Wobserver

Easy to Integrate Monitoring and Debugging

Ian Luites

May 5, 2017

ElixirConf EU

The man behind the beard

Backend developer at Square Enix (London).
We started using Elixir in production.

SQUARE ENIX

Table of contents

SQUARE ENIX

Wobserver

Wobserver: Introduction
What?

W[eb]-observer
Wobserver

Web based metrics, monitoring, and observer

SQUARE ENIX

Wobserver: Introduction
Why?

Observing the internal state of Elixir applications is easy through the use of `:observer`.

It allows for easier debugging and is a great tool for understanding the inner workings of an application.

Sadly enough it is not always possible to use.

SQUARE ENIX

Wobserver: Introduction
Why? Limited access

- Micro services
- Remote deployment (Firewalls, load balancers)
- Docker containers
- Lazy dev ops with arbitrary CI rules...

SQUARE ENIX

It is possible to connect to nodes through SSH, but...

You will need to:

- ☐ have SSH access to the machine.
- ☐ setup the Erlang VM to only listen on the tunneled port.
- ☐ iterate node by node.

SQUARE ENIX®

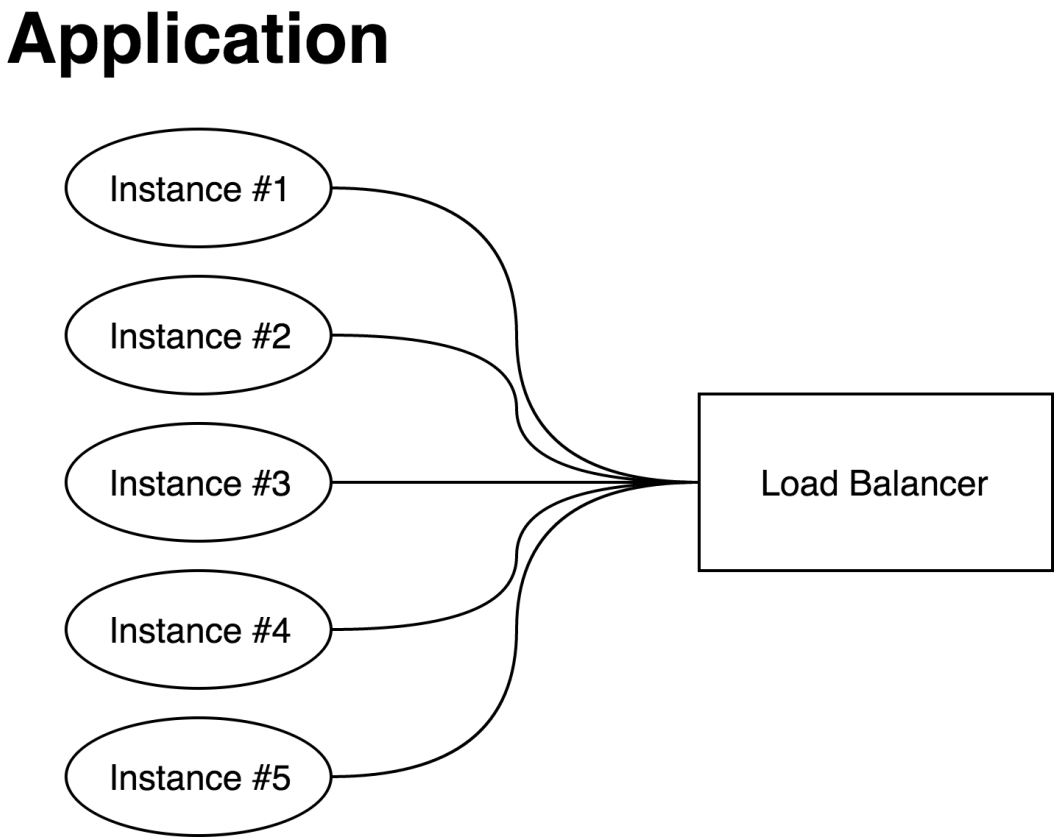
Wobserver: Introduction

Solution: wobserver

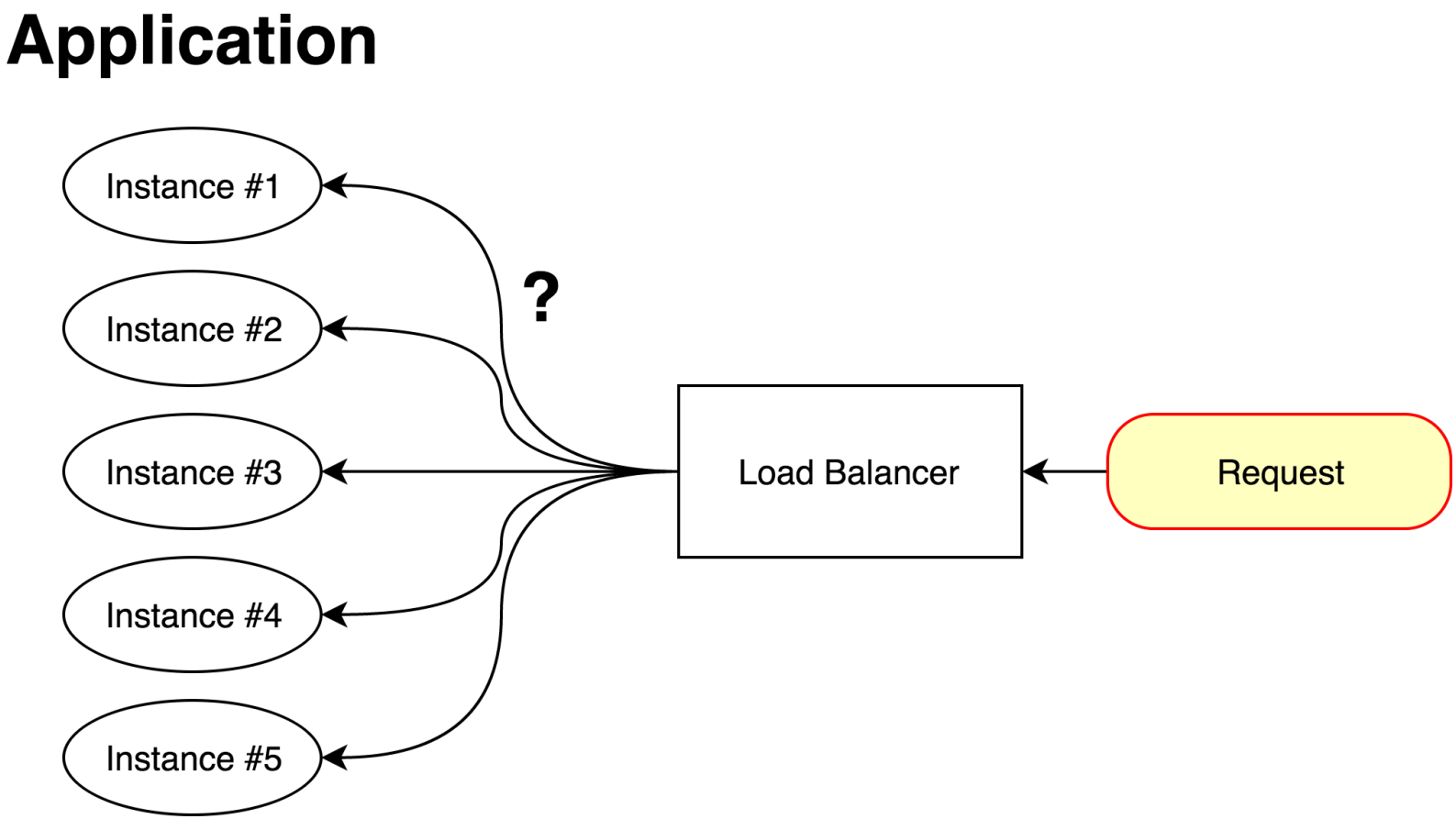
`:wobserver` provides a web interface for easy remote access using websockets.

SQUARE ENIX

Wobserver: Introduction
What about the load balancer?

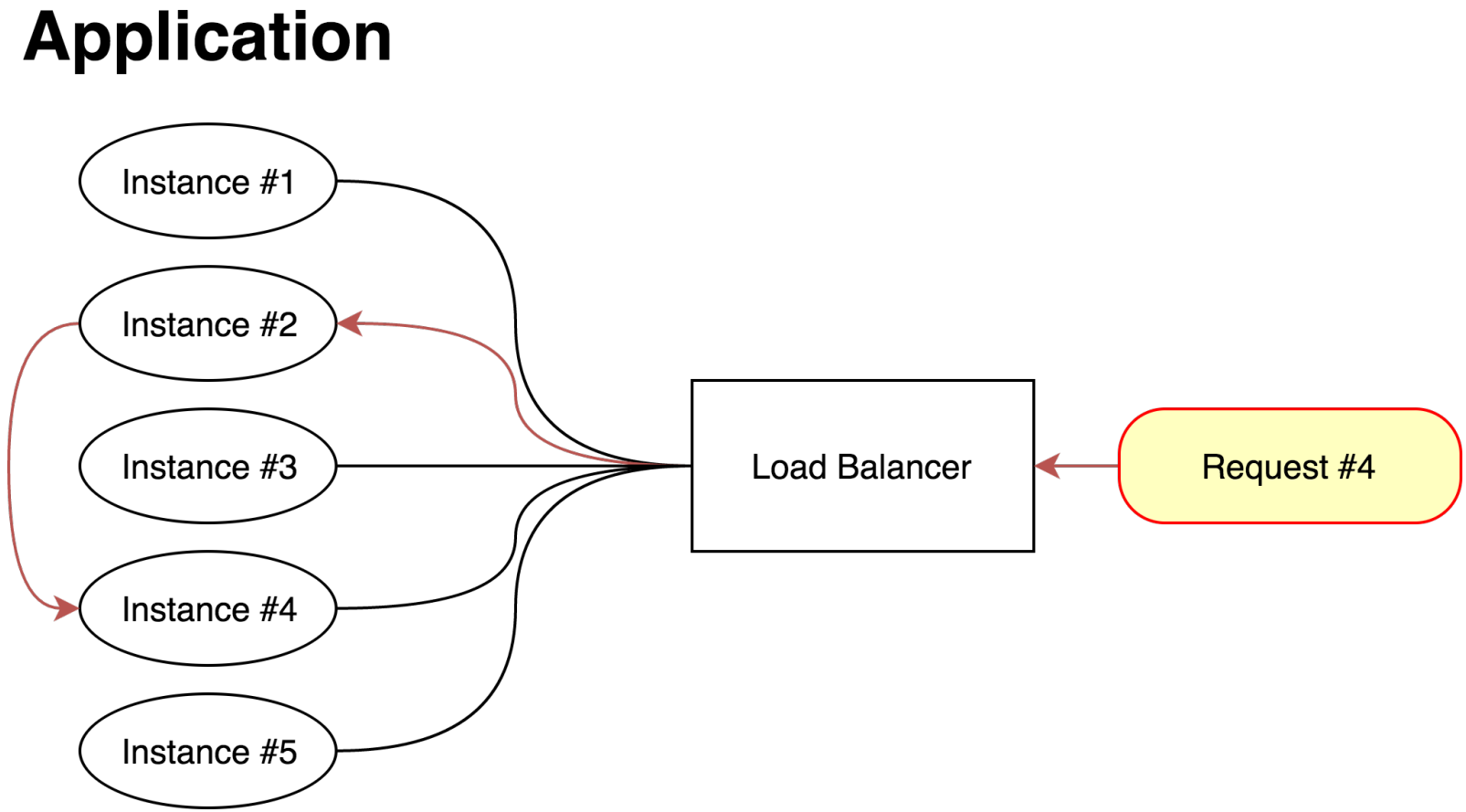


SQUARE ENIX


Application
Instance #1
Instance #2
Instance #3
Instance #4
Instance #5
?
Load Balancer
Request

SQUARE ENIX

Wobserver: Introduction
What about the load balancer?



SQUARE ENIX

Wobserver: Features
Browser

`:wobserver` provides the following information in the web-interface:

- System overview
- Load charts
- Memory allocators
- Application diagram
- Process list
- Port list
- ETS table browser

SQUARE ENIX

Wobserver: Features
API

A JSON API is available to allow for easy automation.

- Node listing
- System information
- Websocket fallback
- Accessing information from specific nodes

It also functions as a fallback for the web UI, when websockets fail.

SQUARE ENIX

Wobserver: Features
Metrics

`:wobserver` adds a `/metrics` endpoint.

It formats system metrics for *Prometheus*, but can be configured to format metrics in any format.

More metrics can be added dynamically by hooking into `:wobserver`.

SQUARE ENIX®

Wobserver: Installation

Hex

1. Add `{:wobserver, "~> 0.1"}` to the dependencies.
2. `mix deps.get`
3. Done, available on *port 4001*

SQUARE ENIX

Wobserver: Installation
Build

1. Clone
   `https://github.com/shinyscorpion/wobserver.git`
2. `mix deps.get`
3. Done?

SQUARE ENIX

Wobserver: Installation
Build: Assets

`:wobserver` bakes in assets to make it easier to use with distillery.

These assets are not in the repo and need to be build locally.

1. npm install
2. mix build

SQUARE ENIX

Wobserver: Installation
Build: mix build

`:wobserver` uses *Gulp* for the asset pipeline.

After building the assets `mix build` will take the generated output and put it into a module.

SQUARE ENIX

Integration

Integration: Plug
Cowboy

It is possible to integrate `:wobserver` with an existing cowboy project.

`:wobserver` is written as a Plug, so to integrate we need to:

- prevent starting another cowboy.
- forward requests to `:wobserver` router.

SQUARE ENIX

Integration: Plug
Cowboy: Project Setup

Initial setup of the project.

1. `mix new --sup cowboy_wobserver`
2. Add `{:wobserver, "~> 0.1"}` to the depencies.
3. Add `{:cowboy, "~> 1.0.0"}` to the depencies.
4. Add `{:plug, "~> 1.0"}` to the depencies.
5. `mix deps.get`

SQUARE ENIX

Integration: Plug
Cowboy: Router

Create a router for our project. (Empty for now)

ROUTER.EX

```
1  defmodule CowboyWobserver.Router do
2    use Plug.Router
3
4    plug :match
5    plug :dispatch
6
7    forward "/wobserver", to: Wobserver.Web.Router
8  end
```

SQUARE ENIX

Integration: Plug
Cowboy: Application

Setup the application to start Cowboy with our router.

APPLICATION.EX

```
18      children = [
19        Cowboy.child_spec(
20          :http,
21          CowboyWobserver.Router,
22          [],
23          options
24        )
25      ]
```

SQUARE ENIX

Integration: Plug
Cowboy: Application

And handle the websocket.

APPLICATION.EX

```
9       options = [
10        dispatch: [
11          {:_, [
12            {"/wobserver/ws", Wobserver.Web.Client, []},
13            {:_, Cowboy.Handler, {CowboyWobserver.Router, []}}
14          ]}
15        ],
16      ]
```

SQUARE ENIX

Integration: Plug
Cowboy: Done

Done.
http://localhost:4000/wobserver

Everything works, right?

SQUARE ENIX

Integration: Plug
Cowboy: Config

We still need to:

- ☐ Disable standalone mode.
- ☐ Point node discovery in the right direction.

CONFIG.EXS

```
3  config :wobserver,
4    mode: :plug,
5    remote_url_prefix: "/wobserver"
```

SQUARE ENIX

Integration: Phoenix
Project Setup

1. `mix phx.new phoenix_wobserver`
2. Add `{:wobserver, "~> 0.1"}` to the depencies.
3. `mix deps.get`
4. `mix phx.server`

Result:

Application `http://localhost:4000/`

Wobserver `http://localhost:4001/`

SQUARE ENIX

Integration: Phoenix
Plug mode

Add the following lines of code:

CONFIG.EXS

```
25 config :wobserver,
26   mode: :plug,
27   remote_url_prefix: "/wobserver"
```

ROUTER.EX

```
16   forward "/wobserver", Wobserver.Web.Router
```

ENDPOINT.EX

```
4   socket "/wobserver", Wobserver.Web.PhoenixSocket
```

SQUARE ENIX

Integration: Node Discovery without EPMD

Problem

`:wobserver` is used to observe nodes that can not be connected to using traditional methods.

We would still like to view all nodes through a single instance of `:wobserver`.

SQUARE ENIX®

Integration: Node Discovery without EPMD

Solution

`:wobserver` proxies all requests (interface and api) to the correct node.

The metrics are not proxied, but aggregated.

But how does `:wobserver` find the other nodes?

SQUARE ENIX

Integration: Node Discovery
DNS

CONFIG.EXS

```
config :wobserver,
  discovery: :dns,
  discovery_search: "google.nl"
```

SQUARE ENIX

Integration: Node Discovery
DNS

DISCOVERY.EX

```
167   @spec dns_discover(search :: String.t) :: list(Remote.t)
168   defp dns_discover(search) when is_binary(search) do
169     search
170     |> String.to_charlist
171     |> :inet_res.lookup(:in, :a)
172     |> Enum.map(&dns_to_node/1)
173   end
```

SQUARE ENIX

Integration: Node Discovery
Custom

CONFIG.EXS

```
config :wobserver,
  discovery: :custom,
  discovery_search: &MyApp.discover/0
```

or

```
config :wobserver,
  discovery: :custom,
  discovery_search: fn -> [] end
```

SQUARE ENIX

Integration: Node Discovery
Custom

REMOTE.EX

```
12    @typedoc "Remote node information."
13    @type t :: %__MODULE__{
14      name: String.t,
15      host: String.t,
16      port: integer,
17      local?: boolean,
18    }
```

Every `:wobserver` (one per node) has a separate list of nodes. Only the node local to the `:wobserver` instance is marked with `local?`.

SQUARE ENIX

Integration: Node Discovery
Connected nodes

Question: How do I get wobserver to see the connected nodes?

SQUARE ENIX

Integration: Node Discovery
Connected nodes

Question: How do I get wobserver to see the connected nodes?

Question: Shouldn't they connect automatically?

SQUARE ENIX

So let’s add it!

Integration: Node Discovery
Creating a node

nodes_wobserver.ex

```
15    defp node_info(local \\ false) do
16      %Wobserver.Util.Node.Remote{
17        name: node() |> to_string,
18        host: "localhost",
19        port: Application.get_env(:wobserver, :port),
20        local?: local,
21      }
22    end
```

SQUARE ENIX

Integration: Node Discovery
Sending node info back to a process

nodes_wobserver.ex

```
11    def remote_node(caller_pid) do
12      send caller_pid, {:wobserver_node, node_info()}
13    end
```

SQUARE ENIX

Integration: Node Discovery
Querying the node

nodes_wobserver.ex

```
24  defp check_node(remote_node) do
25    Task.async fn ->
26      Node.spawn remote_node,
27                 NodesWobserver,
28                 :remote_node,
29                 [self()]
30
31      receive do
32        {:wobserver_node, data} -> data
33      end
34    end
35  end
```

SQUARE ENIX

Integration: Node Discovery
Sending node info back to a process

nodes_wobserver.ex

```
2   def list do
3     [
4       node_info(true) |
5       Node.list
6       |> Enum.map(&check_node/1)
7       |> Enum.map(&Task.await/1)
8     ]
9   end
```

SQUARE ENIX

Does the solve the problem?

Does the solve the problem? *kind-a*

Extending

Extending: Metrics
Types

Add additions metrics or generate metrics during runtime by setting the config.

Metric types:

counter Numeric, should only increase.

gauge Numeric, can go up and down.

SQUARE ENIX

Extending: Metrics
Configuration

CONFIG.EXS

```
3  config :wobserver,
4    metrics: [
5      additional: [
6        marbles: {
7          &ExtendingWobserver.marbles/0,
8          :gauge,
9          "Marbles"
10       },
11     ],
12     generators: [
13       &ExtendingWobserver.generator/0,
14     ]
15   ]
```

SQUARE ENIX

Extending: Pages
Tables

Add additional pages or generate pages during runtime by setting the config.

Page options:

api_only	Numeric, should only increase.
refresh	Refresh time factor, 0 for no refresh, higher is slower.

SQUARE ENIX

Extending: Pages
Data

Page data can be given in different formats, but it all must be JSON encodable.

Page data:

map	displayed as key-value table.
list of maps	displayed as table, where each map is a row.

It is also possible to return a map of page data. Each value will be turned into one of the above tables.

SQUARE ENIX

Extending: Pages
Configuration

CONFIG.EXS

```
17  config :wobserver,
18    pages: [
19      {"Stable", :stable, &ExtendingWobserver.stable/0}
20    ]
```

SQUARE ENIX

A look into the code

A look into the code:
Structure

lib/system

All system statistics.

lib/util

All `:observer` functionality.

lib/util/metrics

All metric formatting.

lib/util/node

Node discovery and inter-connections.

src

All web assets.

gulp.js

The web assets build pipeline.

SQUARE ENIX®

Reflection

Reflection:
Mistakes made

- Too many mixed concerns.
  - Interconnecting nodes
  - Web interface
  - Metrics
  - System monitoring
- Bad websocket handling
- Security not really taken into consideration
- Local nodes...
- Impractical assets setup

And general Elixir inexperience.

SQUARE ENIX

Reflection:
Version 0.2?

- Split concerns.
- Good node interactivity, through sockets and other methods.
- Security from the start.
- Get someone / something to make a nice interface and diagrams.

SQUARE ENIX

Questions

Questions:
Questions?

Questions?

Want to know more about what we do with Elixir @ Square Enix?

Just drop by for a chat.

Want to see the code samples? Download the slides?

See: *github.com/IanLuites/wobserver-elixirconf-2017*

SQUARE ENIX