

Observable Elixir

Agenda

- What is Observability
- Event Logs
- Metrics
- Traces

And we will be talking alot about :telemetry

Bernardo Amorim

Software Engineer @ [Slab.com](#)

What is Observability?

According to Wikipedia

Observability is a measure of how well internal states of a system can be inferred from knowledge of its external outputs.

We want to

- Understand whether the system is healthy or not
- Debug what went or is going wrong during crisis
- Find areas for improvement

The Demo App for this presentation

github.com/bamorim/observable-elixir-daily


```
<video src="../videos/demo-observable-elixir.webm" controls width="100%></video>
```

Your observability stack

Operational dashboards for your data here, there, or anywhere



The (actually useful) free forever plan

Grafana, of course + 10K series

Prometheus metrics + 50GB logs +
50GB traces

[Create free account](#)

(No credit card required)



MILLIONS OF USERS ACROSS 800K+ GLOBAL INSTANCES



PayPal

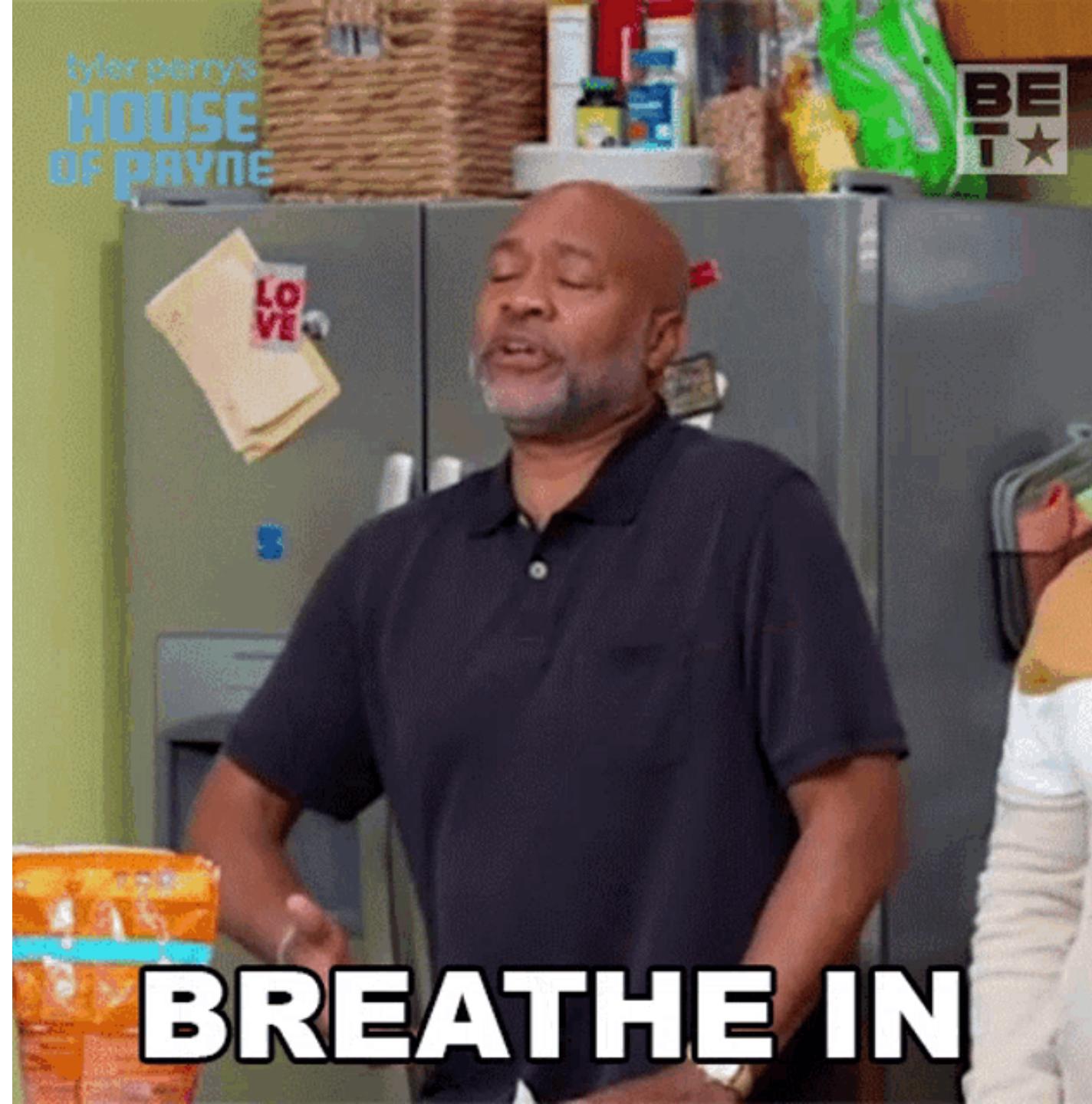
ebay

Pernod Ricard verizon[✓]

[Success stories →](#)

Agenda

- What is Observability
- Event Logs
- Metrics
- Traces



Event Logs

- Things happen in your system
- Logs are a way for externalization
- Examples:
 - HTTP Request Handled
 - Database Query Executed
 - Background Job Executed

Metadata

Common data

- Duration
- Response Status Code
- Path / Route

Similar to :telemetry events

telemetry

v1.1.0

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Telemetry



[Documentation](#)

Telemetry is a lightweight library for dynamic dispatching of events, with a focus on metrics and instrumentation. Any Erlang or Elixir library can use `telemetry` to emit events. Application code and other libraries can then hook into those events and run custom handlers.

Note: this library is agnostic to tooling and therefore is not directly related to OpenTelemetry. For OpenTelemetry in the Erlang VM, see [opentelemetry-erlang](#), and check [opentelemetry-telemetry](#) to connect both libraries.

Usage

In a nutshell, you register a custom module and function to be invoked for certain events, which are executed whenever there is such an event. The event name is a list of atoms. Each event is composed of a numeric value and can have metadata attached to it. Let's look at an example.

Imagine that you have a web application and you'd like to log latency and response status for each incoming request. With Telemetry, you can build a module which does exactly that whenever a response is sent. The first step is to execute a measurement.

In Elixir:

:telemetry events

```
@type event() :: {event_name(), metadata(), measurements()}

@type event_name() :: [atom(), ...]
@type metadata() :: map()
@type measurements() :: map()
```


:telemetry spans

- Has a start and an end
- :telemetry defines a standard convention with 3 events:
 - :start with :system_time measurement
 - :stop and :exception with :duration measurement

:telemetry span example

- [:phoenix, :endpoint, :start] when the request starts
- [:phoenix, :endpoint, :stop] when the requests finishes successfully
- [:phoenix, :endpoint, :exception] when an exception happens

Logs are just
:telemetry events
that are externalized

My problem with Phoenix default logging

```
[info] GET /api/tasks/  
[info] Sent 200 in 23ms  
[info] GET /api/tasks/  
[info] Sent 200 in 2ms  
[info] GET /api/tasks/  
[info] Sent 200 in 2ms
```

We can fix it

- Disable default Phoenix Logger
- Implement custom logger by listening to telemetry events
- Implement custom log formatter using a structured format
(Logfmt or JSON)

Implement in Elixir with Libraries

Many libraries for JSON Logging

- LoggerJSON
- Ink

Implement in Elixir with Libraries

I'm open sourcing some internal libraries for logging we were using:

- github.com/bamorim/telemetry_logger
- github.com/bamorim/structured_logger

Install the libraries

```
defp deps do
  [
    # Add the following deps
    {:telemetry_logger, github: "bamorim/telemetry_logger"},
    {:structured_logger, github: "bamorim/structured_logger"}
  ]
end
```

Then run `mix deps.get`

Switch to the new logger and formatter

```
# Disable Phoenix Logger
config :phoenix, logger: false

# Set the formatter and allow all metadata
config :logger, :console,
  format: {StructuredLogger, :format},
  metadata: :all
```

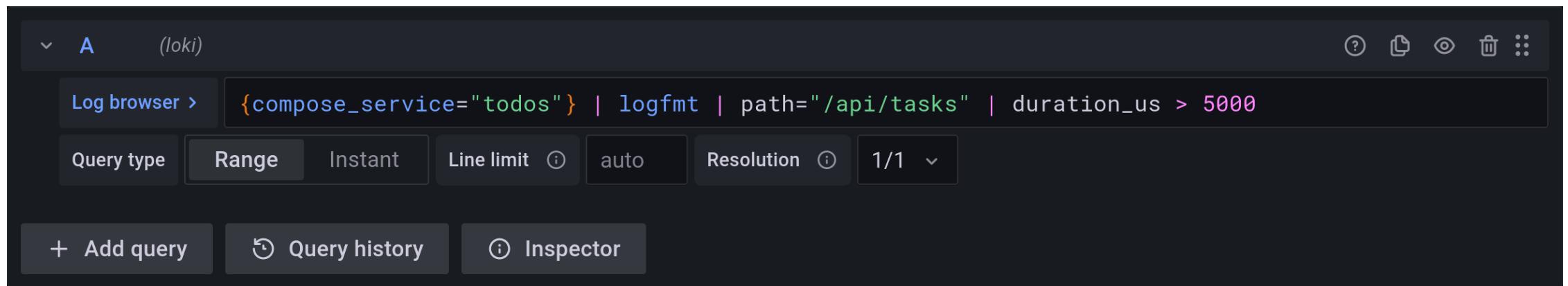
```
# Add to your MyApp.Application.start/2
TelemetryLogger.attach_loggers([
  {TelemetryLogger.PlugLogger, router: MyAppWeb.Router}
])
```

Start of range 18:12:12 - 18:11:12

Older logs ↑

```
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=97e20ebdada39176e12451ef9e977c3b
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=f7b2170f1ef8efd42e681b73209fbbfc
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=5c81c4d2c65da703d2632c413c18bbe8
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=a42a6673ee0947d5f35a915daf810ac1
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=abb5840b44298d2acf492bc819dbbb7e
> level=info msg="GET /api/tasks/3 -> 200" route=/api/tasks/:id path=/api/tasks/3 status=200 trace_id=4f55335202ff8e96f415fa0d3237a945
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=d966111bcef89ac4c8e2bc37427e90c4
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=0fabcc56b18fc4251676722a3a5bf71a3
> level=info msg="GET /api/tasks/5 -> 200" route=/api/tasks/:id path=/api/tasks/5 status=200 trace_id=e149229315dfc776506727fb73525b5
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=9745258ac5d4a9ee9874c07c2bcecc30
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=3a536de1696fe2e01a032a8a2b4e4385
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=8dca6dcf7c21d3b51012ab22fa54ced
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=76a62e2b2675d77e25ad50c1ceaa6135
> level=info msg="GET /api/tasks/1 -> 404" route=/api/tasks/:id path=/api/tasks/1 status=404 trace_id=3955383f19dc543c26633aa6c388ae7b
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=3ef8566aa6bdac4ba9028301fdb07c45
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=690ec0112173a9c30172dc92268d12d5
> level=info msg="GET /api/tasks/1 -> 404" route=/api/tasks/:id path=/api/tasks/1 status=404 trace_id=05e0f4a85b576aac77da34fd8ea9f68c
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=f79df7e1893e5c978f135c4e92235c10
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=9f7de3e1a8afc02691de53adaca9cd7a
> level=info msg="GET /api/tasks/7 -> 404" route=/api/tasks/:id path=/api/tasks/7 status=404 trace_id=272177f568f668c7b7849d6b513c6255
> level=info msg="GET /api/tasks/4 -> 200" route=/api/tasks/:id path=/api/tasks/4 status=200 trace_id=bcaecbad37ba3d04001c1d122721098b
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=8348bd9dbe880933f5312609a2b0cea5
> level=info msg="GET /api/tasks/3 -> 200" route=/api/tasks/:id path=/api/tasks/3 status=200 trace_id=2eb8055d739f9b30f24352e752b23dfe
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=d930ad76d1c1cbe912d7a201635502d2
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=69c286fa4a704eb86bcc3ce60caf07a0
> level=info msg="GET /api/tasks/3 -> 200" route=/api/tasks/:id path=/api/tasks/3 status=200 trace_id=b8e5e16e5e60d4e84c07837ac5061b20
> level=info msg="GET /api/tasks/5 -> 200" route=/api/tasks/:id path=/api/tasks/5 status=200 trace_id=e137dd807120f01d570fbcd739e795a
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=ca3053b2efeab326b0a83f1079342473
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=d697681caec68eeb8e38e39dd321e9b1
> level=info msg="GET /api/tasks/3 -> 200" route=/api/tasks/:id path=/api/tasks/3 status=200 trace_id=f1e35ac999dc3e7bbf840f544c28ec57
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=b5bfd4d9c427e2b4a34a71af8a0f027
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=e14a838a2c032ec0475ad474b00ece2
> level=info msg="GET /api/tasks/4 -> 200" route=/api/tasks/:id path=/api/tasks/4 status=200 trace_id=73161669409aa87d33627017d8b5bccd
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=09d0812abf08f5571781c6264761b2c8
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=aa894dc22ef1e2076a1b16e19ff0cb58
> level=info msg="GET /api/tasks/5 -> 200" route=/api/tasks/:id path=/api/tasks/5 status=200 trace_id=59117653a7b3cd5c2d1dcfc0e817492
> level=info msg="GET /api/reports/daily -> 200" route=/api/reports/daily path=/api/reports/daily status=200 trace_id=1117a4c1c54bbdee82f1a5dea492b1e9
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=1d7136e534aceef6e1b8091a49eff12c
> level=info msg="GET /api/tasks/2 -> 200" route=/api/tasks/:id path=/api/tasks/2 status=200 trace_id=8d0cc274fa176cebe528ca559eb8b384
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=916cbdb3c453bb575f738fe7fd61382b
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=bcf1976a8254000ce3cf1f4348b63c24
> level=info msg="GET /api/tasks/6 -> 404" route=/api/tasks/:id path=/api/tasks/6 status=404 trace_id=4879e66421635c4baac23d132ec458b5
> level=info msg="GET /api/tasks -> 200" route=/api/tasks path=/api/tasks status=200 trace_id=bb9ddc406d4ba8f2733b2f30a7bf4900
```

Grafana, Loki and LogQL are Awesome



Logs Tips

- **Do** use structured logging
- **Don't do** "print-debugging"
- **Do** take advantage of log levels
- **Do** allow your system to change log level without redeploying
- **Don't** nest fields in your logs

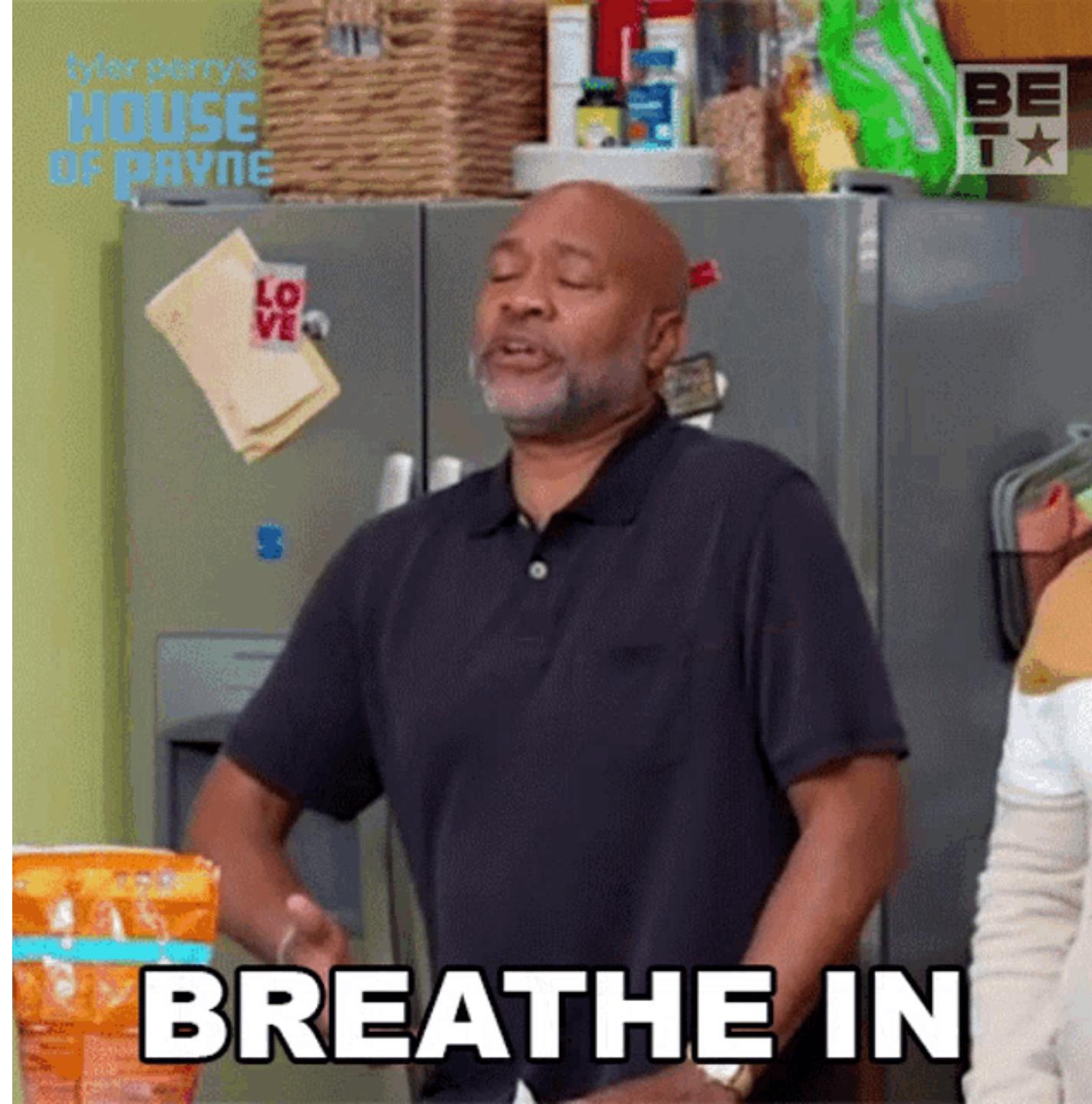
Logs help with debugging, but

How to check if the system is healthy?

- Requests/second
- Average (and other percentiles) latency
- Memory and CPU usage

Agenda

- ~~What is Observability~~
- ~~Event Logging~~
- Metrics
- Traces



Metrics

Numerical values sampled over time

Metrics give you a high-level view of your system

- Useful both on a technical level (e.g. memory usage) or domain level (e.g. total count of payments processed)
- Great for visualizations



Logins

190

Sign ups

269

Sign outs

273

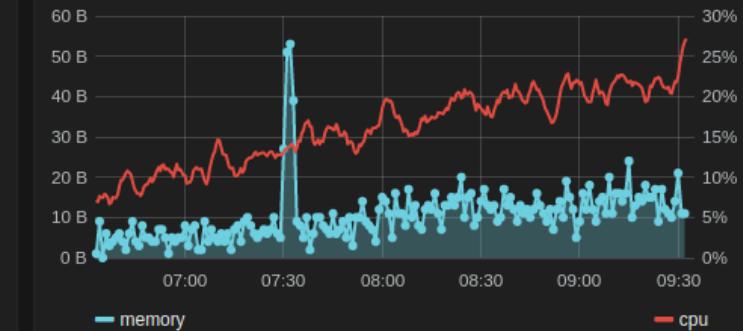
Memory / CPU



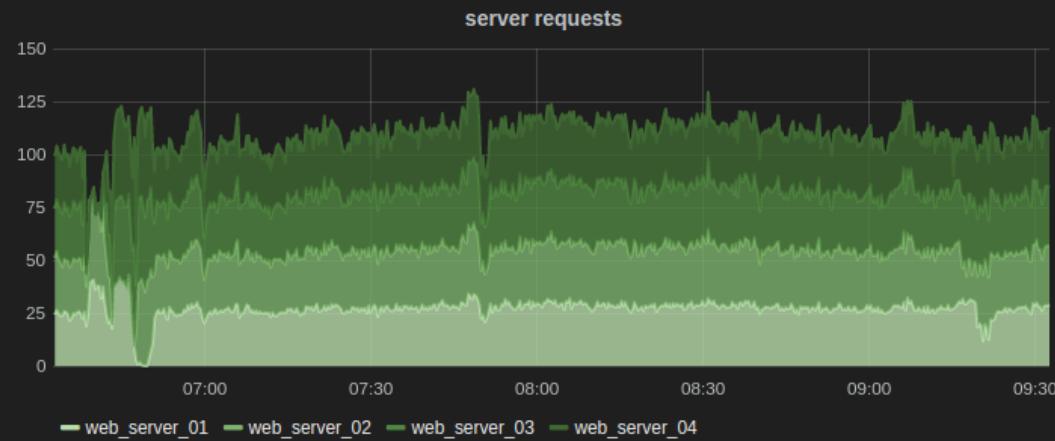
logins



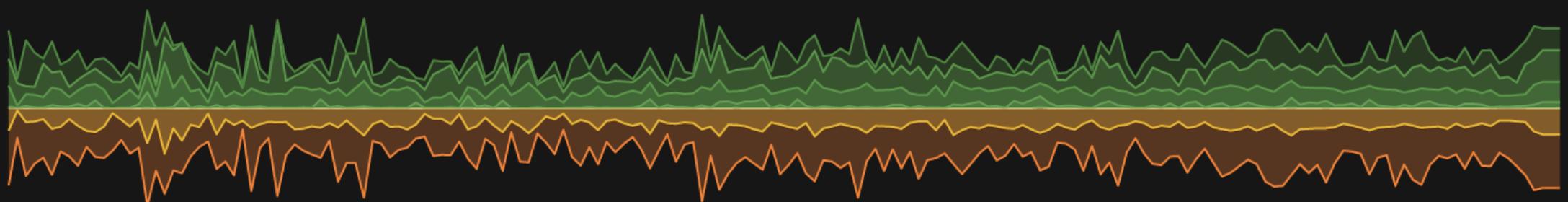
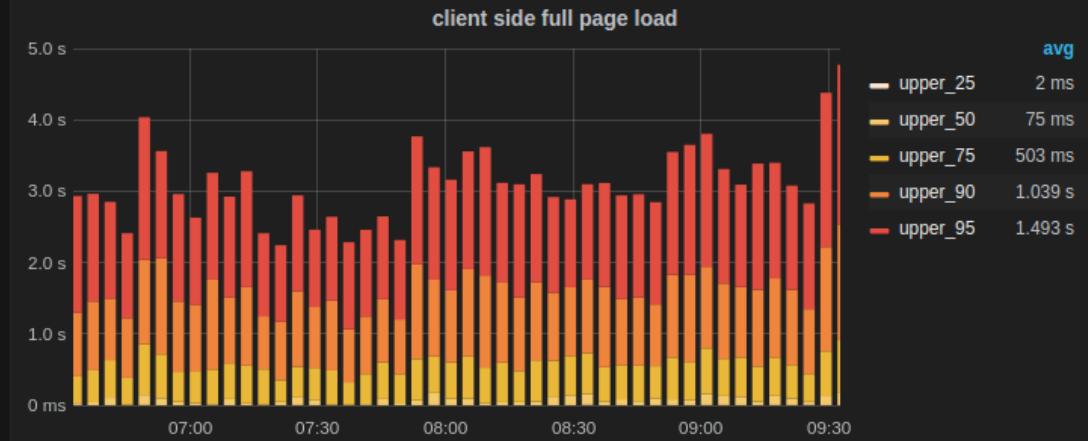
Memory / CPU



server requests



client side full page load



Metrics are cheap and fast to process

- Complexity is only dependent on number of timeseries and sample frequency
- Great for alerting
- Great for long term storage

Metrics - Data Model

```
@type timeseries() :: {metric_id(), [sample()]}

?type metric_id() :: {metric_name(), metric_labels()}
?type sample() :: {sample_value(), timestamp()}

?type metric_name() :: String.t()
?type metric_labels() :: %{String.t() => String.t()}
?type sample_value() :: float()
?type sample_timestamp() :: integer()
```

Computing metrics from `:telemetry` events

- `Plug.Telemetry` emits `[:phoenix, :endpoint, :stop]` events
- We can count the number of events emitted and aggregate into the "total number of requests"

Telemetry.Metrics

v0.6.1 ▾

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Telemetry.Metrics

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Breaking down metric v.
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Types
Functions

Telemetry.Metrics.ConsoleReport

METRICS STRUCTS

Telemetry.Metrics.Counter
Telemetry.Metrics.Distribution
Telemetry.Metrics.LastValue
Telemetry.Metrics.Sum

Telemetry.Metrics

Common interface for defining metrics based on `:telemetry` events.

Metrics are aggregations of Telemetry events with specific name, providing a view of the system's behaviour over time.

To give a more concrete example, imagine that somewhere in your code there is a function which sends an HTTP request, measures the time it took to get a response, and emits an event with the information:

```
:telemetry.execute(:http, :request, :stop, %{duration: duration})
```

You could define a counter metric, which counts how many HTTP requests were completed:

```
Telemetry.Metrics.counter("http.request.stop.duration")
```

or you could use a summary metric to see statistics about the request duration:

```
Telemetry.Metrics.summary("http.request.stop.duration")
```

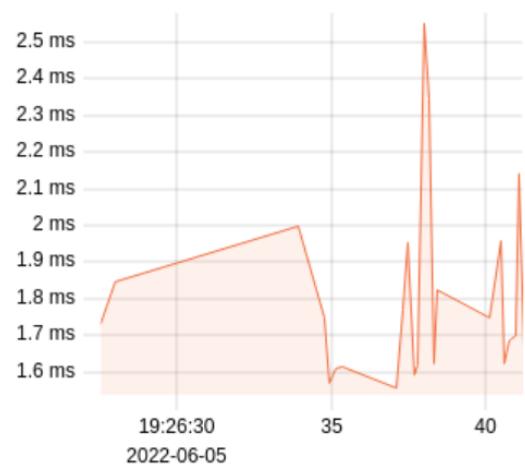
This documentation is going to cover all the available metrics and how to use them, as well as options, and how to integrate those metrics with reporters.

Metrics

Telemetry.Metrics

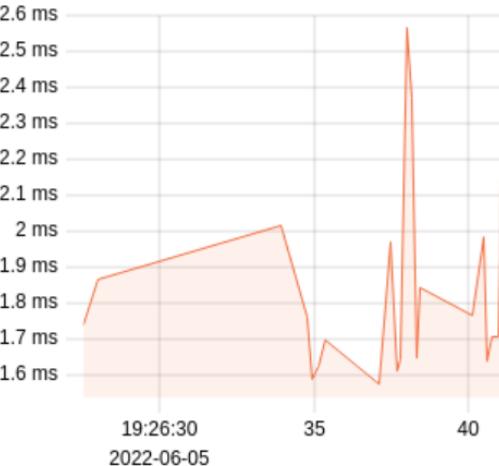
- Language for defining
:telemetry based metrics
- Define 5 different metric types
(counter, distribution, last value,
sum and summary)
- Metric Reporters attach to
events and aggregate them

Phoenix LiveDashboard

[Home](#) [OS Data](#) [Metrics](#) [Request Logger](#) [Applications](#) [Processes](#) [Ports](#) [Sockets](#) [ETS](#) [Ecto Stats](#)[Enable](#)[Daily](#) [Phoenix](#) [VM](#)**phoenix.endpoint.stop.duration**

	Value	Min	Max	Avg
--	-------	-----	-----	-----

<input type="checkbox"/> Duration	--	--	--	--
-----------------------------------	----	----	----	----

**phoenix.router_dispatch.stop.duration
(route)**

	Value	Min	Max	Avg
--	-------	-----	-----	-----

<input type="checkbox"/> /api/tasks	--	--	--	--
-------------------------------------	----	----	----	----

```
defmodule DailyWeb.Telemetry do
  use Supervisor
  import Telemetry.Metrics

  # ...

  def metrics do
    [
      # Phoenix Metrics
      summary("phoenix.endpoint.stop.duration",
        unit: {:native, :millisecond}
      ),
      summary("phoenix.router_dispatch.stop.duration",
        tags: [:route],
        unit: {:native, :millisecond}
      ),
      # ...
    ]
  end
end
```

Limitations of LiveDashboard

- Metrics are not persisted
- If you have multiple apps it will be hard to consolidate visualizations and data
- Only works for Elixir



From metrics to insight

Power your metrics and alerting with the leading open-source monitoring solution.

[GET STARTED](#)[DOWNLOAD](#)

The Prometheus Team strongly condemns Russia's illegal invasion of Ukraine. Please consider donating to a humanitarian aid organization such as [Aktion Deutschland Hilft](#) or [Care in Action](#) to provide relief.

Dimensional data

Prometheus implements a highly dimensional data model. Time series are identified by a metric name and a set of key-value pairs.

Powerful queries

PromQL allows slicing and dicing of collected time series data in order to generate ad-hoc graphs, tables, and alerts.

Great visualization

Prometheus has multiple modes for visualizing data: a built-in expression browser, Grafana integration, and a console template language.

Efficient storage

Prometheus stores time series in memory and on local disk in an efficient custom format. Scaling is achieved by functional sharding and federation.

Simple operation

Each server is independent for reliability, relying only on local storage. Written in Go, all binaries are statically linked and easy to deploy.

Precise alerting

Alerts are defined based on Prometheus's flexible PromQL and maintain dimensional information. An alertmanager handles notifications and silencing.

Many client libraries

Client libraries allow easy instrumentation of services. Over ten languages are supported already and custom libraries are easy to implement.

Many integrations

Existing exporters allow bridging of third-party data into Prometheus. Examples: system statistics, as well as Docker, HAProxy, StatsD, and JMX metrics.

«Even though Borgmon remains internal to Google, the idea of treating time-series data as a data source for generating alerts is now accessible to everyone through those open source tools like Prometheus [...]»

— Site Reliability Engineering: How Google Runs Production Systems (O'Reilly Media)

Prometheus

- Open-source monitoring and alerting system
- A multi-dimensional data model for time-series data
- PromQL: query language
- Data collection via **pull** over simple HTTP protocol

Pull vs Push

- Prometheus is Pull, that is, Prometheus controls when to ask for metrics
 - Improves back-pressure (if Prometheus is overloaded it can delay the sampling)
- Your app just need to:
 - Keep last values for metrics
 - Be able to report them when Prometheus request (in a specific format)

Prometheus Exposition Format

```
my_metric{label1=value1} 101
my_metric{label1=value2} 42

other_metric{label=value} 3.14
```

Integrating Prometheus with Elixir

TelemetryMetricsPrometheus

telemetry_metrics_prometheus

Prometheus Reporter for `Telemetry.Metrics` definitions.

Provide a list of metric definitions to the `init/2` function. It's recommended to run TelemetryMetricsPrometheus under a supervision tree, usually under Application.

```
def start(_type, _args) do
    # List all child processes to be supervised
    children = [
        {TelemetryMetricsPrometheus, [metrics: metrics()]}
        ...
    ]

    opts = [strategy: :one_for_one, name: ExampleApp.Supervisor]
    Supervisor.start_link(children, opts)
end

defp metrics, do:
    [
        counter("http.request.count"),
        sum("http.request.payload_size", unit: :byte),
        last_value("vm.memory.total", unit: :byte)
    ]
```

By default, metrics are exposed on port `9568` at `/metrics`. The port number can be configured if necessary. You are not required to use the included server, though it is recommended. `https` is not supported yet, in

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TelemetryMetricsPrometheus

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- Summary Types Functions

README

**PromEx**

▼ v1.7.1

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API Reference

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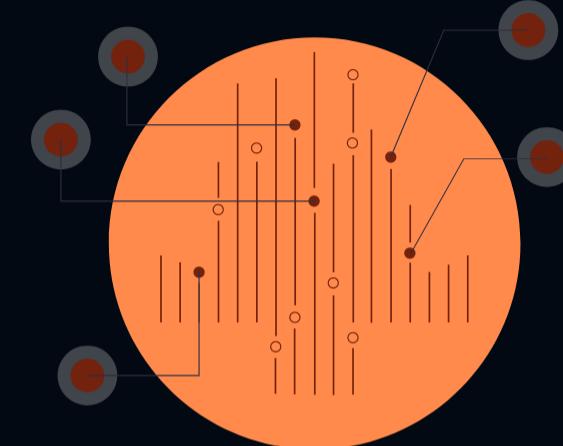
- Installation
- Supporting PromEx
- Setting Up PromEx
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- Design Philosophy
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- Grafana Dashboards
- Security Concerns
- Performance Concerns
- Attribution

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- Writing PromEx Plugins
- Introduction to Telemetry

GRAFANA

- Dashboards
- Screenshots



PromEx

Prometheus metrics and Grafana dashboards for all of your favorite Elixir libraries

[HEX](#)[v1.7.1](#)[BUILD STATUS](#)[PASSING](#)[COVERAGE](#)[81 %](#)[SLACK](#)[#PROM_EX](#)[SUPPORT PROMEX](#)

Contents

PromEx

- Just another handler
- Shared core with
TelemetryMetricsPrometheus
- Nice library of ready-made
metrics and Grafana dashboards
- For something more minimalist,
TelemetryMetricsPrometheus
is probably your best bet.

Install PromEx

Add the dependency

```
defp deps do
  [
    {:prom_ex, "~> 1.7.1"}
  ]
end
```

Run `mix prom_ex.gen.config --datasource prometheus`

You should end up with something like this:

```
defmodule Daily.PromEx do
  use PromEx, otp_app: :daily

  @impl true
  def plugins do
    #...
  end

  @impl true
  def dashboard_assigns do
    # ...
  end

  @impl true
  def dashboards do
    # ...
  end
end
```

If you follow the instructions on the generated file you can then enable the relevant plugins, for example:

```
def plugins do
  [
    Plugins.Application,
    Plugins.Beam,
    {Plugins.Phoenix, router: DailyWeb.Router, endpoint: DailyWeb.Endpoint},
    Plugins.Ecto
  ]
end
```

The instructions will also tell you to set some configs and

```
defmodule DailyWeb.Endpoint do
  use Phoenix.Endpoint, otp_app: :daily

  # Add this line
  plug PromEx.Plug, prom_ex_module: Daily.PromEx
end
```

```
defmodule Daily.Application do
  def start(_type, _args) do
    children = [
      # Add PromEx to the supervision tree
      Daily.PromEx,
      # ...
    ]
    # ...
  end
end
```

Now you can get metrics in prometheus format at <http://localhost:4000/metrics>

```
# HELP daily_prom_ex_phoenix_endpoint_port_info The configured port of the Endpoint module.
# TYPE daily_prom_ex_phoenix_endpoint_port_info gauge
daily_prom_ex_phoenix_endpoint_port_info{endpoint="DailyWeb.Endpoint",port="4000"} 1
# HELP daily_prom_ex_phoenix_endpoint_url_info The configured URL of the Endpoint module.
# TYPE daily_prom_ex_phoenix_endpoint_url_info gauge
daily_prom_ex_phoenix_endpoint_url_info{endpoint="DailyWeb.Endpoint",url="http://localhost:4000"} 1
# HELP daily_prom_ex_beam_systemSchedulers_online_info The number of scheduler threads that are online.
# TYPE daily_prom_ex_beam_systemSchedulers_online_info gauge
daily_prom_ex_beam_systemSchedulers_online_info 6
# HELP daily_prom_ex_beam_systemSchedulers_info The number of scheduler threads in use by the BEAM.
# TYPE daily_prom_ex_beam_systemSchedulers_info gauge
daily_prom_ex_beam_systemSchedulers_info 6
# HELP daily_prom_ex_beam_system_dirtyIoSchedulers_info The total number of dirty I/O schedulers used to execute I/O bound native functions.
# TYPE daily_prom_ex_beam_system_dirtyIoSchedulers_info gauge
daily_prom_ex_beam_system_dirtyIoSchedulers_info 10
# HELP daily_prom_ex_beam_system_dirtyCpuSchedulers_online_info The total number of dirty CPU schedulers that are online.
# TYPE daily_prom_ex_beam_system_dirtyCpuSchedulers_online_info gauge
daily_prom_ex_beam_system_dirtyCpuSchedulers_online_info 6
# HELP daily_prom_ex_beam_system_dirtyCpuSchedulers_info The total number of dirty CPU scheduler threads used by the BEAM.
# TYPE daily_prom_ex_beam_system_dirtyCpuSchedulers_info gauge
daily_prom_ex_beam_system_dirtyCpuSchedulers_info 6
# HELP daily_prom_ex_beam_system_wordSizeBytes_info The size of Erlang term words in bytes.
# TYPE daily_prom_ex_beam_system_wordSizeBytes_info gauge
daily_prom_ex_beam_system_wordSizeBytes_info 8
# HELP daily_prom_ex_beam_system_timeCorrectionSupport_info Whether the BEAM instance has time correction support.
# TYPE daily_prom_ex_beam_system_timeCorrectionSupport_info gauge
daily_prom_ex_beam_system_timeCorrectionSupport_info 1
# HELP daily_prom_ex_beam_systemThreadSupport_info Whether the BEAM instance has been compiled with threading support.
# TYPE daily_prom_ex_beam_systemThreadSupport_info gauge
daily_prom_ex_beam_systemThreadSupport_info 1
# HELP daily_prom_ex_beam_systemJitSupport_info Whether the BEAM instance is running with the JIT compiler.
# TYPE daily_prom_ex_beam_systemJitSupport_info gauge
daily_prom_ex_beam_systemJitSupport_info 1
# HELP daily_prom_ex_beam_systemSmpSupport_info Whether the BEAM instance has been compiled with SMP support.
# TYPE daily_prom_ex_beam_systemSmpSupport_info gauge
daily_prom_ex_beam_systemSmpSupport_info 1
# HELP daily_prom_ex_beam_systemVersion_info The OTP release major version.
# TYPE daily_prom_ex_beam_systemVersion_info gauge
daily_prom_ex_beam_systemVersion_info 25
# HELP daily_prom_ex_beam_systemAtomLimit_info The maximum number of atoms allowed.
# TYPE daily_prom_ex_beam_systemAtomLimit_info gauge
```

Instructing Prometheus to scrape metrics

This will vary depending on your setup, but it should be something as easy as configuring this:

```
scrape_configs:  
  - job_name: 'daily'  
    scrape_interval: 5s  
    static_configs:  
      - targets: ['daily:4000']
```

And now you can query through Grafana (or other frontends)



Explore prometheus

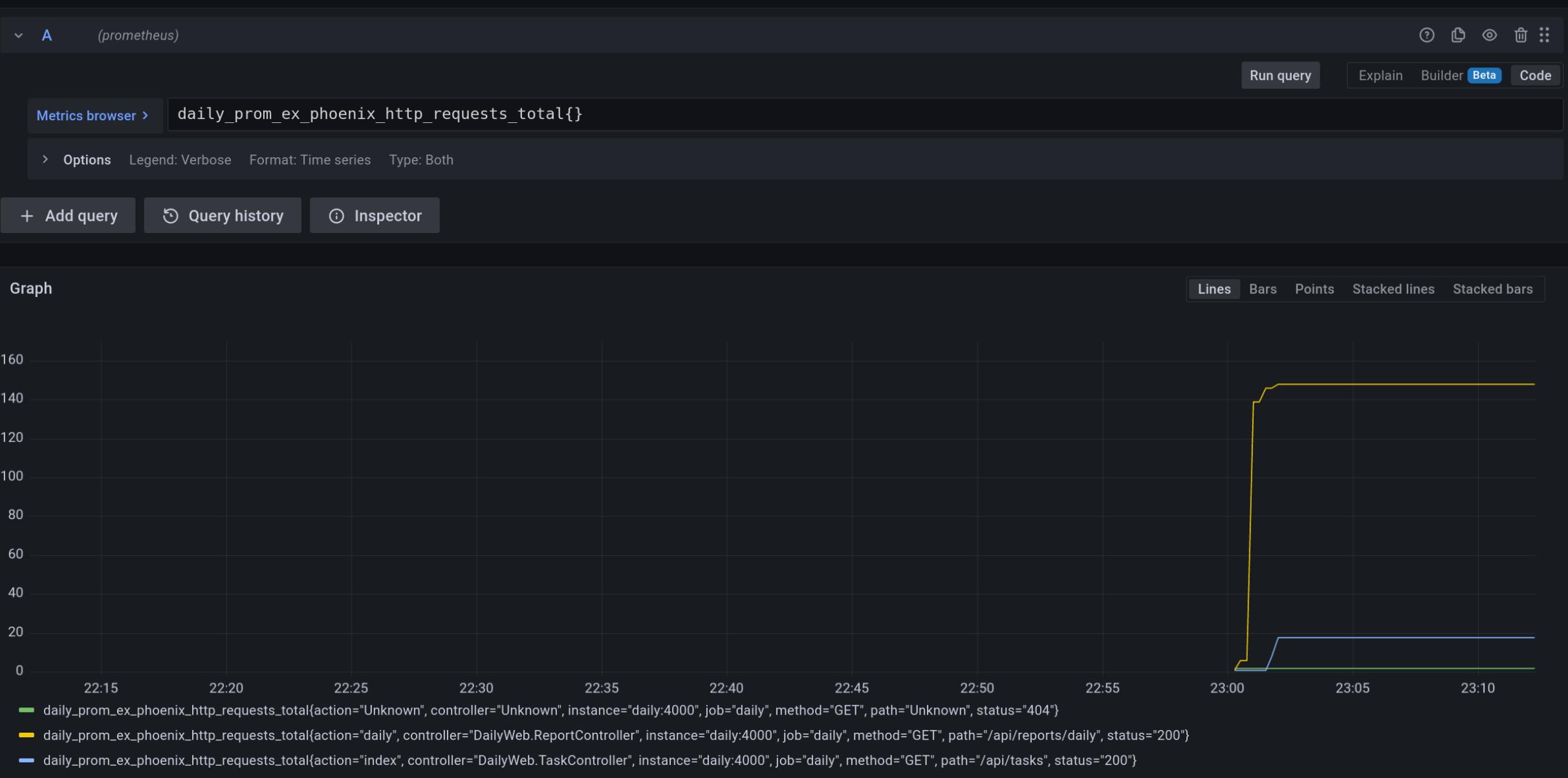
Split

Add to dashboard

Last 1 hour



Run query



And let's say you have something like

```
def dashboards
[
  {:prom_ex, "application.json"},
  {:prom_ex, "beam.json"},
  {:prom_ex, "phoenix.json"},
  {:prom_ex, "ecto.json"}
]
end
```

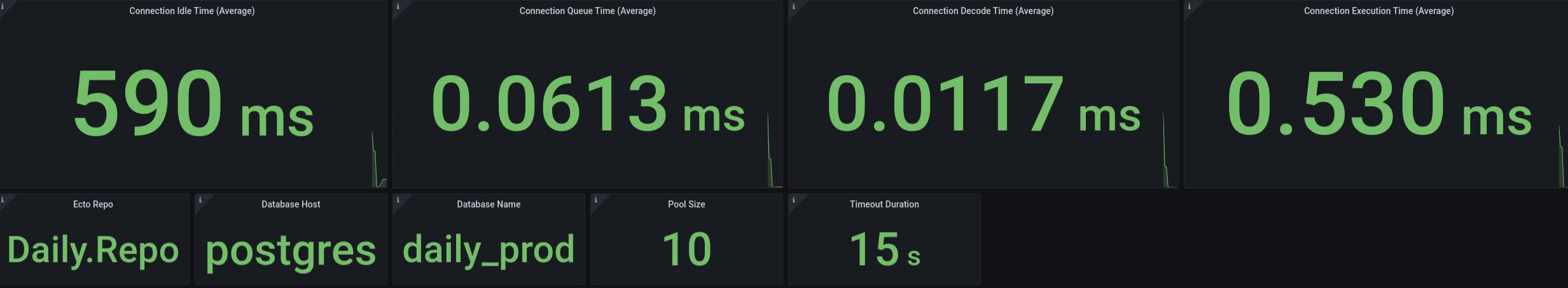
And you run something like

```
for dashboard in application beam phoenix ecto; do
  mix prom_ex.dashboard.export -m 'Daily.PromEx' -d "$dashboard.json" -s > ./docker/grafana/$dashboard.json
done
```

Each will generate a JSON file you import into Grafana.

[Prometheus Job](#) daily [Application Instance](#) daily:4000 [Ecto Repo](#) [Daily Repo](#) [Interval](#) 30s[Sponsor PromEx](#) [Ecto Plugin Docs](#)

Overview

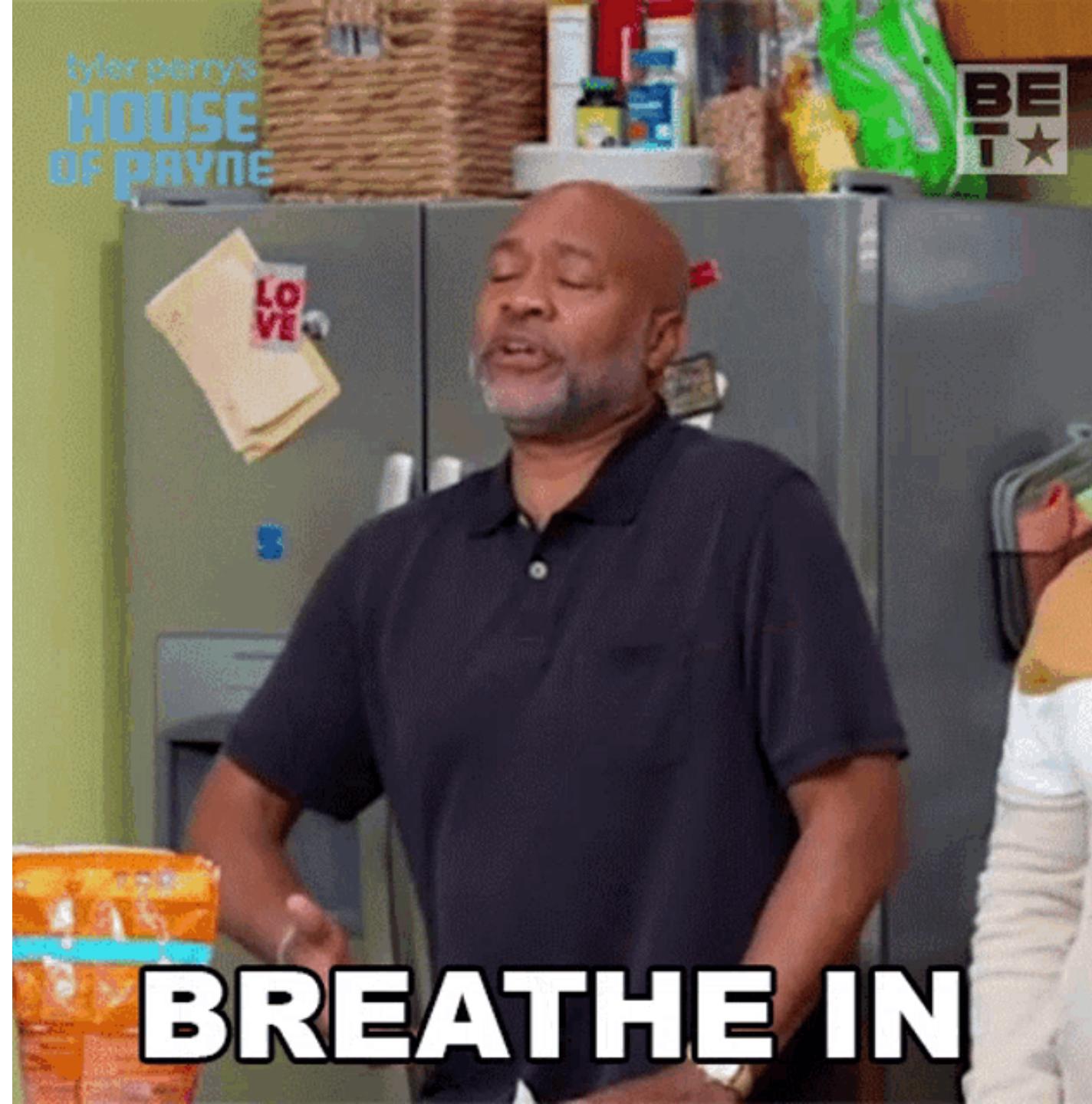


Query Details



Agenda

- What is Observability
- Event Logging
- Metrics
- Traces



Traces

A trace is a collection of **correlated events** that captures information about a program execution.

Distributed Tracing

A trace where spans are executed in multiple different services.

Trace Model

- A **trace** is a tree of **spans**
- A **span**:
 - Has a start and end timestamps
 - Contained to one service
 - Contains some metadata
 - Belongs to a trace
 - Can be either root or child of another span on the same trace

Implementation

OpenTelemetry metrics release candidates are now available! [Read more](#)



High-quality, ubiquitous, and portable telemetry to enable effective observability

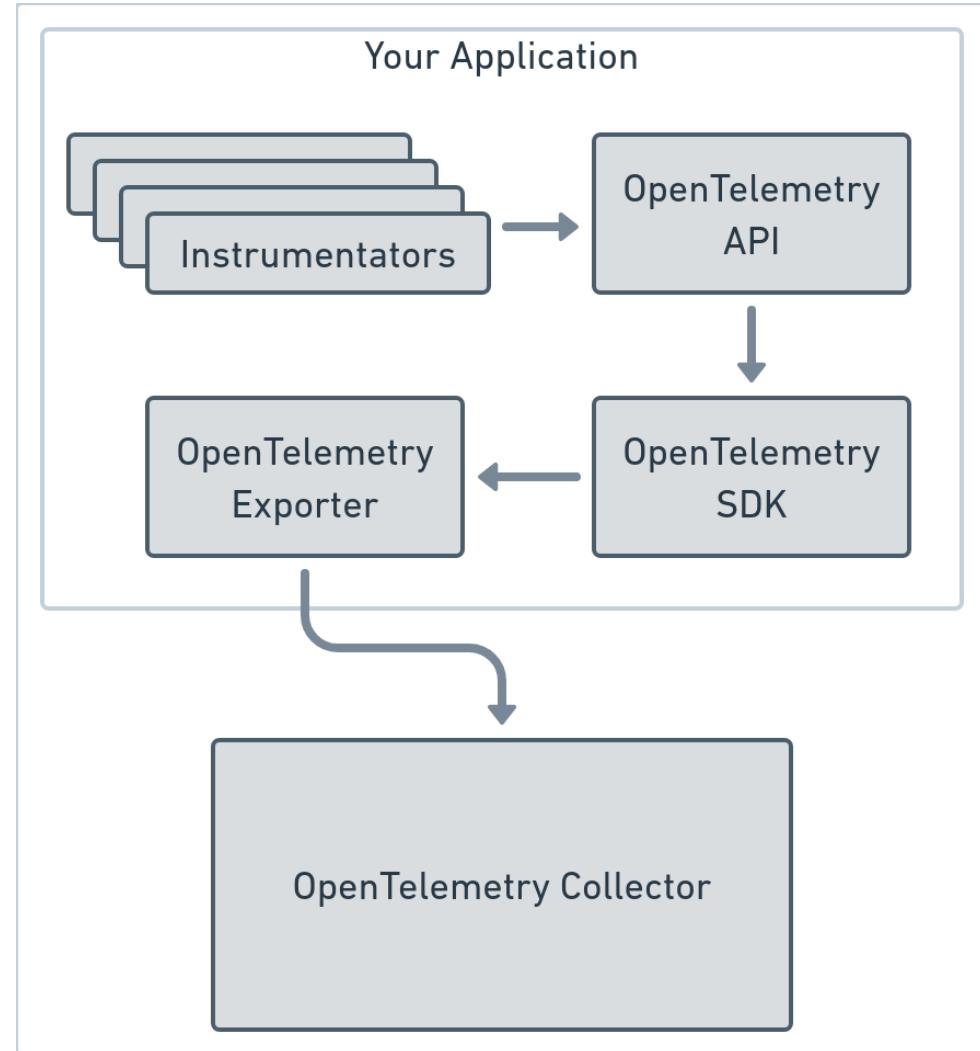
[Learn more](#)[Mission, vision, and values](#)[Get started!](#)[Collector](#)[Java](#)[Go](#)[.NET](#)[JavaScript](#)[...](#)

OpenTelemetry is a collection of tools, APIs, and SDKs. Use it to instrument, generate, collect, and export telemetry data (metrics, logs, and traces) to help you analyze your software's performance and behavior.

OpenTelemetry is **generally available** across [several languages](#) and is suitable for use.

OpenTelemetry Components

- OpenTelemetry API: used on the code to be instrumented
- OpenTelemetry SDK: the "runtime" to collect and process traces and spans
- OpenTelemetry Exporter: responsible for sending data to the collector



opentelemetry_api

v1.0.3

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Erlang/Elixir OpenTelemetry API

Use

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Versioning and Releasing

Erlang/Elixir OpenTelemetry API

EEF Observability hex v1.0.5

This is the API portion of [OpenTelemetry](#) for Erlang and Elixir Applications, implementing the API portion of [the specification](#).

This is a library, it does not start any processes, and should be the only OpenTelemetry dependency of Erlang/Elixir Applications.

Use

There are both Erlang and Elixir macros that make use of the current module's name to lookup a [Named Tracer](#) -- a Named Tracer is created for each Application loaded in the system at start time -- for you and can be used for Trace and Span operations:

```
-include_lib("opentelemetry_api/include/otel_tracer.hrl").  
  
some_fun() ->  
    ?with_span(<<"some_fun/0">>, #{},  
              fun(_SpanCtx) ->  
                  ...  
                  ?set_attribute(<<"key">>, <<"value">>),  
                  ...  
              end),
```

opentelemetry

v1.0.5

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Erlang/Elixir OpenTelemetry SDK

SDK

V1.0.5

EEF

OBSERVABILITY

BUILD

PASSING

The [SDK](#) is an implementation of the [OpenTelemetry API](#) and should be included in your final deployable artifact (usually an OTP Release).

Configuration

The SDK starts up its supervision tree on boot, so initial configuration must be done through the Application or [OS environment variables](#). The following example configurations show configuring the SDK to use the batch span processor which then exports through the [OpenTelemetry Protocol](#) over HTTP to <http://localhost:4318>, encoding the Spans with protobufs.

```
[  
  {opentelemetry,  
   [{span_processor, batch},  
    {traces_exporter, otlp}]],  
  
  {opentelemetry_exporter,  
   [{otlp_protocol, http_protobuf},  
    {otlp_endpoint, "http://localhost:4318"}]}]  
].
```

```
config :opentelemetry,  
  span_processor: :batch
```

opentelemetry_exporter

v1.0.3

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opentelemetry_exporter

The OpenTelemetry Protocol exporter for use with the [OpenTelemetry Collector](#). The version of this Application does not track the supported version of the OpenTelemetry Protocol (OTLP). The currently used version of the [OTLP protobufs](#) is v0.11.0.

Currently only supports the Tracer protocol using either GRPC or Protobuffers over HTTP1.1.

Configuration

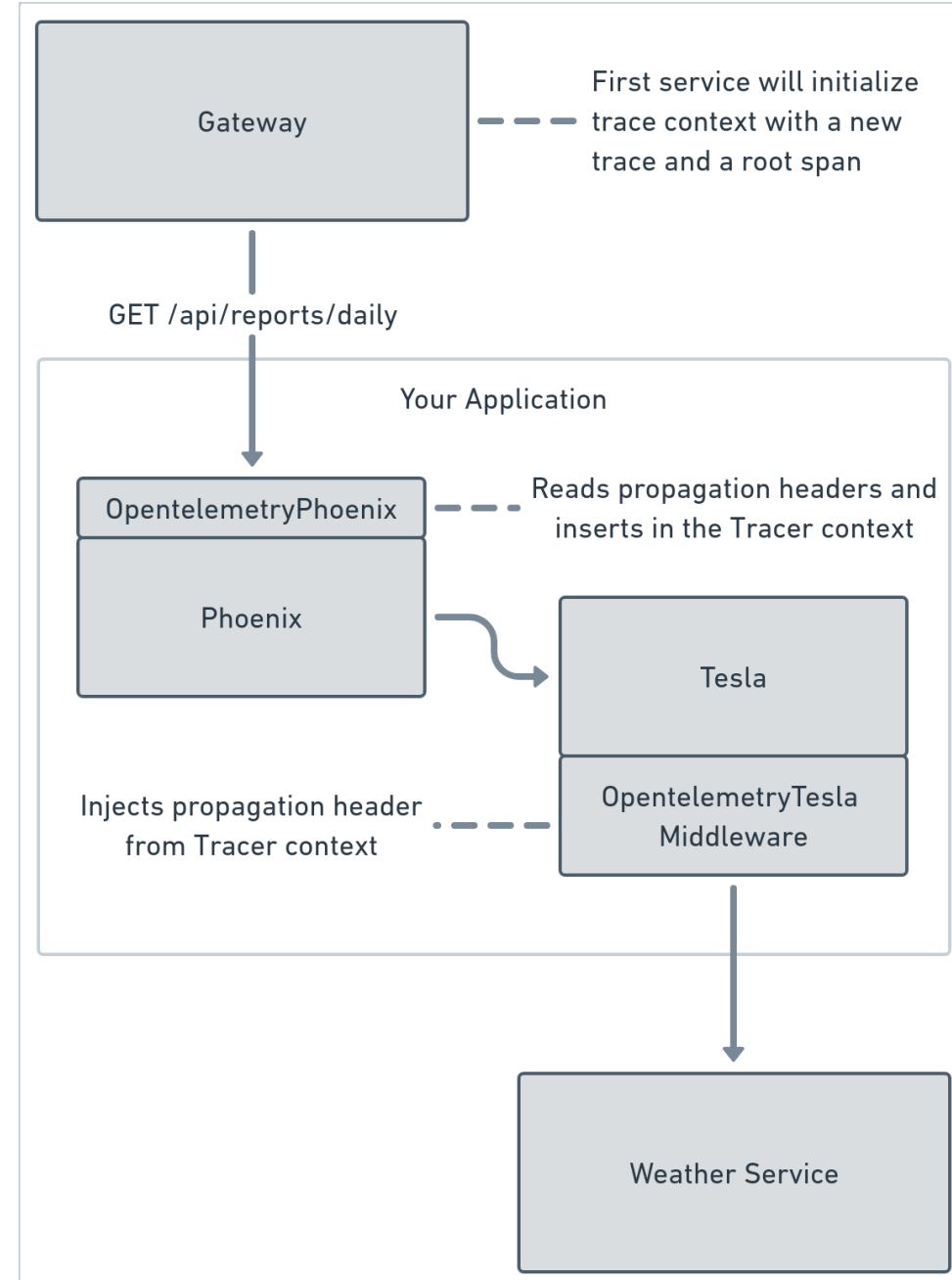
By default the exporter will use HTTP to export protobuf encoded Spans to `http://localhost:4318/v1/traces`.

Available configuration keys:

- `otlp_endpoint`: The URL to send traces and metrics to, for traces the path `v1/traces` is appended to the path in the URL.
- `otlp_traces_endpoint`: URL to send only traces to. This takes precedence for exporting traces and the path of the URL is kept as is, no suffix is appended.
- `otlp_headers`: List of additional headers (`[{unicode:chardata(), unicode:chardata()}]`) to add to export requests.
- `otlp_traces_headers`: Additional headers (`[{unicode:chardata(), unicode:chardata()}]`) to add to only trace export requests.
- `otlp_protocol`: The transport protocol, supported values: `grpc` and `http_protobuf`. Defaults to `http_protobuf`.
- `otlp_traces_protocol`: The transport protocol to use for exporting traces, supported values: `grpc` and

Propagation

- Traces have spans in multiple different services
- Services need to be informed about the parent span when receiving a request
- This is called propagation
- Most used protocols
 - Zipkin's B3
 - W3C Trace Context (usually **default**)



Instrumenting

Similar to `:telemetry spans`

Opentelemetry Telemetry

v1.0.0 ▾

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OpentelemetryTelemetry

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- | OpenTelemetry Con...

- Summary
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- Functions

OpentelemetryTelemetry

`OpentelemetryTelemetry` provides conveniences for leveraging `telemetry` events for `OpenTelemetry` bridge libraries.

OpenTelemetry Contexts

`opentelemetry` does not automatically set current span context when ending another span. Since `telemetry` events are executed in separate handlers with no shared context, correlating individual events requires a mechanism to do so. Additionally, when ending telemetry-based spans, the user must set the correct parent context back as the current context. This ensures sibling spans are correctly correlated to the shared parent span.

This library provides helper functions to manage contexts automatically with `start_telemetry_span/4`, `set_current_telemetry_span/2`, and `end_telemetry_span/2` to give bridge library authors a mechanism for working with these challenges. Once `start_telemetry_span/4` or `set_current_telemetry_span/2` are called, users can use all of `OpenTelemetry` as normal. By providing the application tracer id and the event's metadata, the provided span functions will identify and manage span contexts automatically.

Example Telemetry Event Handlers

```
def handle_event(_event,  
                 %{system_time: start_time},  
                 metadata,  
                 %{type: :start, tracer_id: tracer_id, span_name: name}) do  
  start_opts = %{start_time: start_time}  
  # ...
```

You probably don't need to worry

OpentelemetryPhoenix

v1.0.0

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OpentelemetryPhoenix

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OpentelemetryPhoenix.Reason



OpentelemetryPhoenix

OpentelemetryPhoenix uses [telemetry](#) handlers to create [OpenTelemetry](#) spans.

Current events which are supported include endpoint start/stop, router start/stop, and router exceptions.

Usage

In your application start:

```
def start(_type, _args) do
  OpentelemetryPhoenix.setup()

  children = [
    {Phoenix.PubSub, name: MyApp.PubSub},
    MyAppWeb.Endpoint
  ]

  opts = [strategy: :one_for_one, name: MyStore.Supervisor]
  Supervisor.start_link(children, opts)
end
```

Summary

opentelemetry_ecto

v1.0.0

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OpentelemetryEcto

Summary

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OpentelemetryEcto

Telemetry handler for creating OpenTelemetry Spans from Ecto query events. Any relation preloads, which are executed in parallel in separate tasks, will be linked to the span of the process that initiated the call. For example:

```
Tracer.with_span "parent span" do
  Repo.all(Query.from(User, preload: [:posts, :comments]))
end
```

this will create a span called "parent span" with three child spans for each query: users, posts, and comments.

“ Note

Due to limitations with how Ecto emits its telemetry, nested preloads are not represented as nested spans within a trace.

Summary

Functions

```
setup(event_prefix, config \\ [])
```

OpenTelemetryTesla

Tesla middleware that creates OpenTelemetry spans and injects tracing headers into HTTP requests for Tesla clients.

Installation

If [available in Hex](#), the package can be installed by adding `opentelemetry_tesla` to your list of dependencies in `mix.exs`:

```
def deps do
  [
    {:opentelemetry_tesla, "~> 2.0.1"}
  ]
end
```

Setup

Whilst using this middleware is as simple as adding it to your Tesla middlewares configuration, **It's very important to set the correct order of the middlewares**

This is crucial to correctly get the parameterized version of the URL, something like `/api/users/:id` instead of `/api/users/3`.

`OpenTelemetry` comes first, `PathParams` (if you're using it) comes after.

Add relevant libraries

```
def deps do
  [
    {:opentelemetry, "~> 1.0"},
    {:opentelemetry_exporter, "~> 1.0"},
    {:opentelemetry_phoenix, "~> 1.0"},
    {:opentelemetry_ecto, "~> 1.0"},
    {:opentelemetry_tesla, "~> 2.0"}
  ]
end
```

Setup instrumentation

On your `Application.start`

```
OpentelemetryEcto.setup([:daily, :repo])
OpentelemetryPhoenix.setup()
```

On your Tesla client, add:

```
Tesla.client([
  # ...
  Tesla.Middleware.OpenTelemetry
])
```

Configure the SDK and Exporter

Easiest way is to set the following environment variables

```
OTEL_EXPORTER_OTLP_TRACES_ENDPOINT: "http://tempo:4317"  
OTEL_EXPORTER_OTLP_TRACES_PROTOCOL: grpc  
OTEL_SERVICE_NAME: "daily"
```

Extra: include trace_id in logs

Add to your `Phoenix.Endpoint`:

```
plug :set_logger_trace_id

def set_logger_trace_id(conn, _opts) do
  span_ctx = OpenTelemetry.Tracer.current_span_ctx()

  if span_ctx != :undefined do
    Logger.metadata(trace_id: OpenTelemetry.Span.hex_trace_id(span_ctx))
  end

  conn
end
```



```
> level=info msg="GET /api/tasks/3 -> 200" duration_us=1061 method=GET path=/api/tasks/3 request_id=FvZiVTAYFUH9xJgAF2si route=/api/tasks/:id route_plug=Elixir.DailyWeb.TaskController route_plug_opts=show status=200 time=1654618031124981 trace_id=1acfb6d173c4813ea204f362607d316b  
> level=info msg="GET /api/tasks/2 -> 200" duration_us=1072 method=GET path=/api/tasks/2 request_id=FvZiVS48jwewSY4AF2ri route=/api/tasks/:id route_plug=Elixir.DailyWeb.TaskController route_plug_opts=show status=200 time=1654618031093846 trace_id=fc423955f9c040f06f5bf003553f19b6  
> level=info msg="GET /api/tasks -> 200" duration_us=1034 method=GET path=/api/tasks request_id=FvZiVSbiWRMWt6cAF2qi route=/api/tasks route_plug=Elixir.DailyWeb.TaskController route_plug_opts=index status=200 time=1654618030970476 trace_id=831b0dabc3d6fc55d7ba3a80f470e0f2  
▼ level=info msg="GET /api/reports/daily -> 200" duration_us=8321 method=GET path=/api/reports/daily request_id=FvZiVR3Forf9ddQAF2pi route=/api/reports/daily route_plug=Elixir.DailyWeb.ReportController route_plug_opts=daily status=200 time=1654618030824968 trace_id=fe878f9e72ab9078f82e60708c2ccfaf
```

Start of range

17:07:14

-
17:05:32



Log labels

■	⊕	⊖	compose_project	daily
■	⊕	⊖	compose_service	daily
■	⊕	⊖	container_name	daily-daily-1
■	⊕	⊖	filename	/var/log/docker/6b3ebc821944c4b26ffd40d225318d9d40a4c23dc26032b505352899de32c715/json.log
■	⊕	⊖	host	docker-desktop
■	⊕	⊖	source	stdout

Detected fields ?

■	⌚	traceID	fe878f9e72ab9078f82e60708c2ccfaf	<input checked="" type="checkbox"/> tempo
■	⌚	duration_us	8321	
■	⌚	level	info	
■	⌚	method	GET	
■	⌚	msg	"GET /api/reports/daily -> 200"	

▼ Older logs

↑



Explore 

tempo ✓

 Split

 Add to dashboard



> A (tempo) 5c224b5cc16ae13f4f73939b67e4a10



+ Add query

⌚ Query history

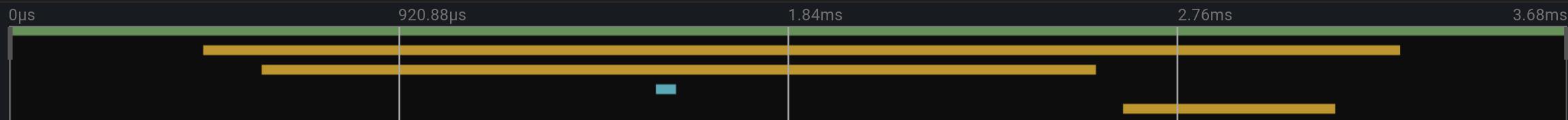
① Inspector

Trace View

Find...

caddy: daily proxy 5c224b5cc16ae13f4f73939b67e4a10

Trace Start: 2022-06-07 13:15:02.135 Duration: 3.68ms Services: 3 Depth: 4 Total Spans: 5



Service & Oper... ▾ ▶

◀ caddy daily proxy | 3.68m

▼ | daily /api/reports/daily | 2.83m

✓ | daily HTTP GET | 1.97m

weather /api/weather | 47.

daily, daily.repo, query:tasks | 5

daily daily.repo.query:tasks | 5.

daily.repo.query:tasks

Service: daily | Duration: 501.35µs | Start Time: 2.63ms

Tags

db.instance	"daily_prod"
db.statement	"SELECT t0."id", t0."description", t0."inserted_at", t0."updated_at" FROM "tasks" AS t0"
db.type	"sql"
db.url	"ecto://postgres"
decode_time_microseconds	3
idle_time_microseconds	925722
otel.library.name	"opentelemetry_ecto"
otel.library.version	"1.0.0"
query_time_microseconds	246
queue_time_microseconds	97
source	"tasks"
span.kind	"client"
status.code	0
total_time_microseconds	346

> Process: service.name = daily | process.runtime.version = 13.0 | process.runtime.name = BEAM | p...

🔗 SpanID: 23273231b02ca14d

Thank You