Scaling Erlang Web Applications

100 to 100K users at one web server

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Inaka Labs

March 20, 2012

INAKA NETWORKS

presents . . .

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presents ...

El Brujo Halcón

in . . .

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in . . .

Scaling Erlang

Based on a true story

SCALING ERLANG

Based on a true story

A *not so* long time ago

A *not so* long time ago

in a country far far away. . .

A Friend

Hey! Let's watch the *superclásico*!!!

Brujo

I can't, I'm at *the office*

A Friend

. . .

Brujo

We need an app for that!

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We need an app for that!

BRUJO

Let's call it MATCHSTREAM

A FRIEND

Ok, then. . . We know there will be hundreds of thousands of users, right?
We need the system to **scale**

BRUJO

Of course! We should use Erlang!

BRUJO

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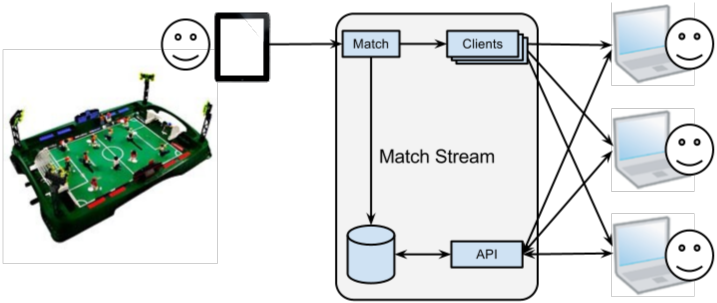
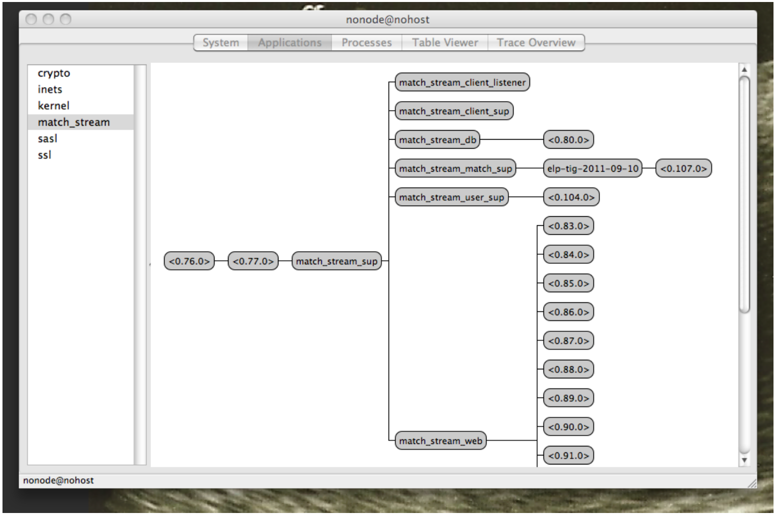
A while later. . .


Match
Clients
Match Stream
API

MatchStream
Architecture



TODO: Take this picture with client(s) connected

BRUJO

Boca plays again today, let's try our system out with this game!
What can **possibly** go wrong?

USER 1

Wow! MATCHSTREAM is awesome!

. . .

USER 100

Hey! this system is a total crap! It doesn't even let me connect to it!

BRUJO

WTF?! The system doesn't scale!!

A FRIEND

Didn't you use Erlang?

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Lesson Learned

Just using Erlang is not enough to make your system scale

So, we made it scale. . .

Step 1

First of all we wanted to be sure that the system was actually working.

- We built a simulator
- We improved the logging mechanisms
- We tested the system
- We found its initial scale limits

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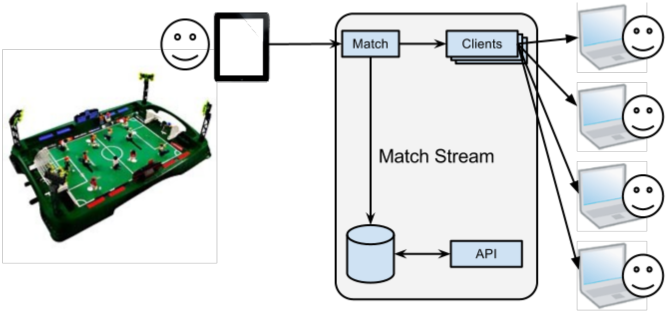
Step 1
Results



N = 1024 / C = 4

Step 2

Once we knew the system was fine, we decided to tune up the server where it was installed. So, we checked the kernel variables and system limits for

- Concurrent TCP connections
- Open files limit
- TCP backlog size
- TCP memory allocation
- Erlang VM process limit

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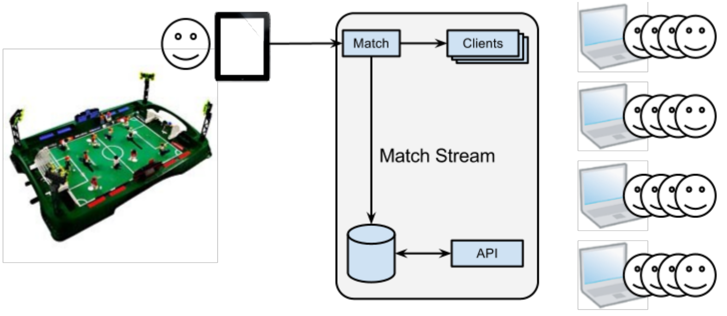

N = 4096 / C = 4

Step 3

Then we decided to start improving the different components of the system.

We called a friend to help us...

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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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TODO users / TODO at a time

SUP_HANDLER

- Don't use it
- Monitor the processes instead

LONG DELIVERY QUEUES

- Use *repeaters*

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- Monitor the processes instead

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TODO users / TODO at a time

CALL TIMEOUTS

Remember `gen_server:reply/2`

MEMORY FOOTPRINT

Remember `hibernate`

LONG INIT/1

Use 0 timeout

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CALL TIMEOUTS

Remember `gen_server:reply/2`

MEMORY FOOTPRINT

Remember `hibernate`

LONG `init/1`

Use 0 timeout

TODO users / TODO at a time

- 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))).
```

TODO users / TODO at a time

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

Step 3
Other Processes

Timers

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- Use `erlang:send_after`

Logging

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Registration

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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
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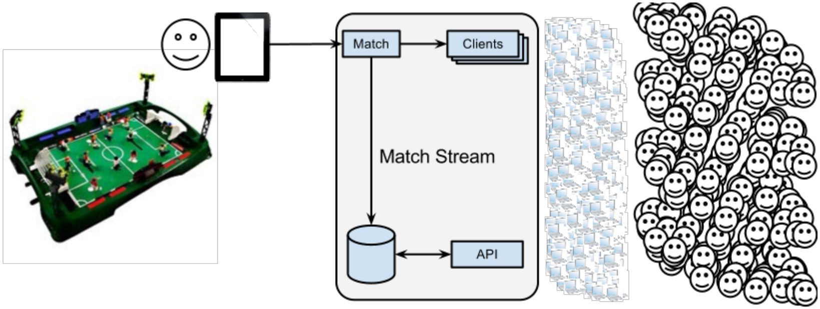
Step 3
Results



N = 65536 / C = 8192

TODO: Img of what the system looks like at this point

Step 4

Well, let's add some nodes to it!

Again, it's not as easy as just starting the app in another Erlang node We needed to find the best topology, we considered using:

- connected nodes
- independent nodes

We had to decide which processes needed to communicate and how and of course, test the whole system again

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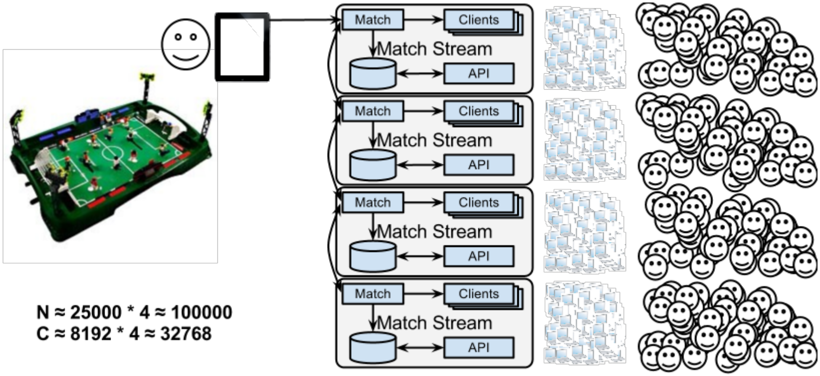

N ≈ 25000 * 4 ≈ 100000
C ≈ 8192 * 4 ≈ 32768