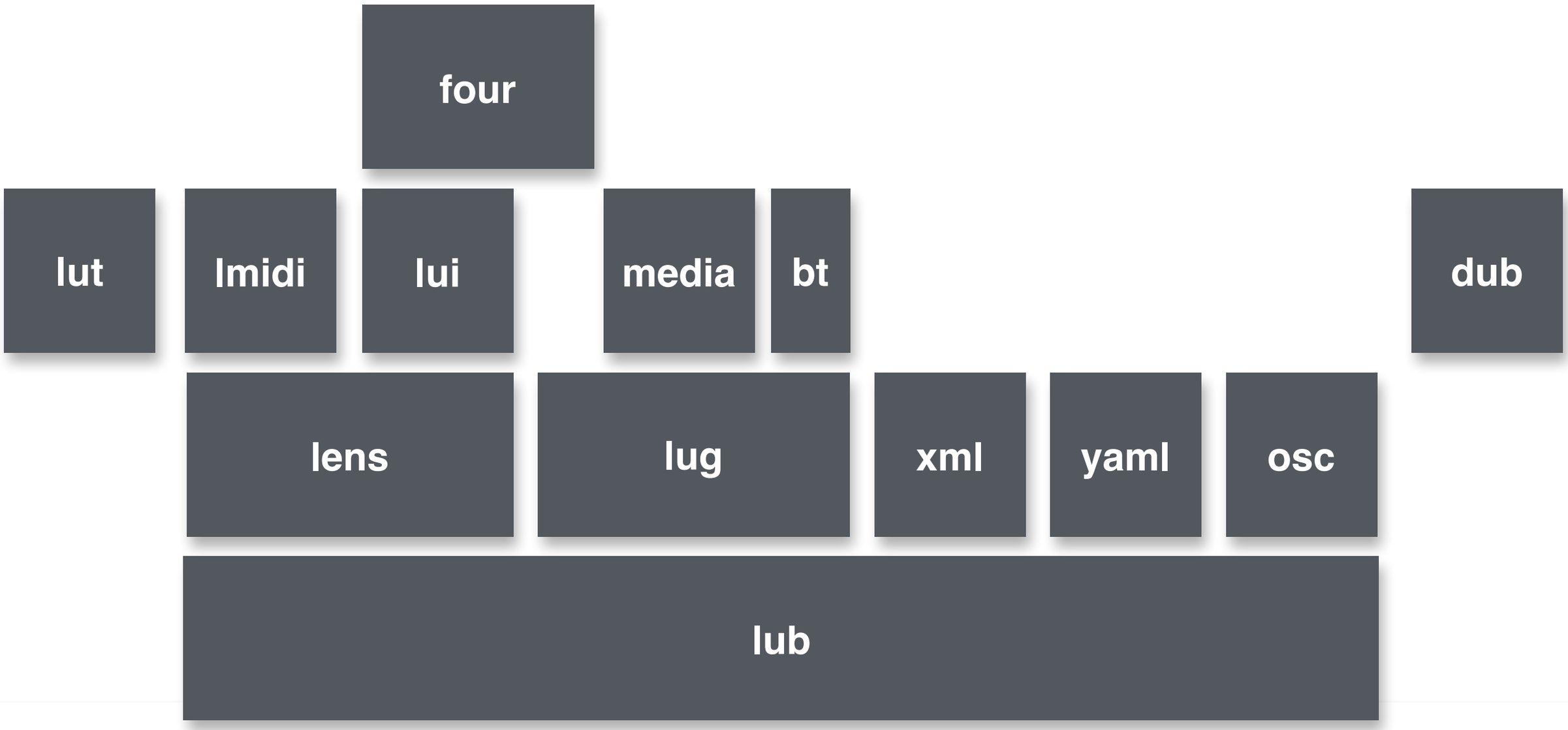
```
lens.run(function() lens.FileWatch() end)
```

This part of the script is executed on the initial `FileWatch` call. This means we are actually within the scheduler loop and we can therefore create threads and timers.

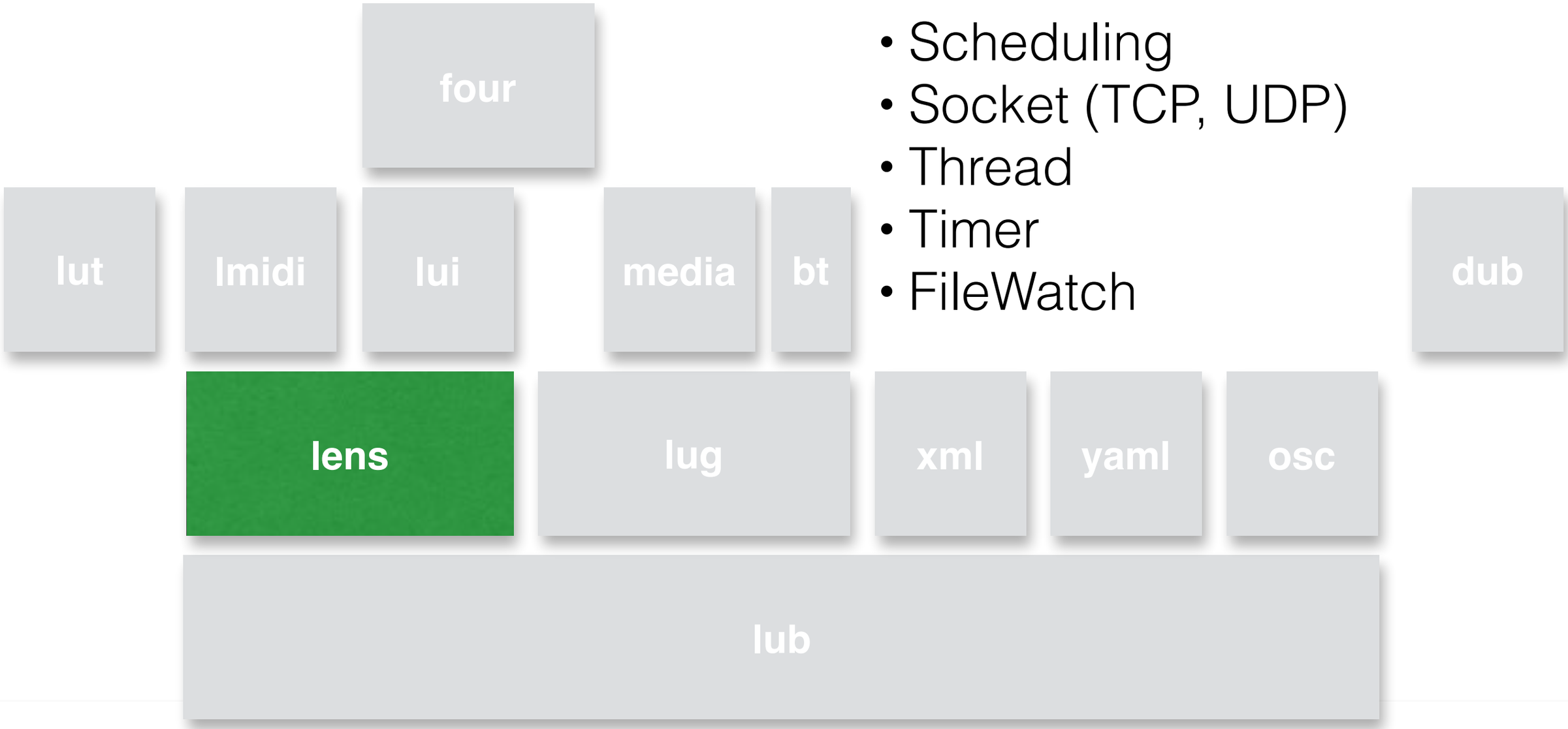
Testing with **lut.Test**

```
local lub    = require 'lub'
local lut    = require 'lut'
local should = lut.Test 'lub'

function should.readAll()
  local p = lub.path '|fixtures/io.txt'
  assertEqual('Hello Lubyk!\n', lub.content(p))
end

function should.absolutizePath()
  assertEqual(lfs.currentdir() .. '/foo/bar', lub.absolutizePath('foo/bar'))
  assertEqual('/foo/bar', lub.absolutizePath('/foo/bar'))
end

function should.merge()
  local base = {a = { b = {x=1}}, c = {d = 4}}
  lub.merge(base, {
    a = 'hello',
    d = 'boom',
  })
  assertValueEqual({a = 'hello', c = {d = 4}, d = 'boom'}, base)
end
```

Libraries using **lut**



lens



- Scheduling
- Socket (TCP, UDP)
- Thread
- Timer
- FileWatch

encode / decode

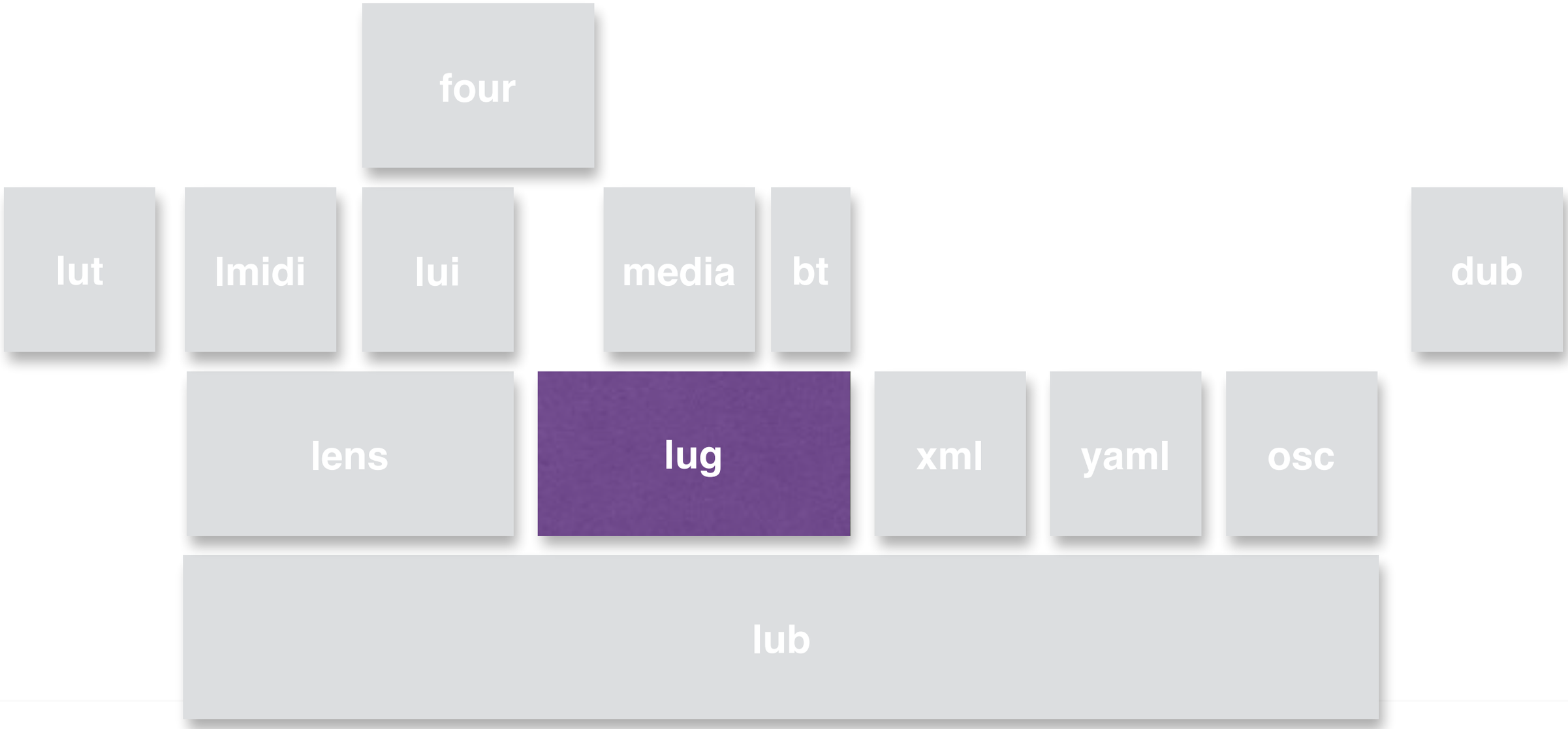
four

lut | lmidi | lui | media | bt | dub

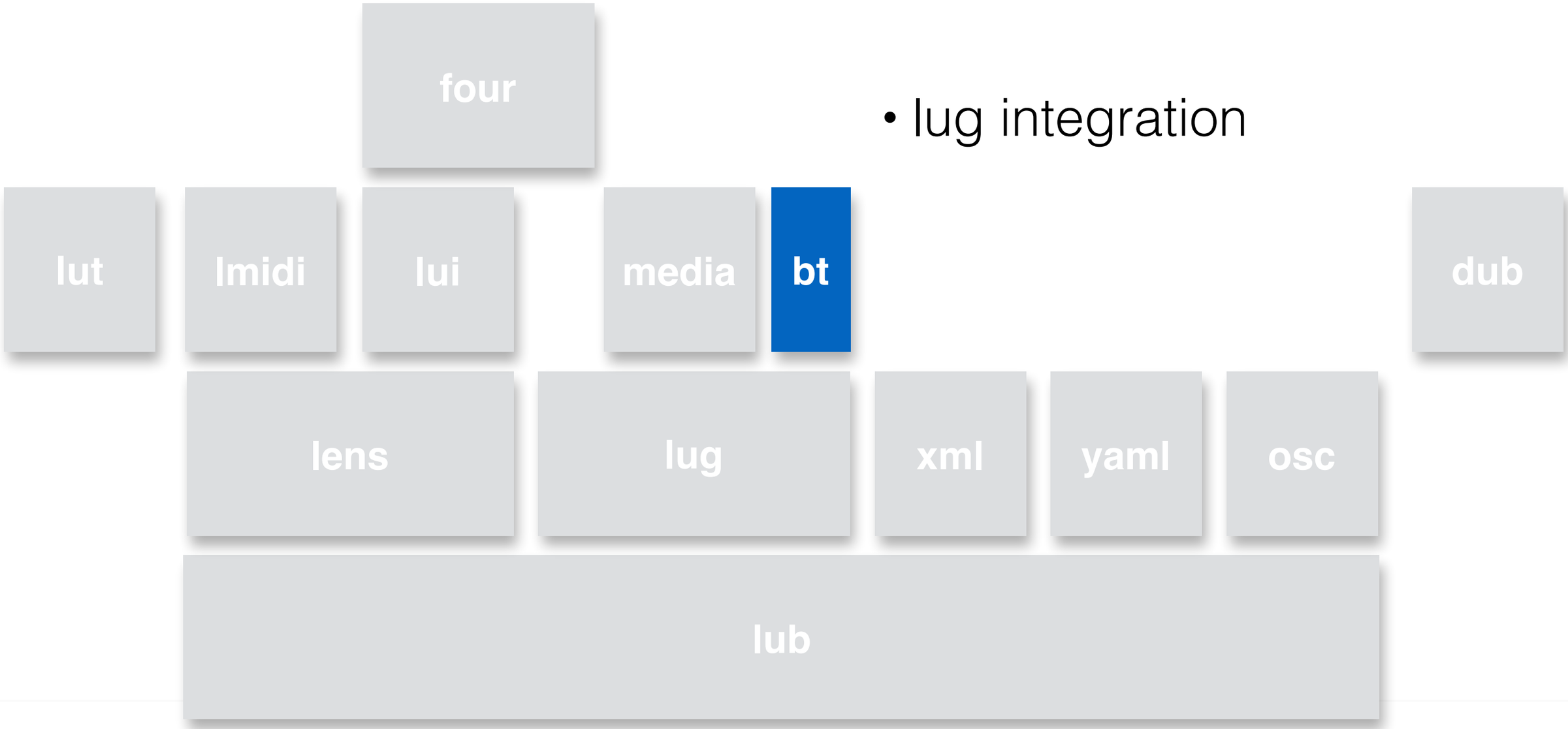
lens | lug | xml | yaml | osc

lub

Core graphic types

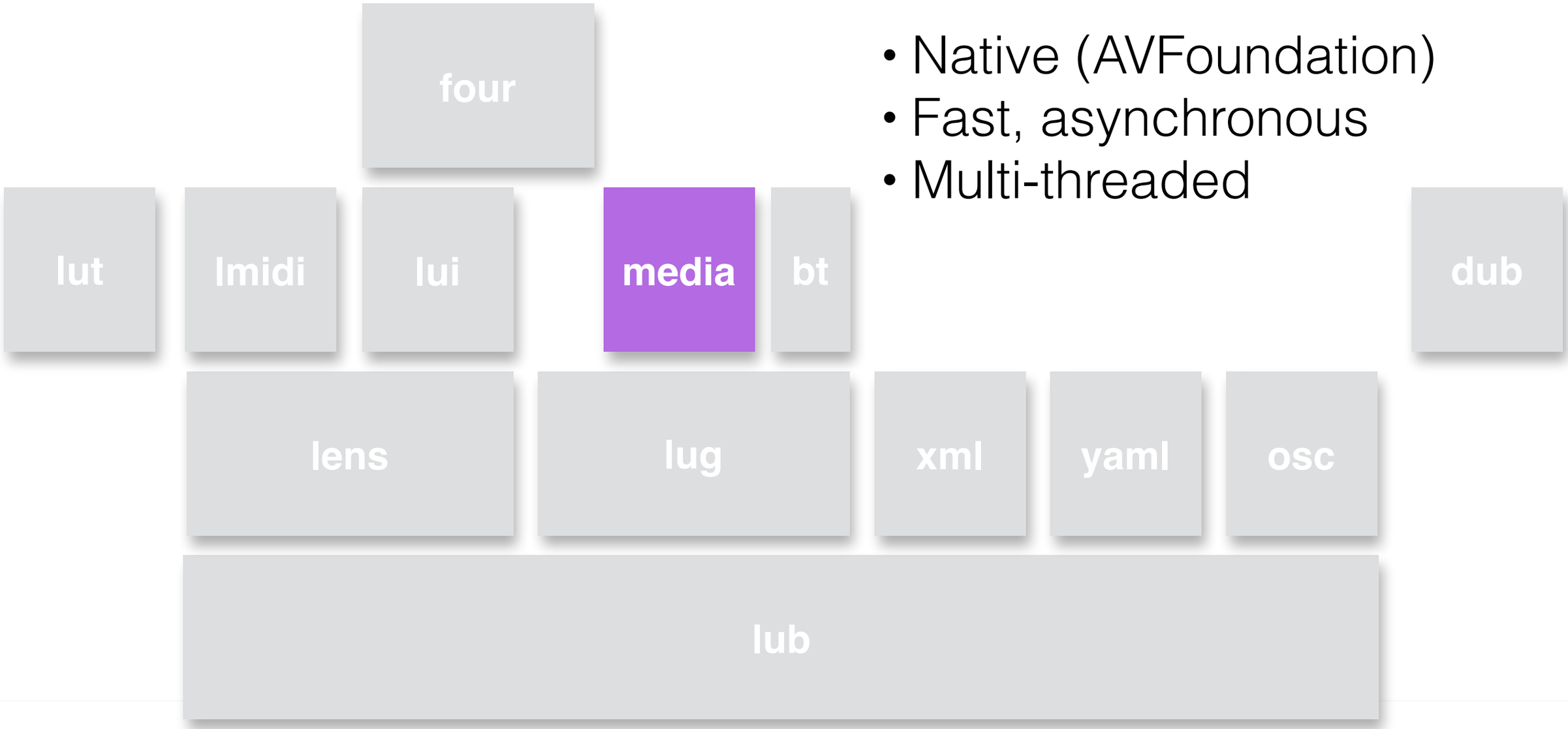


bulletphysics (3D physics)



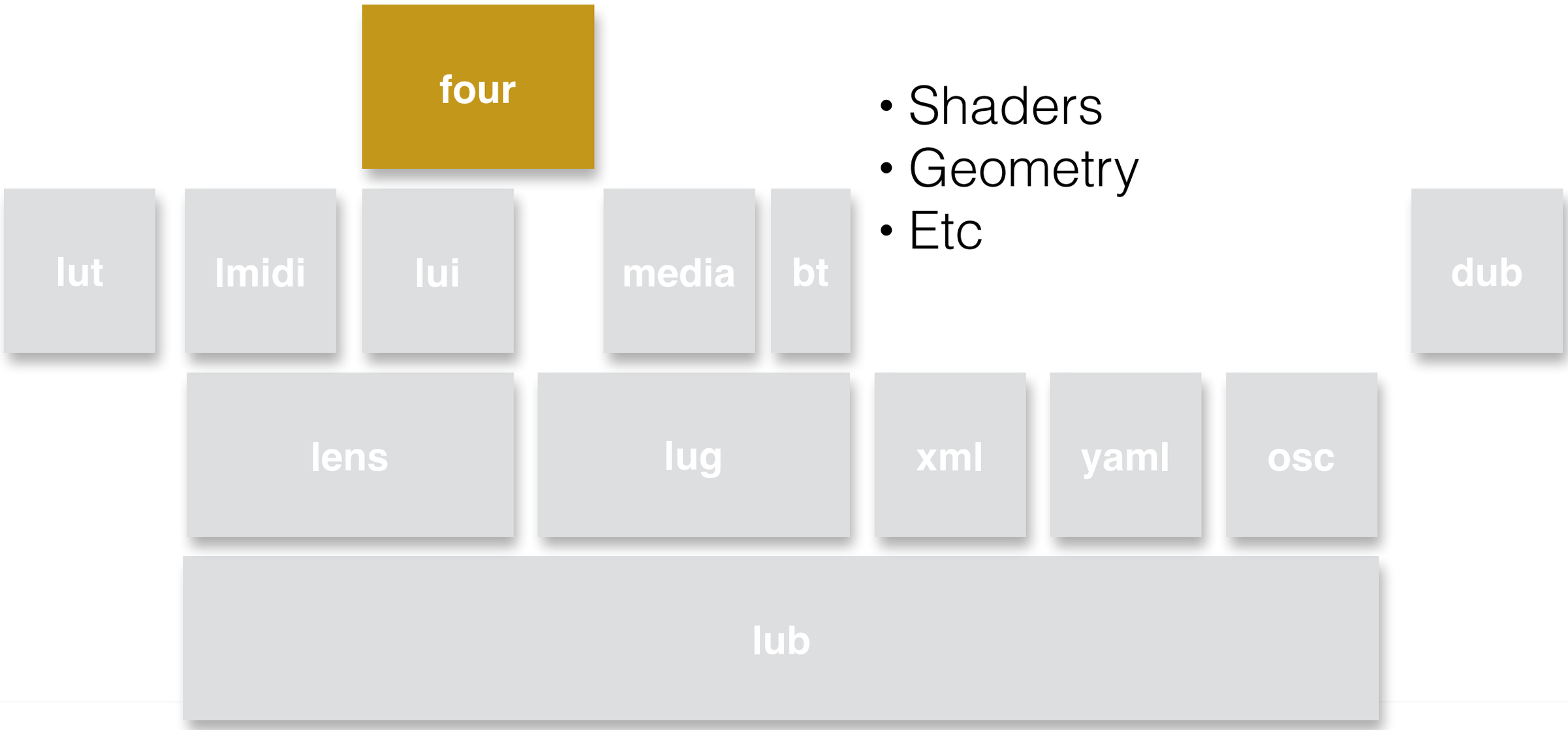
- lug integration

media (video, image)



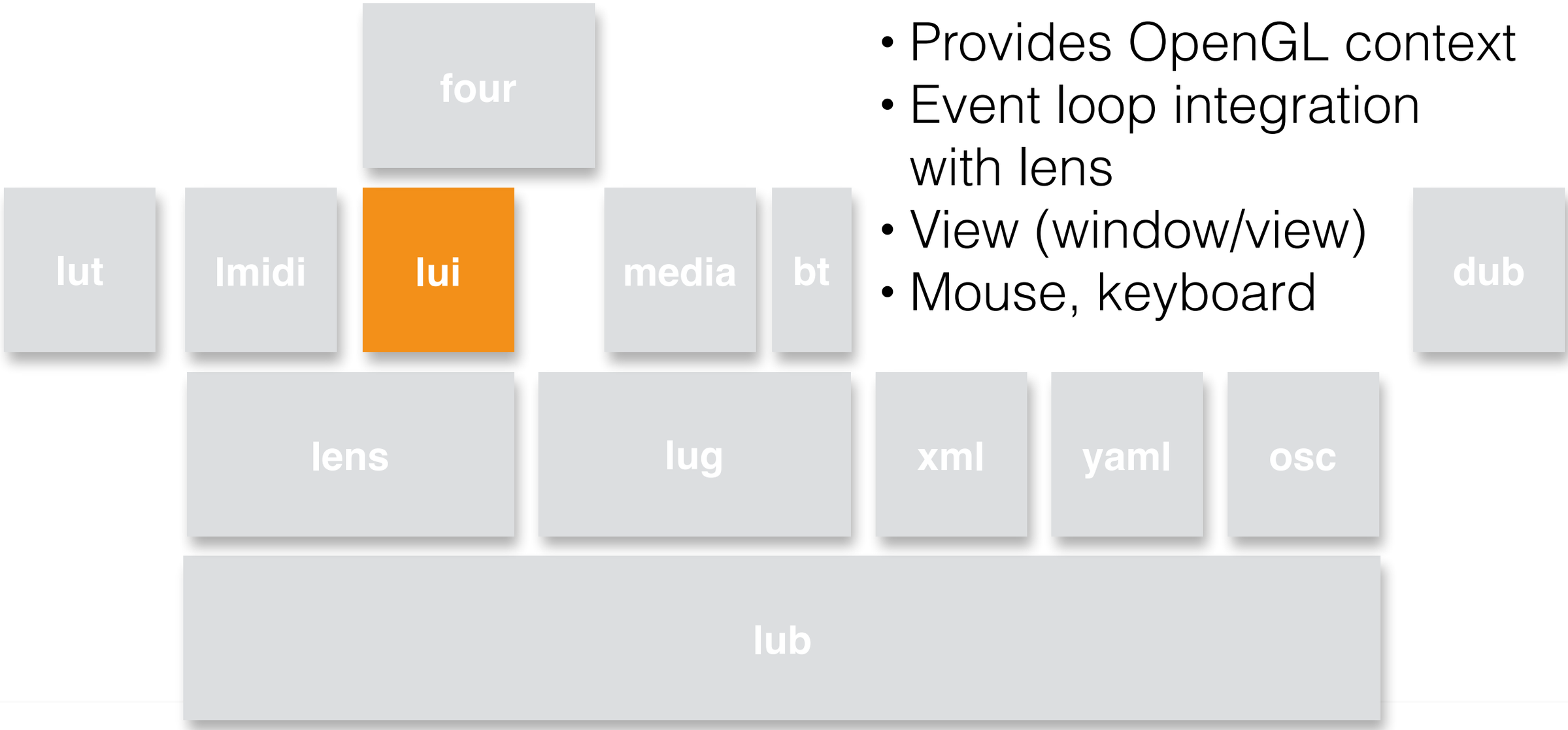
- Native (AVFoundation)
- Fast, asynchronous
- Multi-threaded

OpenGL 4



- Shaders
- Geometry
- Etc

Native UI



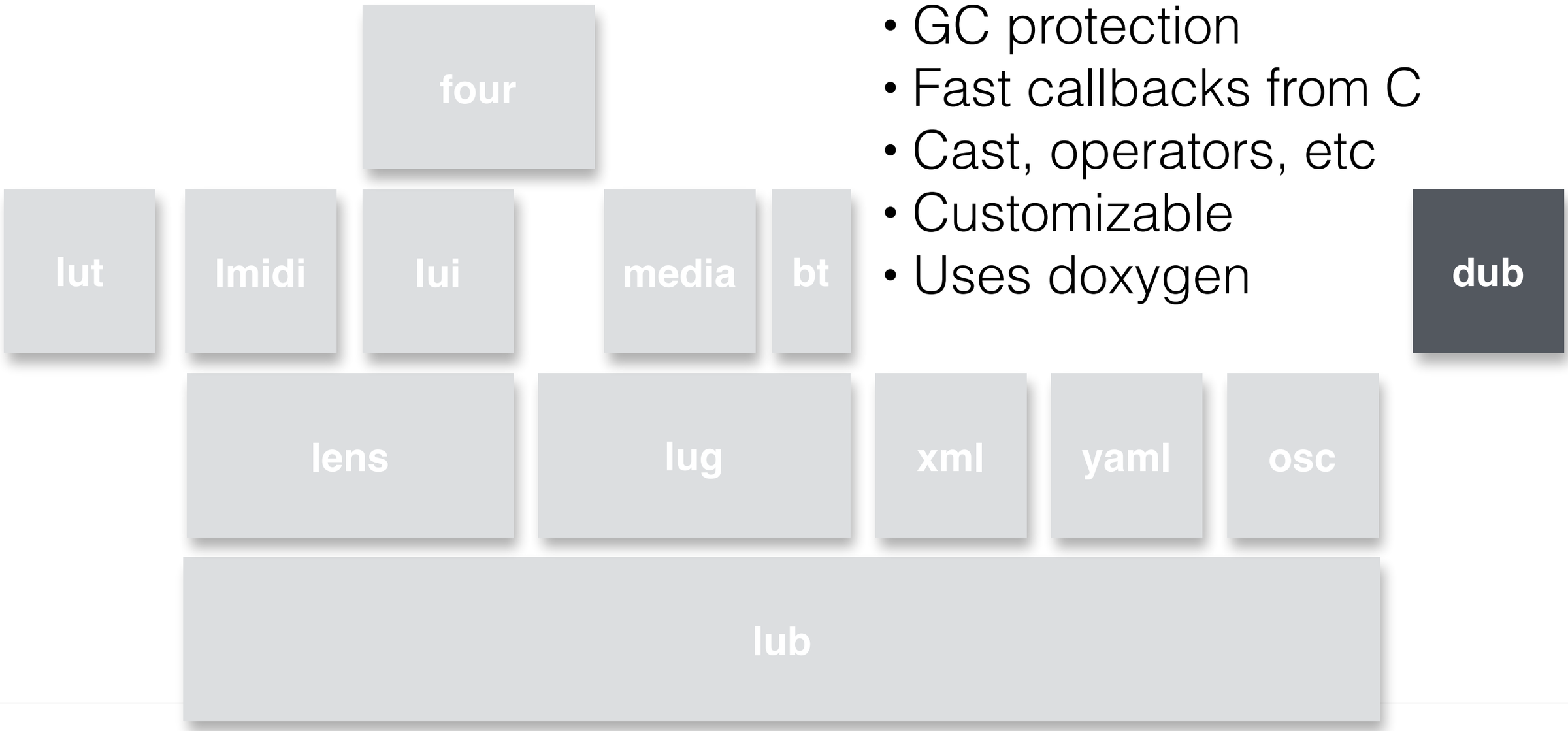
- Provides OpenGL context
- Event loop integration with lens
- View (window/view)
- Mouse, keyboard

midi

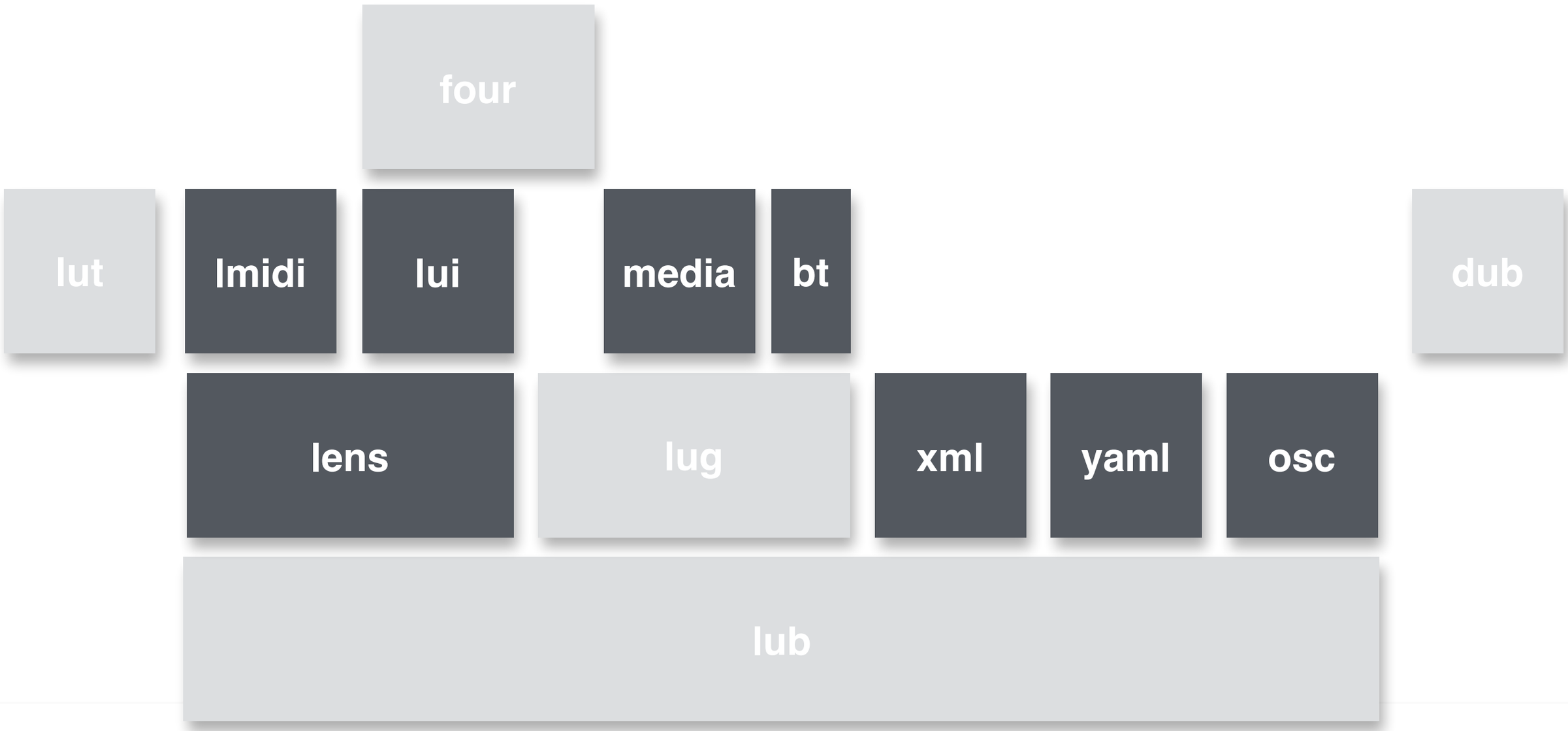
- Midi in/out
- Virtual ports, real ports
- Note handling (off event)

C++ binding generator

- Advanced type management
- GC protection
- Fast callbacks from C
- Cast, operators, etc
- Customizable
- Uses doxygen



Libraries using **dub**



OS Support

Windows

alpha

beta

released

four

lut

lmidi

lui

media

bt

dub

lens

lug

xml

yaml

osc

lub

Linux

alpha

beta

released

four

lut

lmidi

lui

media

bt

dub

lens

lug

xml

yaml

osc

lub

Mac OS X

alpha

beta

released

four

- media = 10.9

lut

lmidi

lui

media

bt

dub

lens

lug

xml

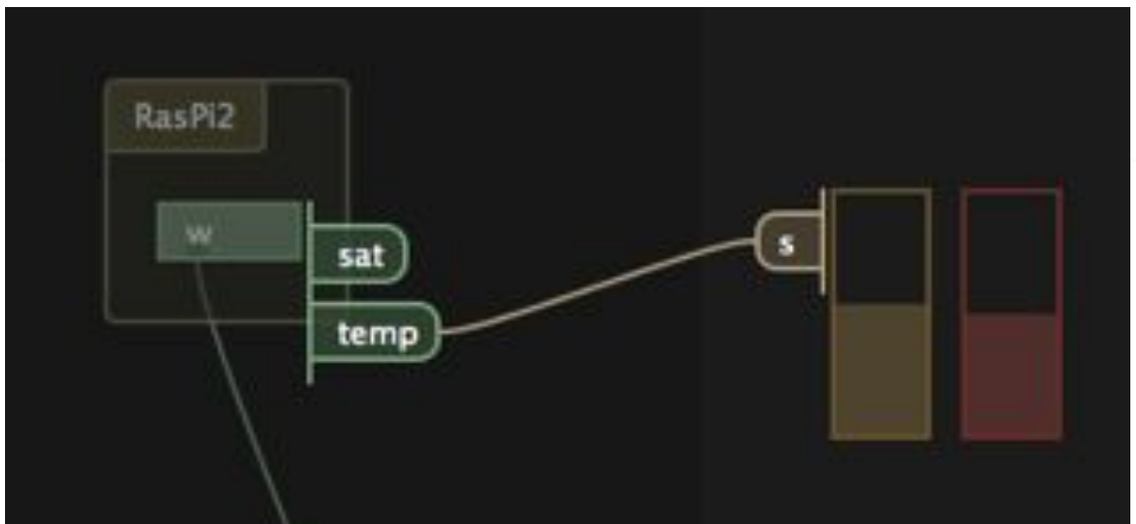
yaml

osc

lub

Future plans

- Simple multi-machine, multi-process support (**mdns** + **zmq** + **dropbox**)
- Parameter support (per effect, per object, etc). Makes code reuse and adaptation easy.
- Eventually, use a simple web app for this.
- Exploration needed, **ideas welcome !**

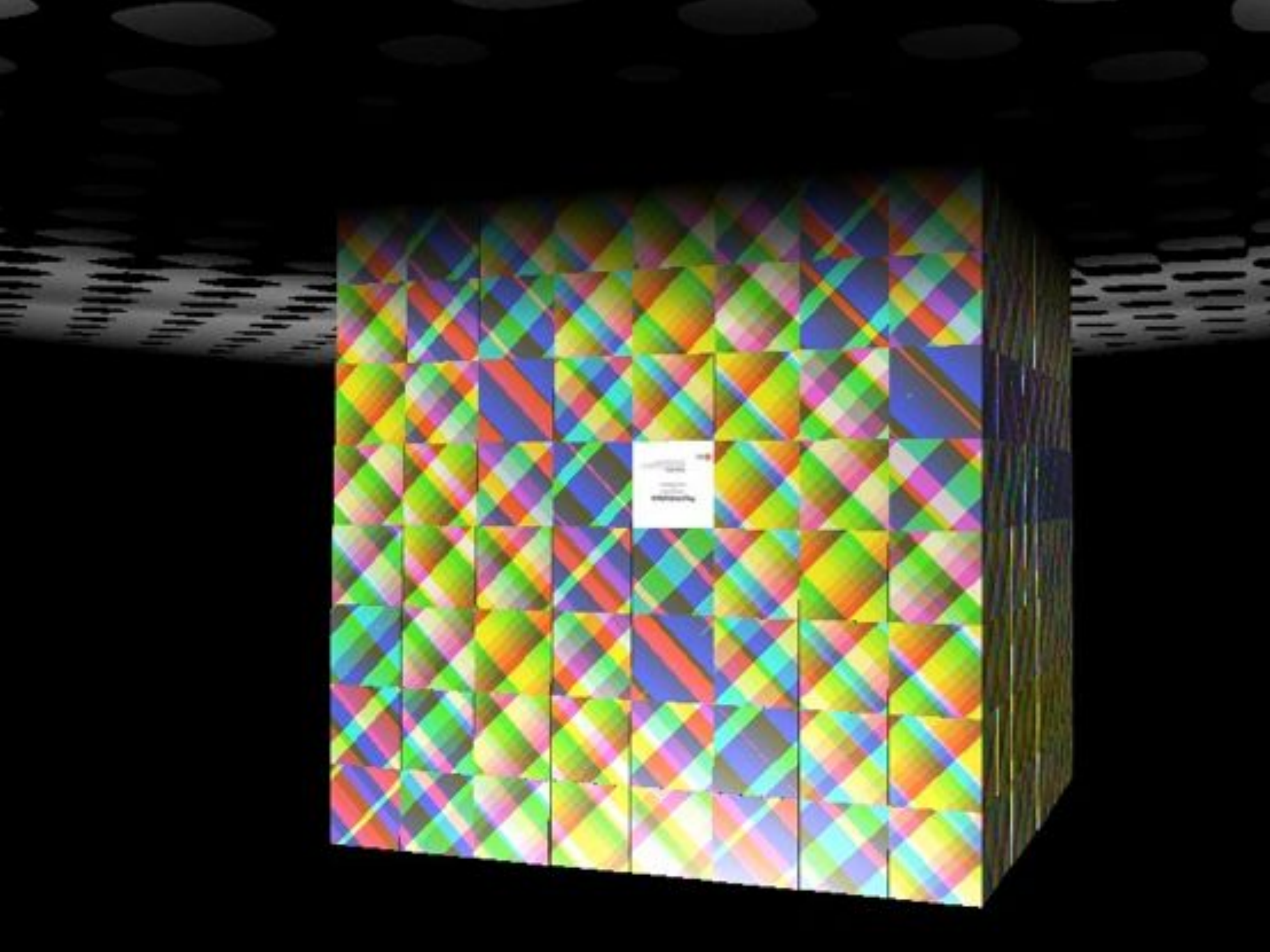


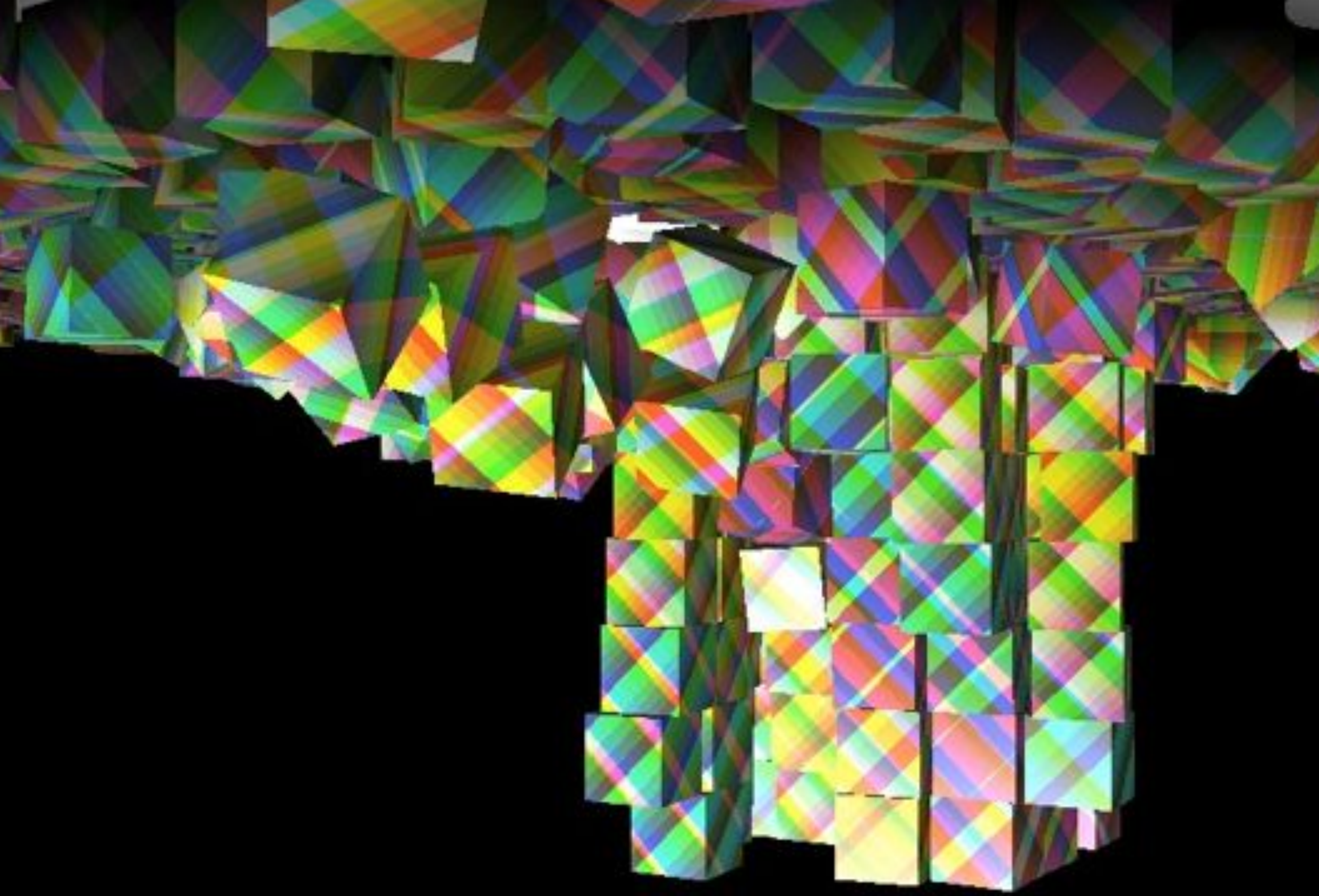
Immediate plans

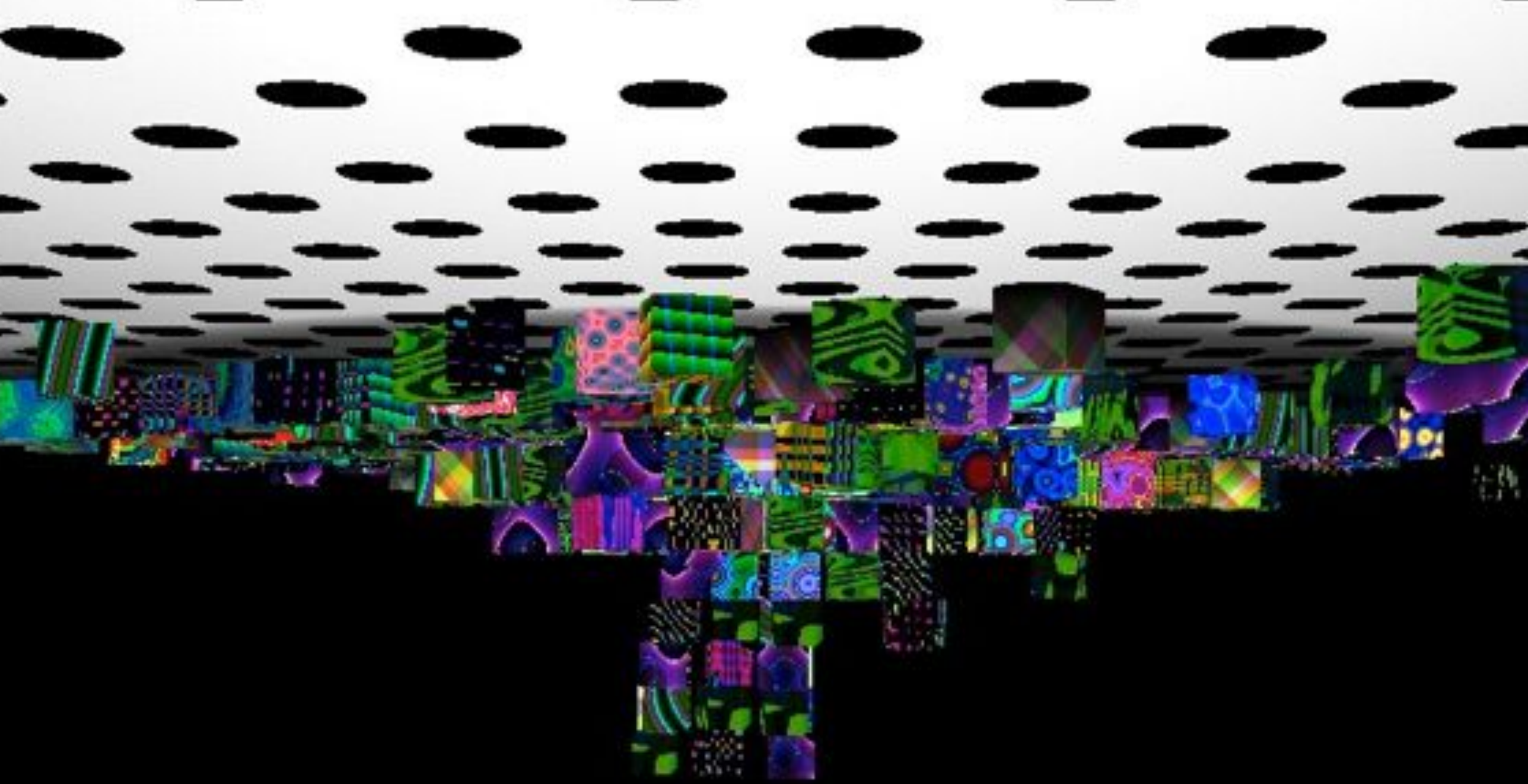
- Finish Linux port, start Windows port, for fun RPi
- Extract **lug** from four and optimize data transfers
- Fix old lubyk libraries
  - **mdns** (Zeroconf plug&play network)
  - **zmq** (ZeroMQ messaging library)
  - **box2D** (2D physics)
- Parameter handling
- **Workshops !**

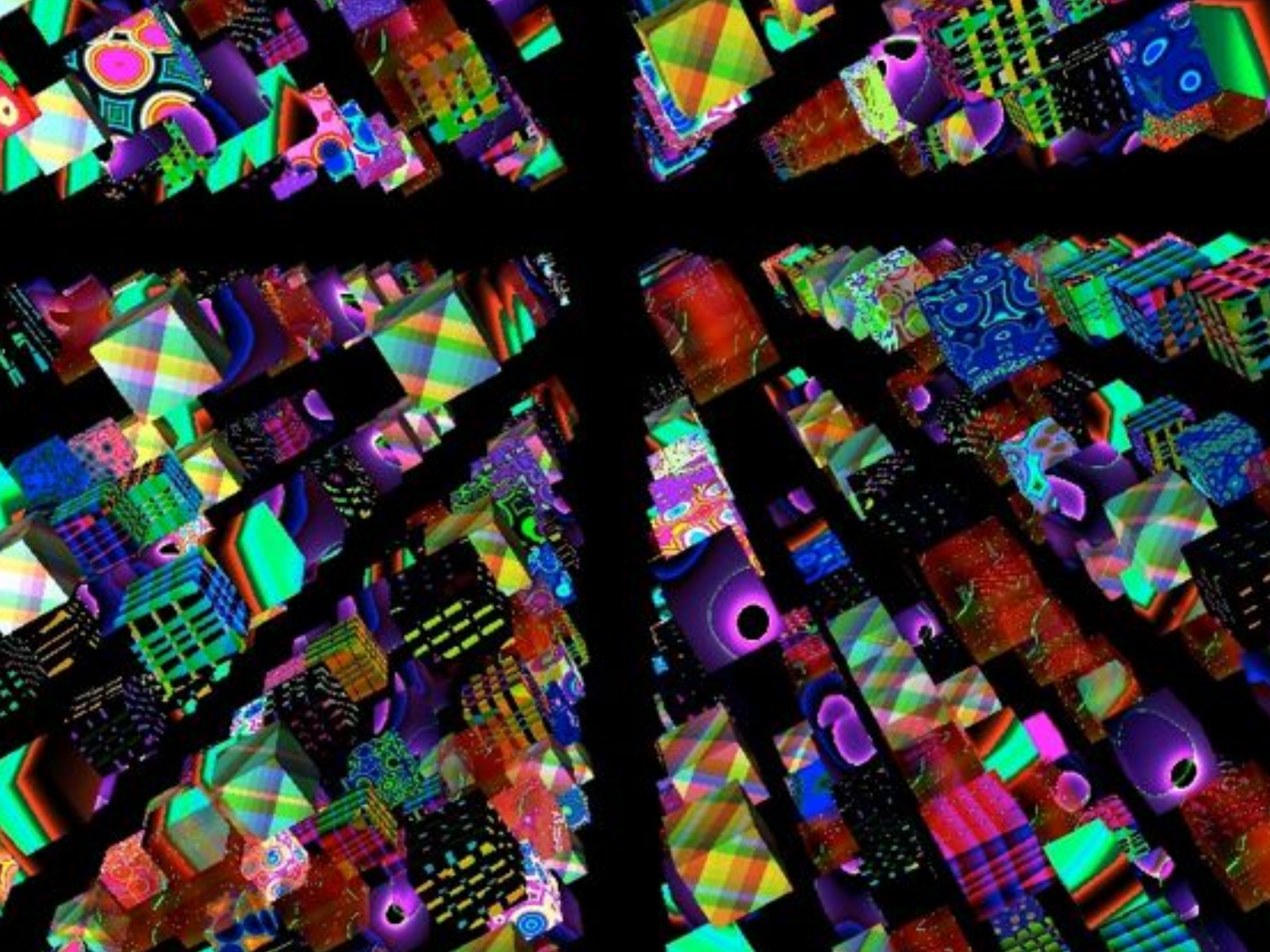
using **lubyk**

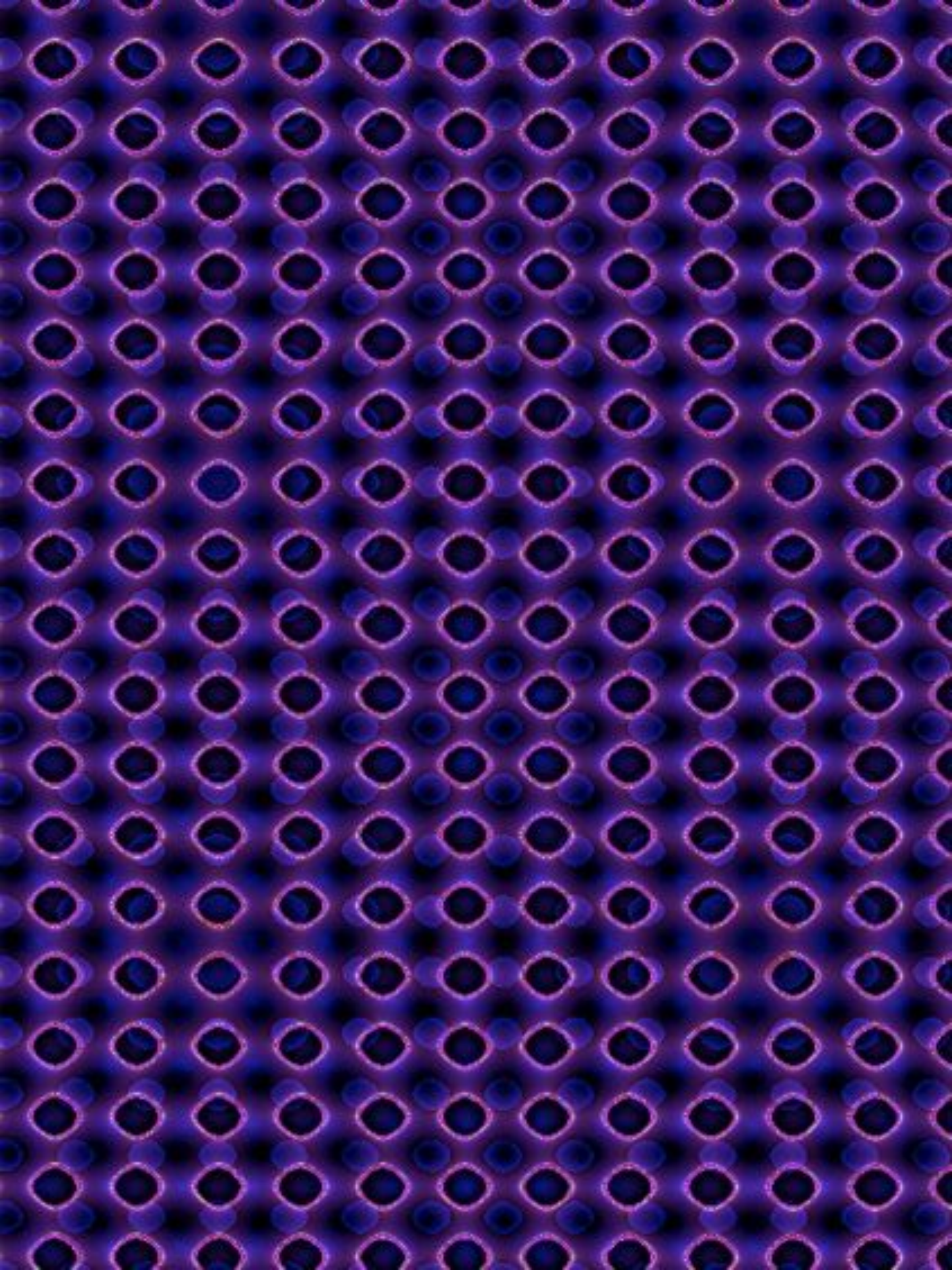
- Stable modules: **luarocks install …**
- Licence: **MIT**
- Documentation: **doc.lubyk.org**
- Source code: **github.com/lubyk**
- Twitter: **@lubyk_**











спасибо

lots of projects to follow on

@bumagy