Erlang Solutions

Concurrency Oriented Programming
In a Modern World.

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Concurrency Oriented Programming

Joe Armstrong

Concurrency Oriented Programming

- The world is concurrent
- Things in the world don’t share data
- Things communicate with messages
- Things fail

Joe Armstrong’s Tenets

Let’s create a Programming Language which builds on these beliefs!

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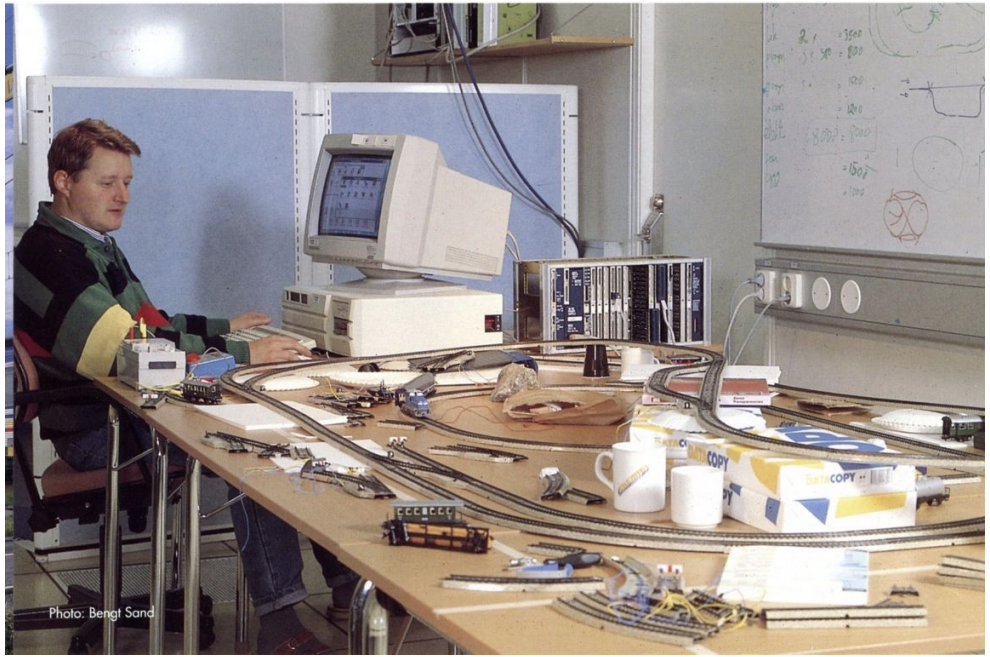
Hard at work developing Erlang

Robert Virding preparing the demo of a Märklin toy railway for the IT show.

They demonstrated a working toy railway with 2 trains on the same track, ATC and balises.

(October 1993)



The Main Ideas

pid1

```
pid1 = spawn(Mod, func, args)
```

The Main Ideas

pid1

```
defmodule Foo do
  def print_add(a, b), do: IO.puts(a + b)
end
pid1 = spawn(Foo,:print_add, [1, 2])
```

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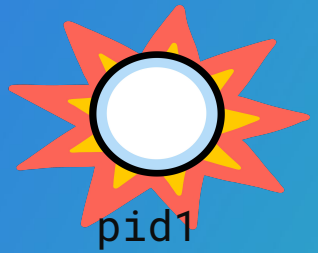
The Main Ideas




```
defmodule Foo do
  def print_add(a, b), do: IO.puts(a + b)
end
pid1 = spawn(Foo,:print_add, [1, 2])
```

```
defmodule Foo do
  def kaboom(a, b), do: a/b
end
pid1 = spawn(Foo,:kaboom, [1, 0])
```

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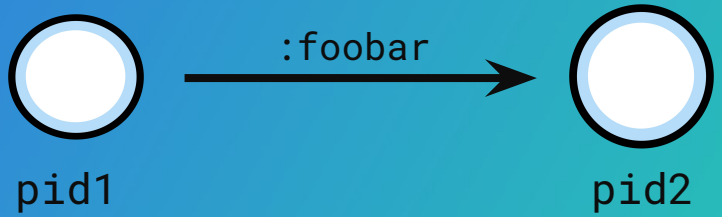
The Main Ideas




```
send(pid2, :foobar)
```

The Main Ideas

```
:foobar
:start
```

```
receive do
  :start        -> start_it()
  :stop         -> stop_it()
  {pid, :boot} -> boot(pid)
end
```

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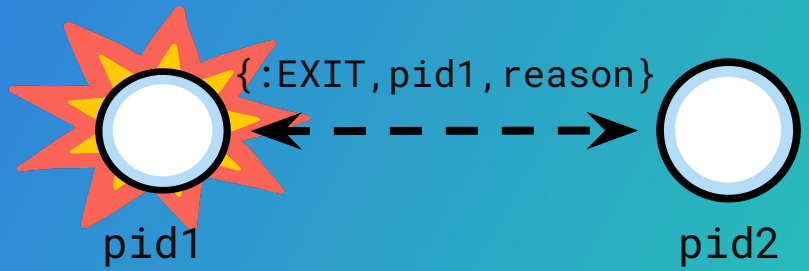
The Main Ideas

```
Process.link(pid2)
```

The Main Ideas

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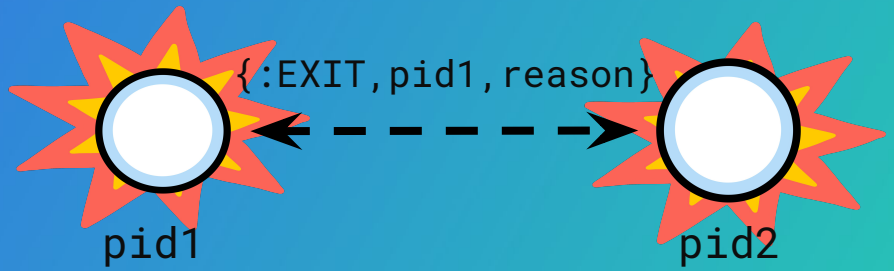
```

The Main Ideas

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Process.link(pid2)
```
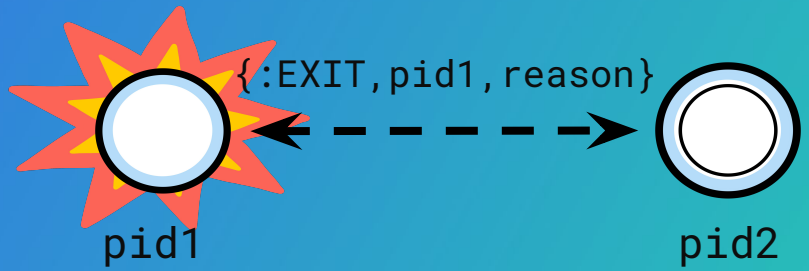

The Main Ideas



{:EXIT,pid1,reason}

```
Process.flag(:trap_exit, true)
```

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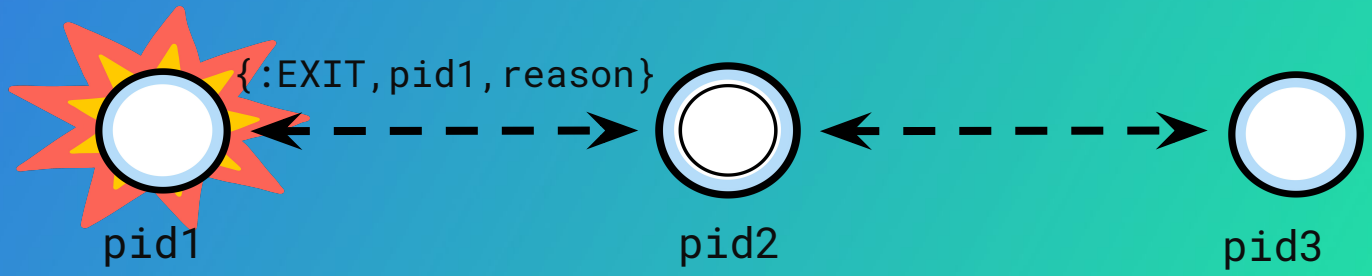
The Main Ideas




```
Process.flag(:trap_exit, true)
```

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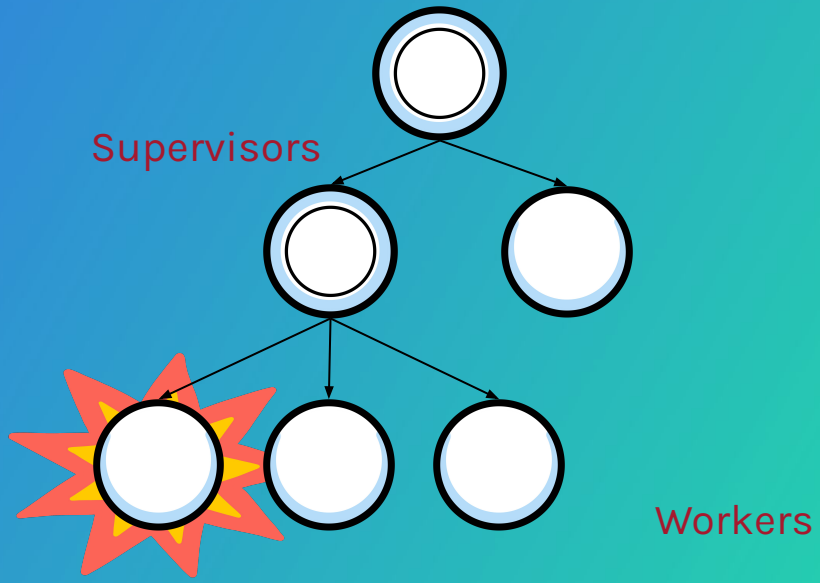
The Main Ideas



“OOP to me means only messaging, local retention and protection and hiding of state-process, and extreme LateBinding of all things.”

Alan Kay

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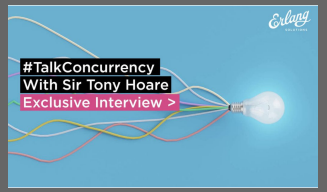
Why is this relevant today?

#TalkConcurrency Interviews & Panel

WITH SIR TONY HOARE, JOE ARMSTRONG, CARL HEWITT



“Concurrency is about dealing with lots of things at once. Parallelism is about doing lots of things at once”

Rob Pike

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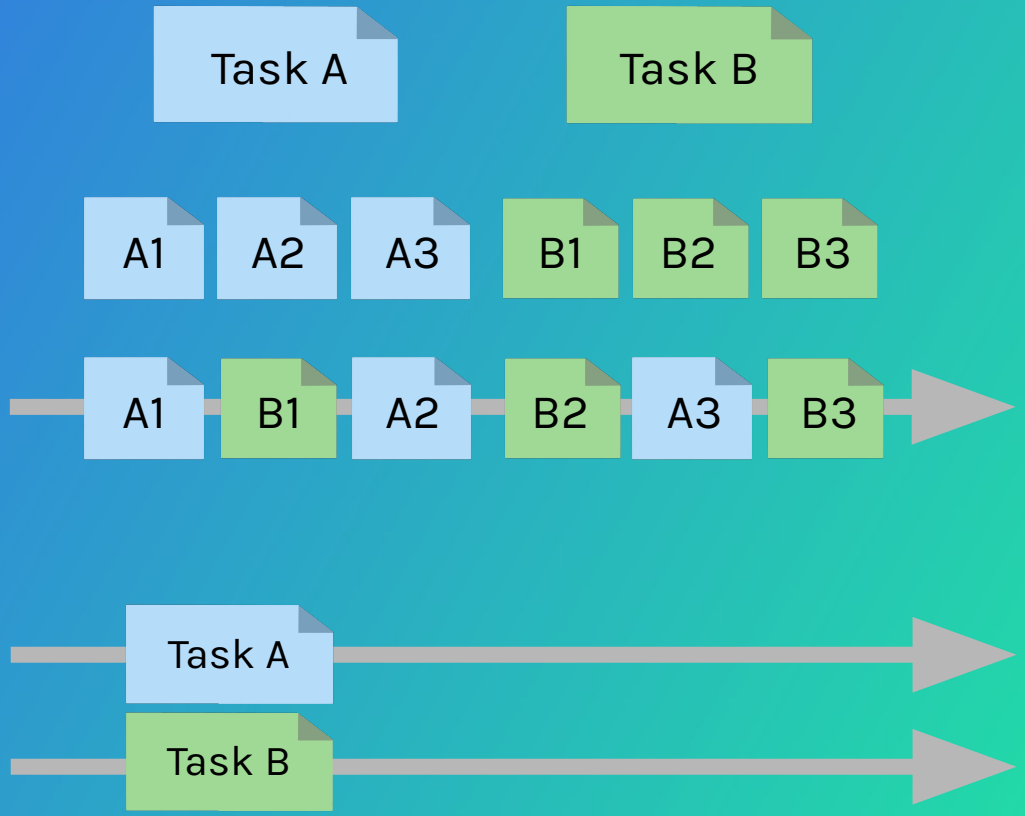
Concurrency vs Parallelism



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WhatsApp Blog

1 million is so 2011

Happy 2012 everyone!

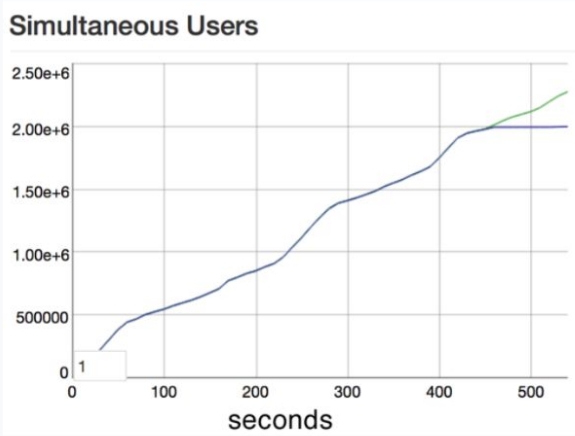
A few months ago we published a blog post that talked about our servers doing 1 million tcp connections on a single box: http://blog.whatsapp.com/?p=170

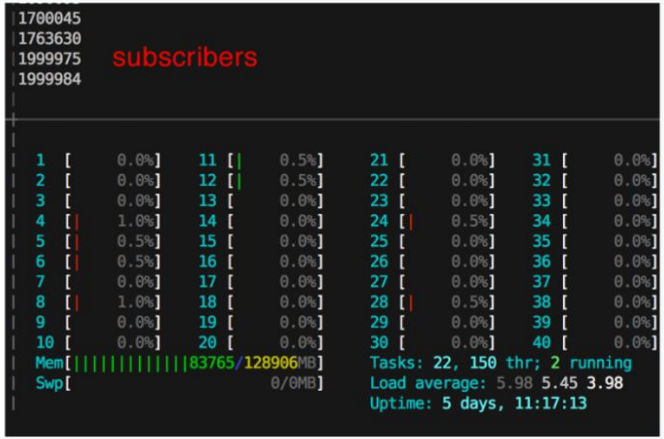
Today we have an update for those keeping score at home: we are now able to easily push our systems to over 2 million tcp connections!

```
jkb@c123$ sysctl kern.ipc.numopensockets
kern.ipc.numopensockets: 2277845
```

The Road to 2 Million Websocket Connections in Phoenix

Posted on November 3rd, 2015 by Gary Rennie





Search

Search for... Search

Tags

CI
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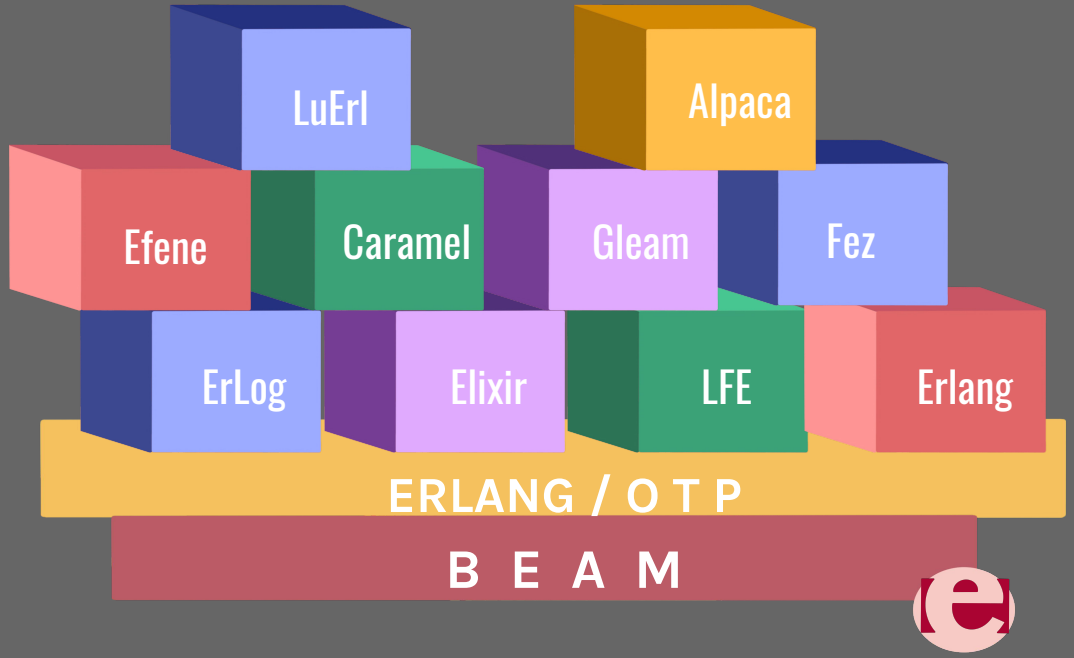
A Language Becomes an Ecosystem

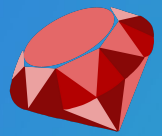


Elixir

Functional Languages
ML, Miranda

Concurrent Languages
SmallTalk, Ada,
Modula, Chill

Logical Languages
Prolog



RUBY

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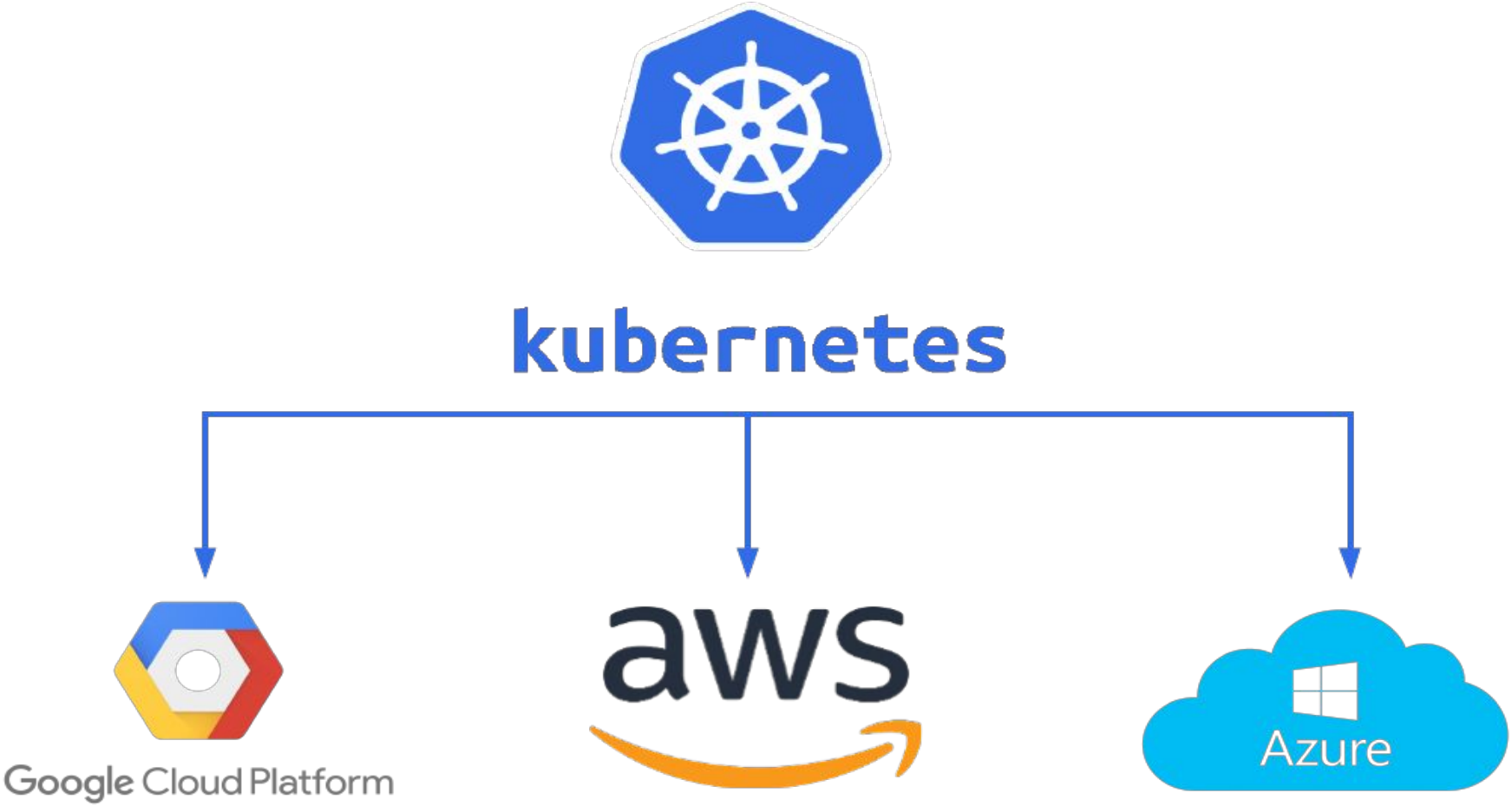
kubernetes
Google Cloud Platform
aws
Azure

Virding's First Rule of Programming

> Any sufficiently complicated concurrent program in another language contains an ad hoc informally-specified bug-ridden slow implementation of half of Erlang.

- Robert Virding

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Questions?

Concurrency Oriented Programming in a Modern World.

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