Scaling Erlang Web Applications

100 to 100K users at one web server

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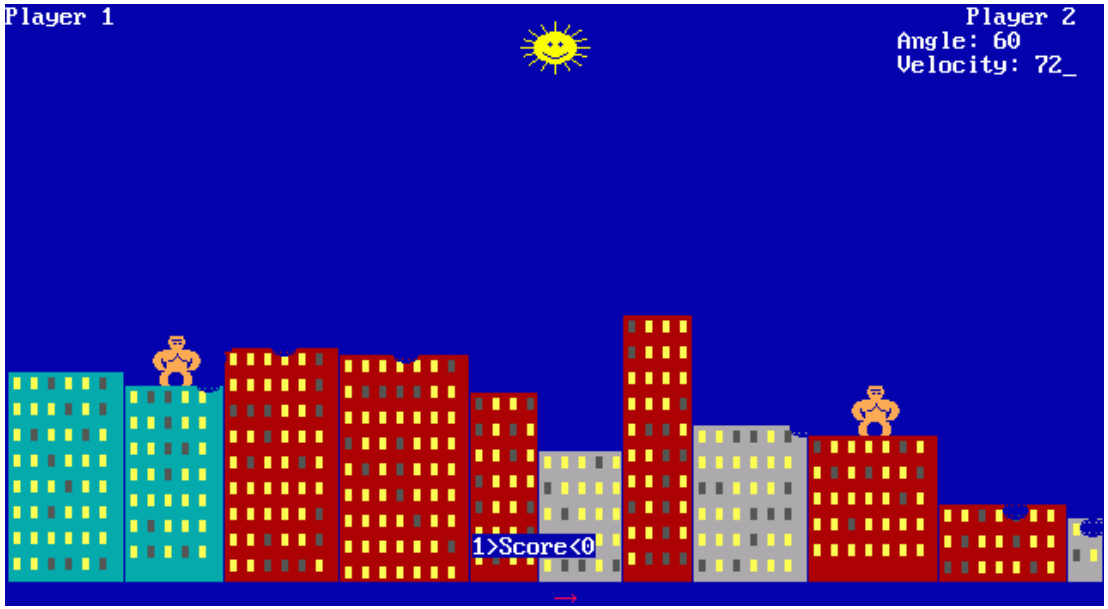
Hello World!

- 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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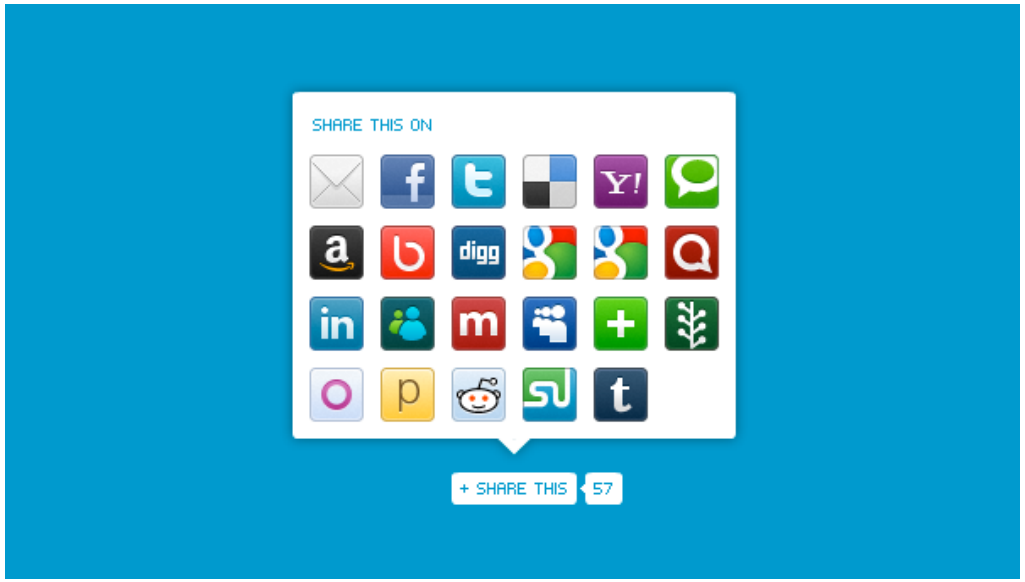

Outline

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?

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The Tips and Tricks

What have we learned from it?

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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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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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
```

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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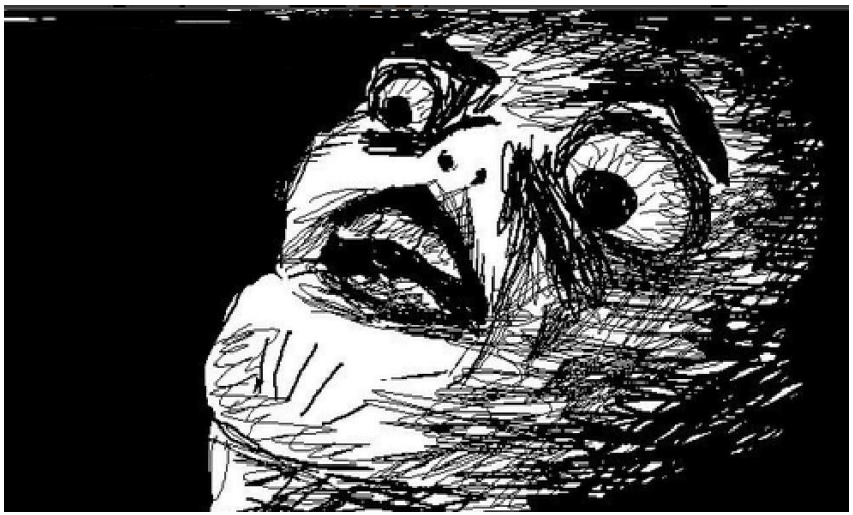

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Connection tweaks

Backlog

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

Connections

- Don't use just one of them
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SUP_HANDLER

- Don't use it
- Monitor the processes instead

LONG DELIVERY QUEUES

- Use *repeaters*

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GEN_SERVERS

Call Timeouts

Remember `gen_server:reply/2`

Memory Footprint

Remember `hibernate`

Long init/1

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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))).
```

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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Other stuff

that we left out of this presentation

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

Questions

Thanks!