ELIXIR

AUF DEN SCHULTERN EINES GIGANTEN

Meetup SoCraOS 06.03.2019

WHOAMI

```
{
  "name": "Henning Löhr",

  "position": "Backend-Developer",
  "company": "SALT AND PEPPER - Software Solutions",
  "blog": "randomoutput.xyz",
  "github": "github.com/hlhr",
  "mail": "mail@randomoutput.xyz"
}
```

ELIXIR

Created by **José Valim** circa 2012,
Former Ruby on Rails Core Team Member

He was trying to make Rails really thread safe, found Erlang and created a new programming language by mistake.

github.com/elixir-lang/elixir

Elixir is a **dynamic**, **functional** language designed for building **scalable** and **maintainable** applications.

Elixir leverages the **Erlang** VM (BEAM), known for running **low-latency**, **distributed** and **fault-tolerant** systems.

FUNCTIONAL PROGRAMMING

- ...
- Pattern matching
- Immutability
- ...

ERLANG & OTP

Robert Virding
Creator of Erlang

Mike Williams
Creator of Erlang

Joe Armstrong
Creator of Erlang

Erlang is a programming language used to build

massively scalable soft real-time systems with requirements on **high availability.**

Open **T**elecom **P**latform is a set of Erlang libraries and design principles providing middleware to develop these systems.

ERLANG WORLDVIEW

- Everything is a process
- Process creation is a lightweight operation
- Message passing is the only way to interact
- Processes share no resources
- Processes do what they are supposed to do or fail (fail fast)

If Java is 'write once, run anywhere',
then Erlang is 'write once, run forever'.

Joe Armstrong, 2013

1998

- Ericsson announced the AXD301 switch
  (a million lines of Erlang)
- Ericsson Radio Systems banned Erlang
- Joe Armstrong (and others) leaves Ericsson
- Erlang / OTP was Open Sourced

github.com/erlang

COMPANIES USING ERLANG

- WhatsApp messaging servers
  (2 million connected users per server)
- Motorola, Ericsson (call processing)
- Call of Duty (game server backend)
- ...

ELIXIR

SYNTAX

DEMO SYNTAX

Elixir is a **dynamically typed** language, but...

```elixir
defmodule LousyCalculator do
  @spec add(number, number) :: number
  def add(x, y), do: x + y


  @spec multiply(number, number) :: number
  def multiply(x, y), do: x * y
end
```
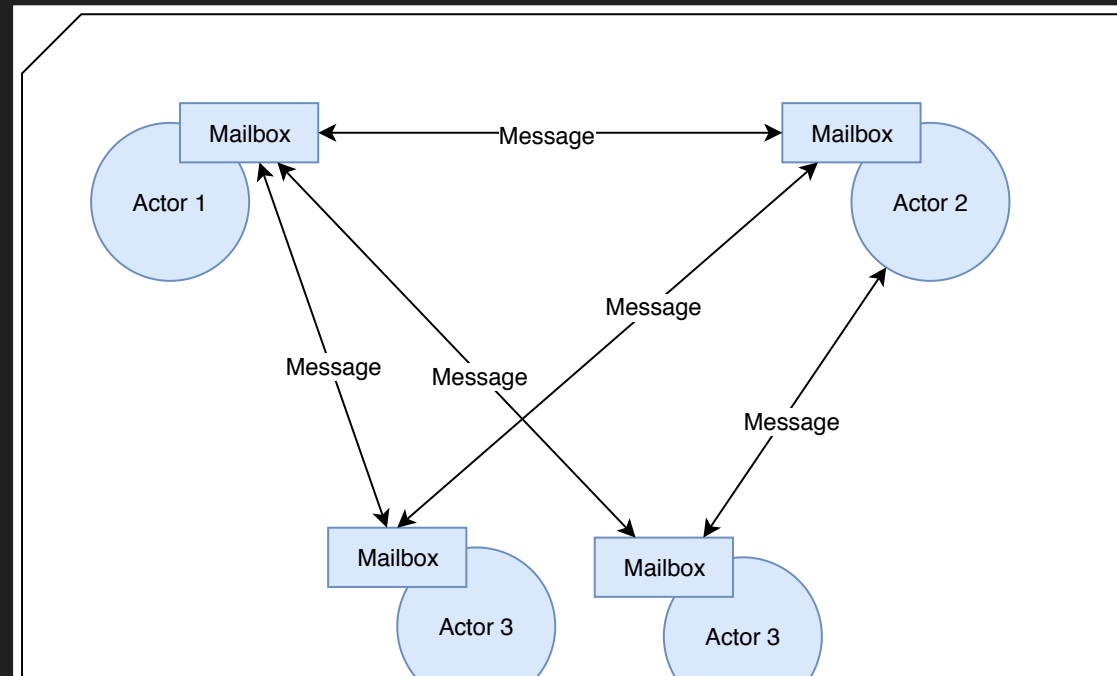
Typespecs + Dialyxir / Dialyzer = <3

ELIXIR

OTP

ACTOR MODEL

DEMO OTP

GenServer - Agent - Supervisor - Observer

```
iex(1)> DemoOtp.ClickCounterRegistry. \
create(DemoOtp.ClickCounterRegistry, "google.de")
:ok

iex(2)> {:ok, pid} = DemoOtp.ClickCounterRegistry. \
lookup(DemoOtp.ClickCounterRegistry, "google.de")
{:ok, #PID<0.137.0>}
...
:ok
iex(6)> DemoOtp.ClickCounter.register_click(pid)
:ok
iex(7)> DemoOtp.ClickCounter.get_click_count(pid)
3
```

HOT CODE RELOADING

run multiple versions of a module simultaneously

```elixir
defmodule Customer do
  use GenServer


  ...


  def code_change(_old_vsn, state, _extra) do
    # transform to new state
  end
end
```

Elixir Alchemy: Hot Code Reloading in Elixir

UMBRELLA APPLICATIONS

project composed of many applications

+

communication via message passing

+

location transparency

=

microservices

...AND THERE IS MORE

- Task
- ETS
- Mnesia
- ...

ELIXIR

ECOSYSTEM

MIX

build tool

```
mix new test_project
mix test
mix [task name]
mix help
```

HEX

package manager for erlang
(currently ~8200 packages)
hex.pm - hexdocs.pm

EXUNIT

```elixir
defmodule AssertionTest do
  use ExUnit.Case, async: true


  test "the truth" do
    assert true
  end
end
```

ECTO

toolkit for data handling and processing

- language integrated queries
- data mapping
- change tracking
- validation
- migration

commonly used to interact with databases

PHOENIX

web development framework

- **M**odel **V**iew **C**ontroller
- Channels
- Presence

DEMO PHOENIX

DISTILLERY

creates an (self contained) Erlang OTP release
from an Elixir project

will be part of elixir in the future

NERVES

bulletproof embedded software

If a board can run embedded Linux,
it likely can run Nerves.

ElixirConf 2017
Building an Artificial Pancreas with Elixir and Nerves
Tim Mecklem

...AND THERE IS MORE

- Absinthe: GraphQL Toolkit
- Flow:
  parallel computation execution (like Map-Reduce)
- GenStage:
  exchanging events between producers and
  consumers (+ rate limiting)

COMPANIES USING ELIXIR

- Discord (Communication Platform)
- Forza Football (Mobile App)
- Simplecast (Podcast Publishing/Hosting)
- Weedmaps (Solutions for the cannabis sector)
- Pinterest (Ads API, Spam Protectiom)
- Wunder (Shared Mobility)
- Bleacher Report (Sport News Site)

NEXT STEPS

- Online: Getting started Guide
- Online: Elixir School
- Book: Programming Elixir - Dave Thomas
- Book: Elixir in Action - Saša Jurić
- YouTube: ElixirConf
- Newsletter: Elixir Radar
- Podcast: Elixir Mix

QUESTIONS?

Presentation + Demos:
github.com/hlhr/talk_socraos_elixir

Blog: randomoutput.xyz
Contact: mail@randomoutput.xyz