





LUA AS A SECOND LANGUAGE



WHERE CAN WE FIND LUA?

LIGHTROOM

MYSQL WORKBENCH

WIRESHARK

ASTERISK

WORLD OF WARCRAFT

LUA IS LIGHT IN FEATURES

DYNAMICALLY TYPED

FEW ATOMIC STRUCTURES

EVEN LESS COMPOUND STRUCTURES

FUNCTIONS AS FIRST CLASS CITIZENS

DATA TYPES

SCALAR



BOOLEAN
INTEGER
FLOAT
STRING



BOOLEAN
NUMBER
STRING

DATA TYPES

COMPOUND



ARRAY
OBJECT
CALLABLE
ITERABLE



TABLE
FUNCTION

DATA TYPES

SPECIAL



NULL
RESOURCE



NIL
USERDATA
THREAD

LUA IS LIGHT IN FEATURES

COERCION

CLOSURES

COROUTINES

GARBAGE COLLECTION

OBJECTS?

```
class Player
{
    public $name = '';

    public function __construct($name)
    {
        $this->name = $name;
    }
}
```



```
Player = {
    name = ''
}
```

```
function Player:new(object)
    object = object or {};
    setmetatable(object, self);
    self.__index = self;

    return object;
end
```



INHERITANCE?

```
class NPC extends Player  
{  
  
}
```

```
Npc = Player:new()  
o = Npc:new{name="Ogre"}
```



NAMESPACES?

```
namespace Player\NPC;
```

```
Player = {}  
Player.NPC = {}
```



LUA STANDARD LIBRARY

BASE

PACKAGE

COROUTINE

STRING

UTF8

TABLE

MATH

IO

OS

DEBUG

ARRAY

array_change_key_case, array_chunk, array_column, array_combine, array_count_values, array_diff_assoc, array_diff_key, array_diff_uassoc, array_diff_ukey, array_diff, array_fill_keys, array_fill, array_filter, array_flip, array_intersect_assoc, array_intersect_key, array_intersect_uassoc, array_intersect_ukey, array_intersect, array_key_exists, array_key_first, array_key_last, array_keys, array_map, array_merge_recursive, array_merge, array_multisort, array_pad, array_pop, array_product, array_push, array_rand, array_reduce, array_replace_recursive, array_replace, array_reverse, array_search, array_shift, array_slice, array_splice, array_sum, array_udiff_assoc, array_udiff_uassoc, array_udiff, array_uintersect_assoc, array_uintersect_uassoc, array_uintersect, array_unique, array_unshift, array_values, array_walk_recursive, array_walk, array_arsort, array_asort, compact, count, current, end, extract, in_array, key_exists, key, krsort, ksort, list, natcasesort, natsort, next, pos, prev, range, reset, rsort, shuffle, sizeof, sort, uasort, uksort, usort,

TABLE

concat, insert, maxn, remove, sort

ECOSYSTEM

ECOSYSTEM

TIOBE INDEX



#9



#33

ECOSYSTEM

GITHUB REPOSITORIES



1M+



62K+

ECOSYSTEM

STACK OVERFLOW QUESTIONS



1.2M+



15K+

ECOSYSTEM

IDE

INTELLIJ

ECLIPSE

ZEROBRANE STUDIO

VISUAL STUDIO

EMACS

ATOM

SUBLIME

ECOSYSTEM

PACKAGE MANAGEMENT

LUAROCKS

LUADIST

ECOSYSTEM

PACKAGE MANAGEMENT

BUSTED

SPECL

LUASOCKET

REDIS-LUA

LUA-CJSON

UUID

LUASQL-MYSQL

LUA-GEOIP



REDIS

MOST LOVED DB

THIRD YEAR IN A ROW (via [STACK OVERFLOW INSIGHTS](#))

REDIS

DATA STRUCTURE STORE

CACHE

DATABASE

MESSAGE BROKER

ATOMIC

LUA SCRIPTING

REDIS

LUA SCRIPTING

PROMISE OF ATOMICITY

ACCESS REDIS ITSELF WITH `redis.call()` OR `redis.log()`

LEARN CONVERSION BETWEEN DATATYPES

NO GLOBAL VALUES

BASE LIBRARIES + STRUCT, CJSON & CMSGPACK

THE CRISIS



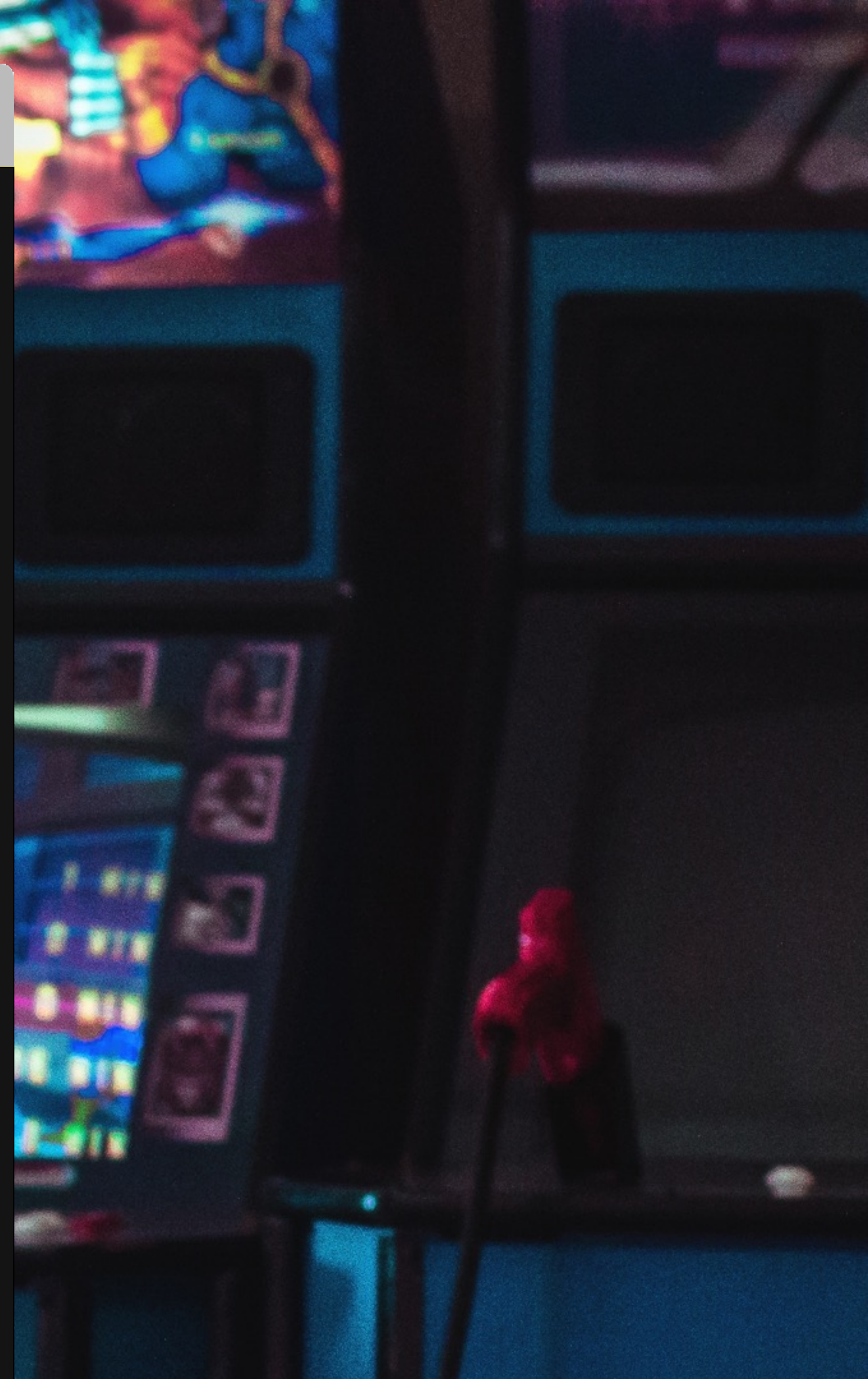
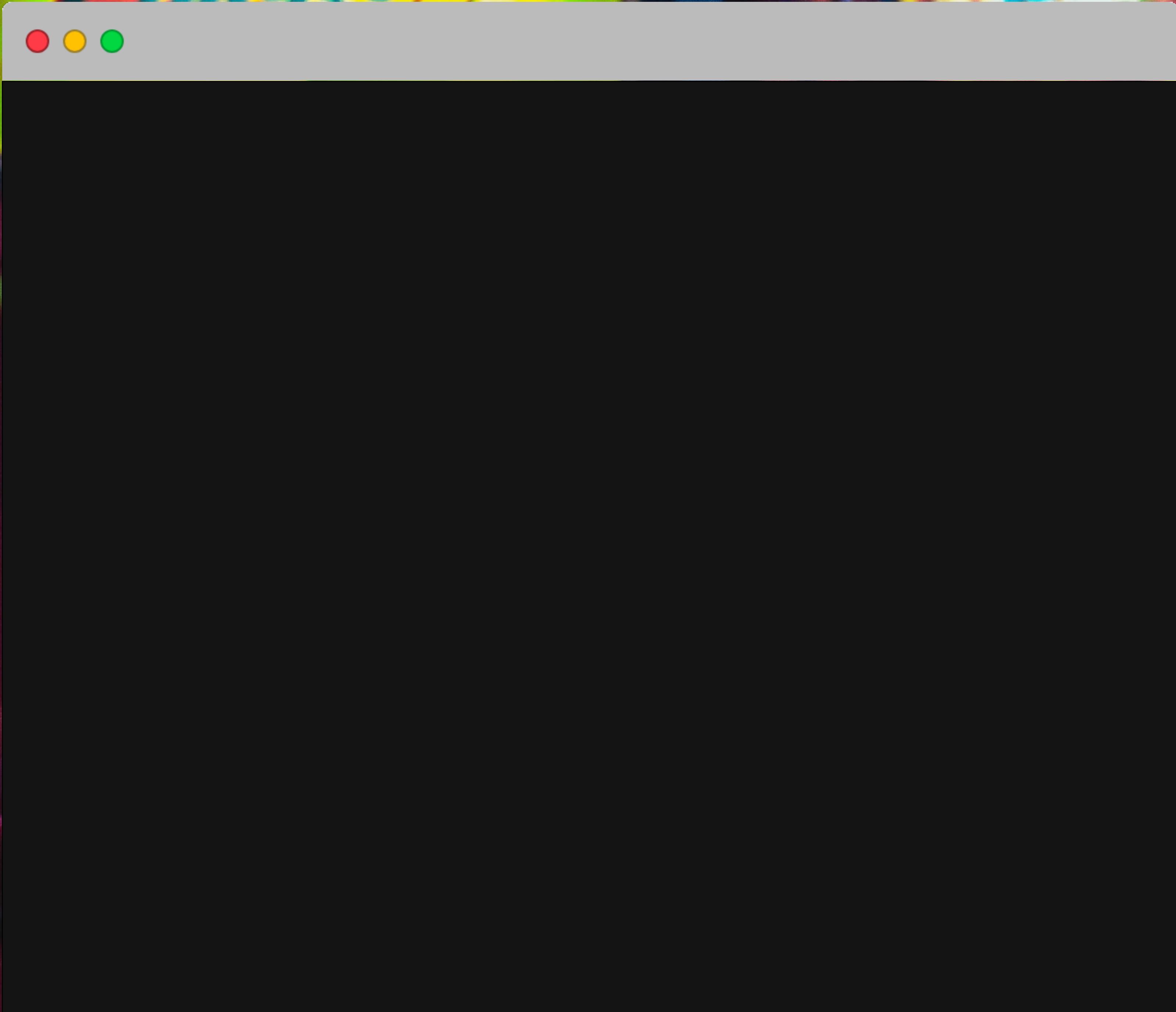
5:27 TRY 2P COOP



00000 000

1st	CAP	737700	1 WIN
2nd	CAP	182500	0 WIN
3rd	CAP	72700	0 WIN
4th	NIN	50000	10 WIN
5th	ADI	100	1 WIN







```
~ curl -X POST http://api:8080/highscore \  
-d { "name": "NEO", "score": "9999" }
```



```
~ curl -X POST http://api:8080/highscore \  
  -d { "name": "NEO", "score": "9999" }
```

```
{  
  "name": "NEO",  
  "position": "1"  
}
```

REDIS

HOW TO RUN LUA IN REDIS

```
redis.call('zadd', KEYS[1], ARGV[1], ARGV[2])  
  
local rank = redis.call('zrevrank', KEYS[1], ARGV[2])  
local position = tostring(rank + 1)  
  
return position
```



REDIS

HOW TO RUN LUA IN REDIS

DON'T BE SCARED :)

REDIS

HOW TO RUN LUA IN REDIS

EVAL

REDIS

HOW TO RUN LUA IN REDIS

```
$client = new Predis\Client($parameters, $options);
```

```
$position = $client->eval($lua, 1, 'highscores', 9999, 'NEO');
```

```
$position = $client->evalsha(sha1($lua), 1, 'highscores', 9999, 'NEO');
```



REDIS

HOW TO RUN LUA IN REDIS

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$client = new Predis\Client($parameters, $options);
```

```
$position = $client->eval($lua, 1, 'highscores', 9999, 'NEO');
```

```
$position = $client->evalsha(sha1($lua), 1, 'highscores', 9999, 'NEO');
```



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redis.call('zadd', KEYS[1], ARGV[1], ARGV[2])
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local rank = redis.call('zrevrank', KEYS[1], ARGV[2])  
local position = tostring(rank + 1)
```

```
return position
```

REDIS

POSSIBLE USAGES

THINK MORE HELPER SCRIPTS, LESS BUILD A FRAMEWORK IN REDIS

SOMETHING + LOGS

ALL STATISTICS STUFF

TRANSACTION LIKE THINGS



NGINX

WHERE CAN WE FIND IT?

PROXY

BALANCER

CACHE

WEB SERVER

NGINX

WHY DO WE USE IT?

VERY LOW MEMORY FOOTPRINT

EVENT DRIVEN

POOL OF WORKERS

NGINX

+ PHP-FPM

VERY LOW MEMORY FOOTPRINT

EVENT DRIVEN

POOL OF WORKERS

SHARED NOTHING ARCHITECTURE

SYNCHRONOUS CODE WITH BLOCKING I/O

NGINX

+ LUA

VERY LOW MEMORY FOOTPRINT

EVENT DRIVEN

POOL OF WORKERS

ALLOWS FOR SHARED DATA BETWEEN REQUESTS

SYNCHRONOUS CODE WITH NON-BLOCKING I/O

NGINX + LUA

GET STARTED WITH OPENRESTY

BUNDLE, NOT A FORK

NGINX + LUAJIT + MODULES

LEVERAGE EVENT MODEL AND NON-BLOCKING I/O

NUMEROUS MODULES

NGINX

PHASES (SIMPLIFIED)

REQUEST

REWRITE

ACCESS

CONTENT

LOG

RESPONSE

NGINX + LUA

PHASES (SIMPLIFIED)

REWRITE_BY_LUA_BLOCK

ACCESS_BY_LUA_BLOCK

CONTENT_BY_LUA_BLOCK

LOG_BY_LUA_BLOCK

REWRITE_BY_LUA_FILE

ACCESS_BY_LUA_FILE

CONTENT_BY_LUA_FILE

LOG_BY_LUA_FILE

THE CRISIS



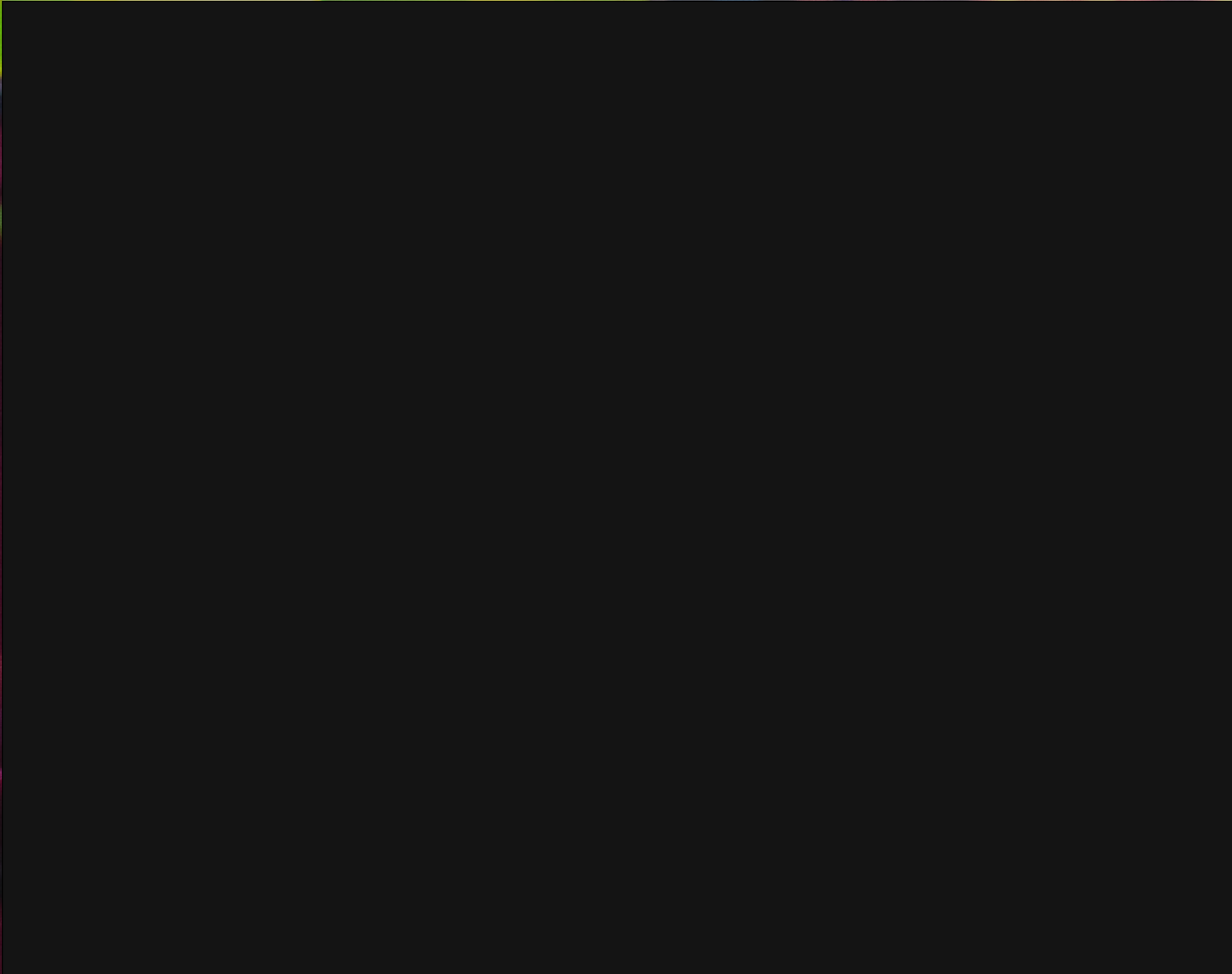
5:27 TRY 2P COOP



00000 000

Rank	Class	Score	Time
1st	CAP	737700	1:01
2nd	CAP	182500	0:51
3rd	CAP	72700	0:51
4th	NIN	50000	1:01
5th	ADI	100	1:01







```
~ curl -Gs http://api:8080/highscores
```



```
~ curl -Gs http://api:8080/highscores
```

```
[  
  {  
    "name": "NEO",  
    "score": "9999"  
  },  
  {  
    "name": "ALC",  
    "score": "1234"  
  },  
  {  
    "name": "BOB",  
    "score": "1000"  
  }  
]
```


NGINX + LUA

CONFIGURATION

```
location /highscores {  
    default_type application/json;  
    content_by_lua_block {  
        # ...  
    }  
}
```

NGINX + LUA

CONFIGURATION

```
local cjson = require "cjson"
local redis = require "resty.redis"
local red = redis:new()
local ok, err = red:connect("127.0.0.1", 6379)

local highscores, err = red:zrevrange("highscores", 0, 10, "withscores")

local response = {}
for i = 1, #highscores, 2 do
    local player = { name = highscores[i], score = highscores[i + 1] }

    table.insert(response, player)
end

ngx.say(cjson.encode(response))
```



NGINX + LUA

USAGES

ACCESS CONTROL & SECURITY CHECKS

REPOSE HEADER MANIPULATION

FETCH BACKEND INFO DIRECTLY FROM MYSQL OR REDIS

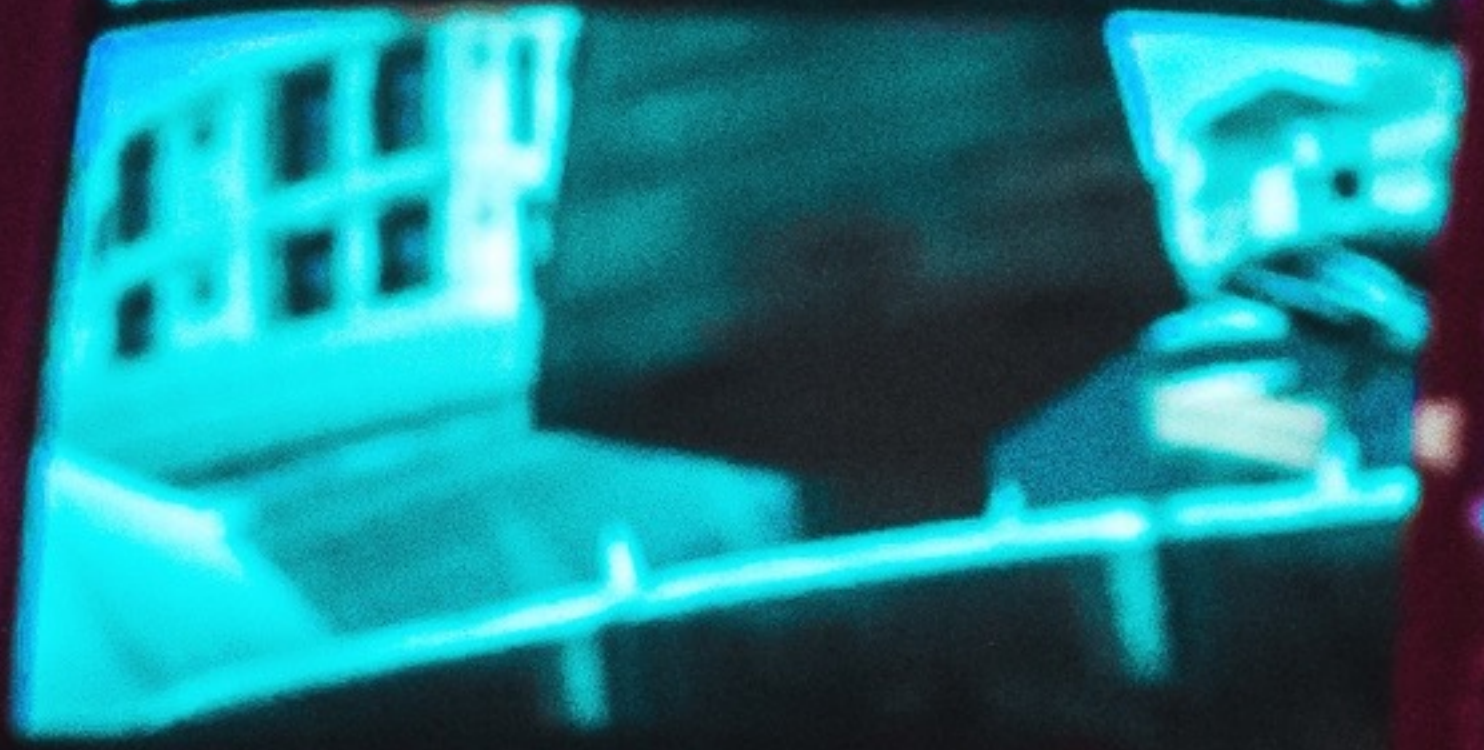
CACHE

FORMAT LOG & ADD MORE INFOMATION

THE CRISIS



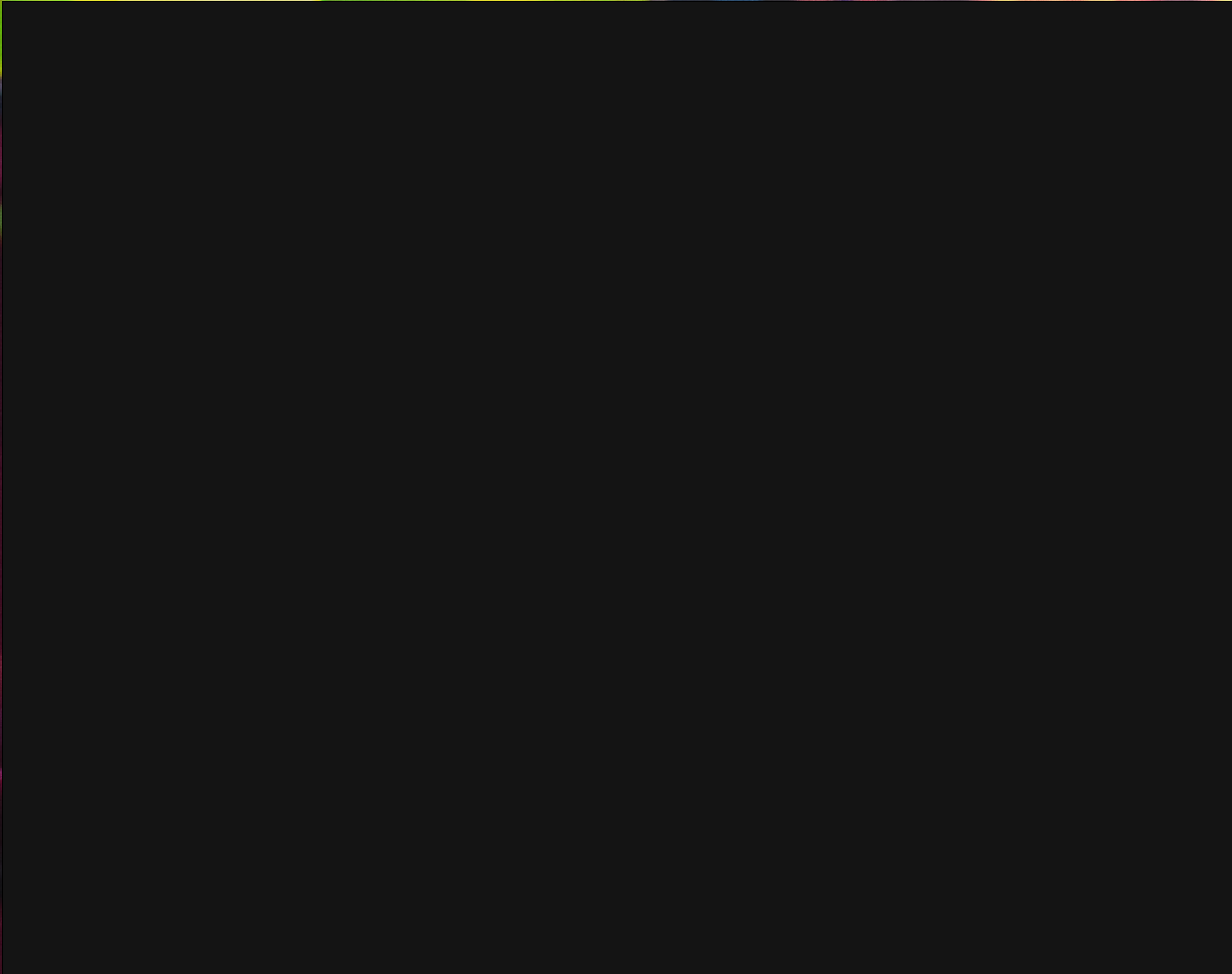
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```
~# ab -n 50000 -c 100 -k http://api:8080/highscores
```



```
~# ab -n 50000 -c 100 -k http://api:8080/highscores
```

```
Concurrency Level:      100
Time taken for tests:   21.821 seconds
Complete requests:     50000
Failed requests:       0
Keep-Alive requests:   49548
Total transferred:     12197740 bytes
HTML transferred:     4550000 bytes
Requests per second:   2291.40 [#/sec] (mean)
Time per request:      43.641 [ms] (mean)
Time per request:      0.436 [ms] (mean, across all
concurrent requests)
Transfer rate:         545.90 [Kbytes/sec] received
```



```
~# ab -n 50000 -c 100 -k http://api:8080/highscores
```

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```


Connection Times (ms)

	min	mean[+/-sd]	median	max
Connect:	0	0 0.1	0	3
Processing:	3	44 14.6	42	727
Waiting:	3	44 14.6	42	727
Total:	4	44 14.7	42	728

Percentage of the requests served within a certain time (ms)

50%	42
66%	43
75%	44
80%	45
90%	49
95%	53
98%	60
99%	63
100%	728 (longest request)

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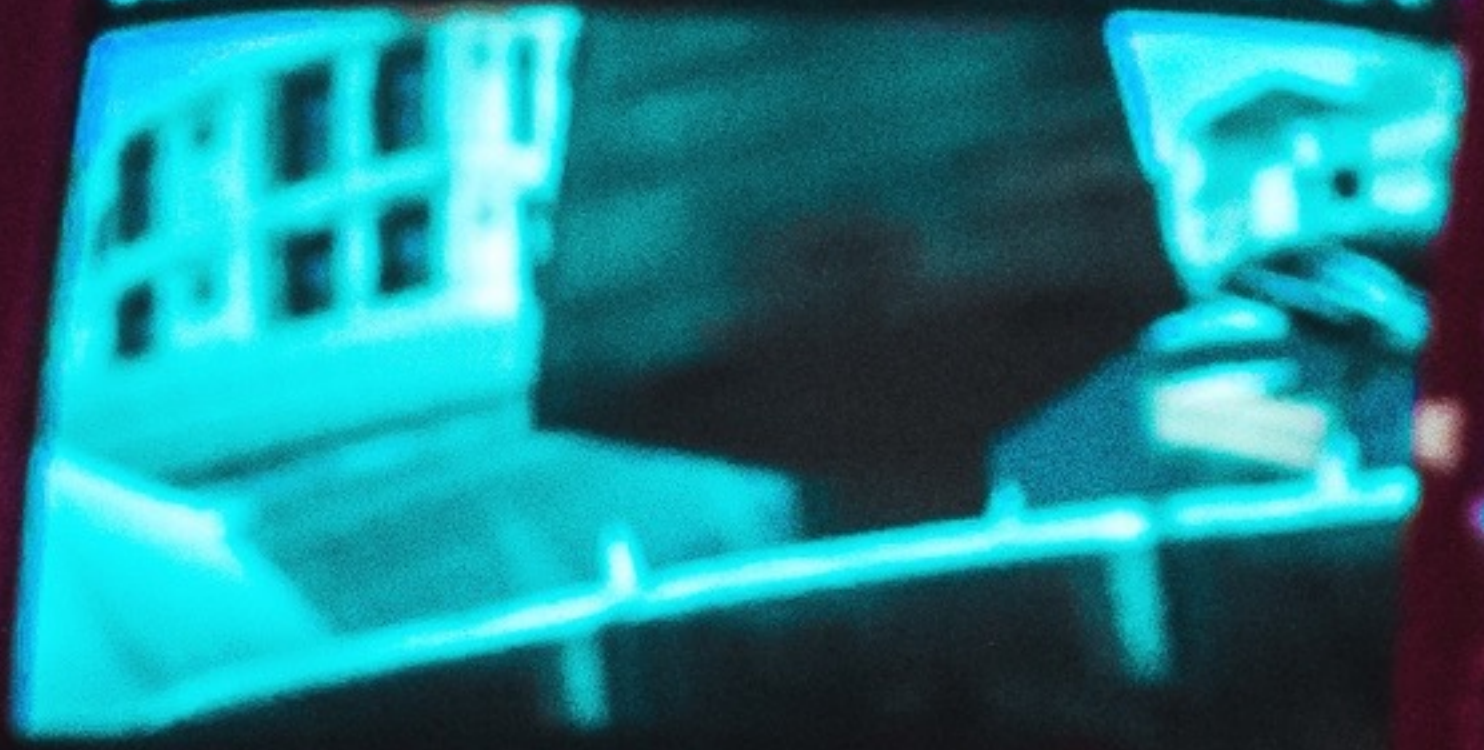
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THE CRISIS



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TL;DR;

BEFORE YOU GO HOME

STEP OUTSIDE OF YOUR COMFORT ZONE

EXPERIMENT

WEBCAMP ZAGREB

Technology oriented
conference for
developers &
designers

Plaza Event Centar
Slavonska avenija 6/2
Zagreb, Croatia

October
11th & 12th, 2019

CFP OPEN 2019.webcampzg.org

THANK YOU



Luka Muzinic
[@lmuzinic](#)

luka.muzinic.net/talks

Photos by Nicolas Thomas and zhan zhang on Unsplash