Wobserver

Easy to Integrate Monitoring and Debugging

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Elixir into production.

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Wobserver: Introduction
What?

W[eb]-observer
Wobserver

Web based metrics, monitoring, and observer

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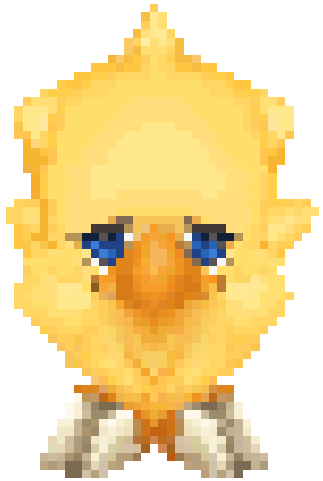
Wobserver: Introduction
Why?

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.



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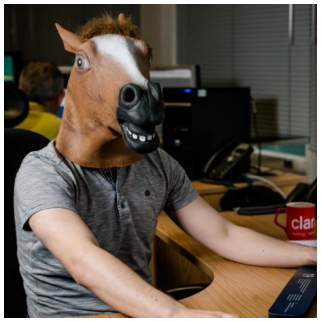
Wobserver: Introduction
Why? Limited access

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



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

You will need to:

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

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Wobserver: Introduction

Solution: wobserver

`:wobserver` provides a web interface.

The web interface uses websockets for live data and inter-connecting.

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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

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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.

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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`.

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Wobserver: Installation

Hex

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

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Wobserver: Installation
Build

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

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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

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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.

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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.

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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`

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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
```

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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      ]
```

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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      ]
```

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Integration: Plug
Cowboy: Done

Done.
http://localhost:4000/wobserver

Everything works, right?

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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"
```

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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/`

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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
```

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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`.

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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?

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Integration: Node Discovery
DNS

CONFIG.EXS

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

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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
```

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Integration: Node Discovery
Custom

CONFIG.EXS

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

or

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

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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?`.

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Integration: Node Discovery
Connected nodes

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

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Integration: Node Discovery
Connected nodes

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

Question: Shouldn't they connect automatically?

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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
```

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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
```

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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
```

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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
```

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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.

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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   ]
```

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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.

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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.

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Extending: Pages
Configuration

CONFIG.EXS

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

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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.

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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.

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Reflection:
Version 0.2?

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

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Questions

Questions:
Questions?

Questions?

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

Just drop by for a chat.

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