Scaling Erlang Web Applications

100 to 100K users at one web server

Fernando Benavides (*@elbrujohalcon*)

Inaka Labs

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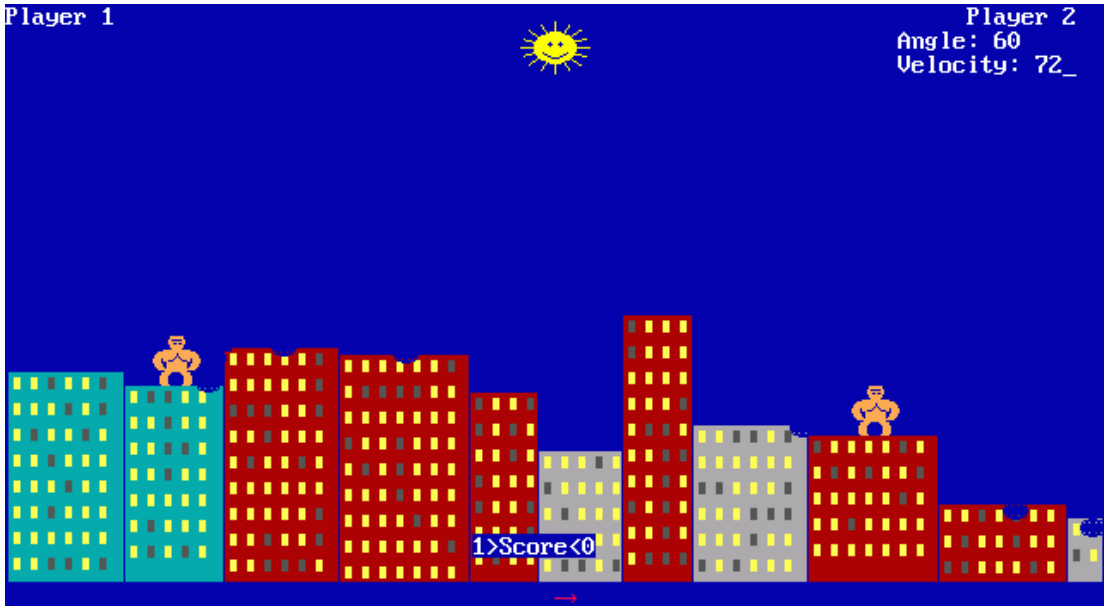
Hello World!

- I'm a developer since I was 10
- I'm an Erlang developer since 2008
- I've worked in many dynamic web sites
- Most of them with high scale requirements
- I'll share my experience with you



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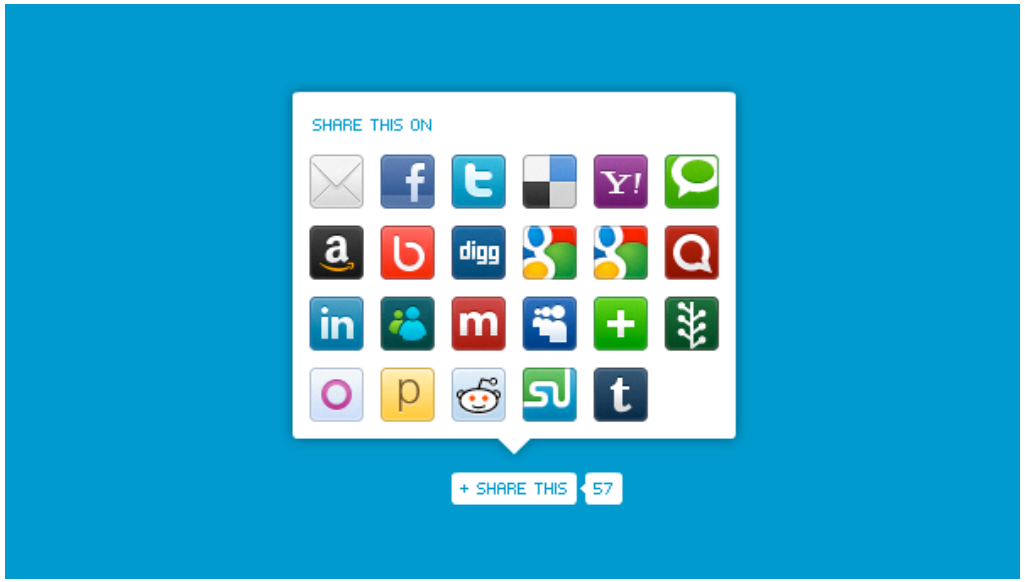

Outline

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The Challenge

What do we have to deal with?

The Plan

How do we face it?

The Tips and Tricks

What have we learned from it?

The Challenge

We will work on the scalability of a *web* project that has an *HTTP API* and keeps clients *connected* to the server for *long periods* of time.

Examples:

- Social sites
- Chat sites
- Sports sites

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The Challenge

We will focus on

- OTP behaviours
- TCP connections
- mochiweb
- Underlaying system configurations

*We will **not** deal with*

- Multiple machines/nodes
- Databases

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The Plan

General Considerations

- Build a system that works
- Automate your clients
- Keep a human watching
- Be patient

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Stage 1
Finding The Initial Boundaries

Goals

- Test the system as it is
- How many users can the system handle as is?
- Find *N* and *C*

Stage 1
Finding The Initial Boundaries

Steps

- Choose *N* and *C*
- Test the API
- Test long-lived connections
- Test both
- Repeat with higher values for *N* and *C*

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Stage 2
Blackbox Tests

Goals

- Improve the system environment
- Tune-In the machine(s)
- Don't touch the code

Stage 2
Blackbox Tests

Steps

- Check kernel variables
- Check system limits
- Check Erlang VM parameters
- Repeat Stage 1

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Stage 3
Erlang Tuning

Goals

- Tune up your system
- Discover scalability issues and fix them
- Find the biggest *N* and *C* for one node

Stage 3
Erlang Tuning

Steps

- Choose *N* and *C* to fail
- Find a problem
- Fix it
- Add it to the list of *Tips and Tricks*
- Repeat with higher values for *N* and *C*

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Erlang Tuning

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Stage 4
Adding Nodes

Goals

- Get the system ready to work on many nodes
- Design the system topology
- Find *N* and *C* per node

Stage 4
Adding Nodes

Steps

- Get the second node running
- Choose *N* and *C*
- Try interconnected instances
- Try independent instances
- Repeat with higher values for *N* and *C*

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Tips and Tricks

OS TWEAKS

Kernel Variables

```
sysctl -w net.ipv4.ip_local_port_range="1024 65535"
sysctl -w net.core.rmem_max=16777216
sysctl -w net.core.wmem_max=16777216
sysctl -w net.ipv4.tcp_rmem="4096 87380 16777216"
sysctl -w net.ipv4.tcp_wmem="4096 65536 16777216"
sysctl -w net.ipv4.tcp_syncookies=1
sysctl -w net.ipv4.tcp_mem="50576   64768   98152"
sysctl -w net.core.netdev_max_backlog=2500
sysctl -w net.netfilter.nf_conntrack_max=1233000
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Open Files Limit

```
ulimit -n 999999
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Erlang VM tweaks

+P Number of Processes

+K Kernell Polling

-SMP SMP Support

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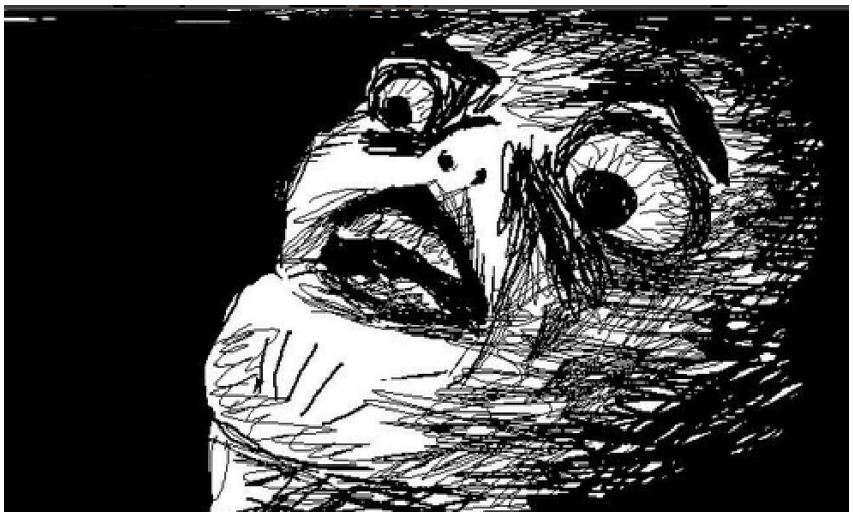

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Connection tweaks

Backlog

- Allow more concurrent connections
- Remember HTTP *runs on* TCP

Connections

- Don't use just one of them
- Check inbound and outbound connections

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SUP_HANDLER

- Don't use it
- Monitor the processes instead

LONG DELIVERY QUEUES

- Use *repeaters*

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GEN_SERVER

Call Timeouts

Remember `gen_server:reply/2`

Memory Footprint

Remember `hibernate`

Long init/1

Use 0 timeout

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SUPERVISORS

- Sometimes `simple_one_for_one` supervisors get overburdened because they have too many children
- Try a supervisor hierarchy with several managers below the main supervisor
- Turn `supervisor:start_child/2` calls into something like

```
supervisor:start_child(
  list_to_atom("module-name_" ++
                          integer_to_list(random:uniform(#ofSupervisors))).
```

Other Processes

Timers

- Don't use the `timer` module
- Use `erlang:send_after`

Logging

- Don't log too much
- Use a good logging system

Registration

- Sometimes it's better to register processes instead of keeping track of their pids manually
- You can always register processes both locally and globally

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- It's no silver bullet
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Scaling Topics

that weren't covered on this presentation

- Adding nodes
- Choosing databases
- System specific improvements
- Measuring tools

Questions

Thanks!