WE KNOW WHAT YOUR APP DID LAST SUMMER DO YOU

Observing Python applications using Prometheus

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- Ex Frontend Engineer turned Site Reliability Engineer
- Dog mom, avid scrobbler, and horror movie enthusiast
- Community organizer centering Black, Indigenous, and People of Color in Tech

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JESSICA GREENE

She/her

- Software Engineer. Self Taught & Community taught.
- Career changer. Previously a Coffee roaster & Camera assistant.
- Pylady, community organiser, reader, knitter, plant mum

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Backend
Site Reliability
BTVSSTYLE INSTAGRAM
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Agenda

1. What is Monitoring & Why is it important?
2. Overview of today's project repo
3. Exposing metrics with Prometheus Client
    a. **Challenge 1**: Expose base app metrics on /metrics endpoint
4. Adding custom metrics: What makes a meaningful metric?
    a. **Challenge 2**: Adding a custom metric with labels
5. **Break**
6. Inspecting metrics with Prometheus & Grafana
    a. **Challenge 3**: Query your metric with PromQL
    b. **Challenge 4:** Create a Grafana Dashboard
7. Q&A

Monitoring: What is it?

Monitoring: Why does it matter?

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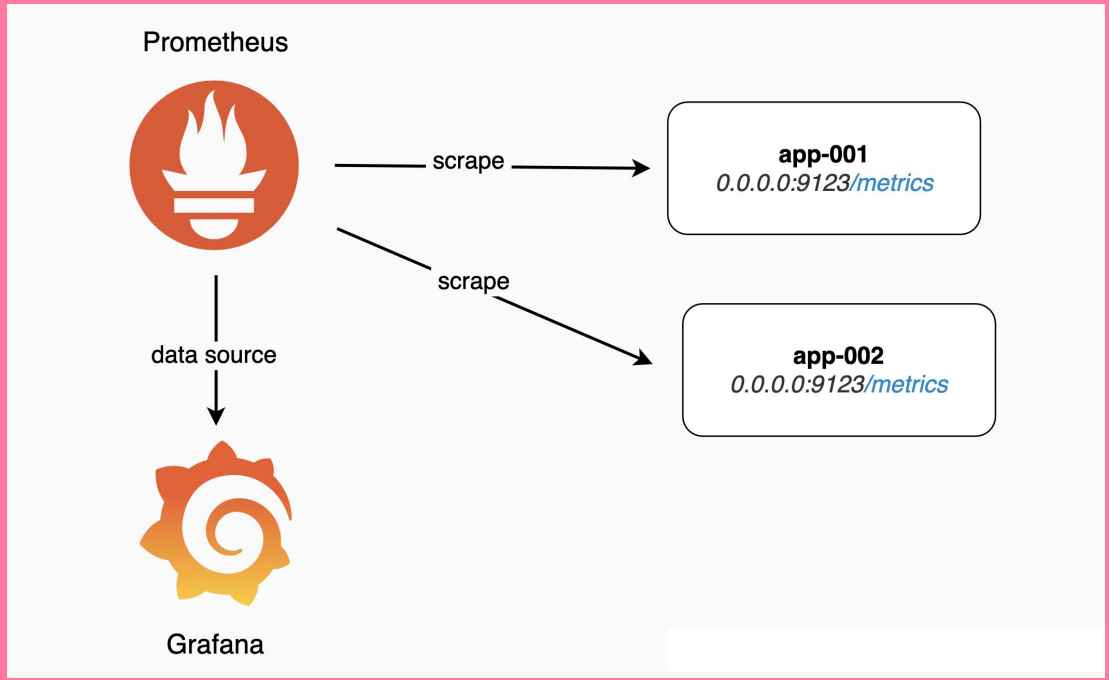
Monitoring: How?



Tour

https://github.com/ecosia/pycon22-prometheus-workshop

What is a metric? (base metrics)

```
# HELP process_cpu_seconds_total Total user and system CPU time spent in seconds.
# TYPE process_cpu_seconds_total counter
process_cpu_seconds_total 1.01
```

```
# HELP python_gc_collections_total Number of times this generation was collected
# TYPE python_gc_collections_total counter
python_gc_collections_total{generation="0"} 53.0
python_gc_collections_total{generation="1"} 4.0
python_gc_collections_total{generation="2"} 0.0
```

The Python garbage collector has three generations in total, and an object moves into an older generation whenever it survives a garbage collection process on its current generation.

```
# HELP process_start_time_seconds Start time of the process since unix epoch in seconds.
# TYPE process_start_time_seconds gauge
process_start_time_seconds 1.60251632472e+09
```

Challenge 1 - expose metrics

1. Import the python client & use the prometheus handler as a base for your request handler
2. run the application a few times and check /metrics

https://github.com/ecosia/pycon22-prometheus-workshop

Defining Custom Metrics

- Useful when ‘out of the box’ metrics aren’t sufficient
- To define one, choose a data type and provide:
  - Base name
  - Description
  - Labels

```
7  from prometheus_client import Counter, MetricsHandler
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15 with open('./templates/treeCounter.html', 'r') as f:
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21     # Here is one possible place you may decide to call this metric from
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23     if r.status_code == 200:
24             return r.json()['count']
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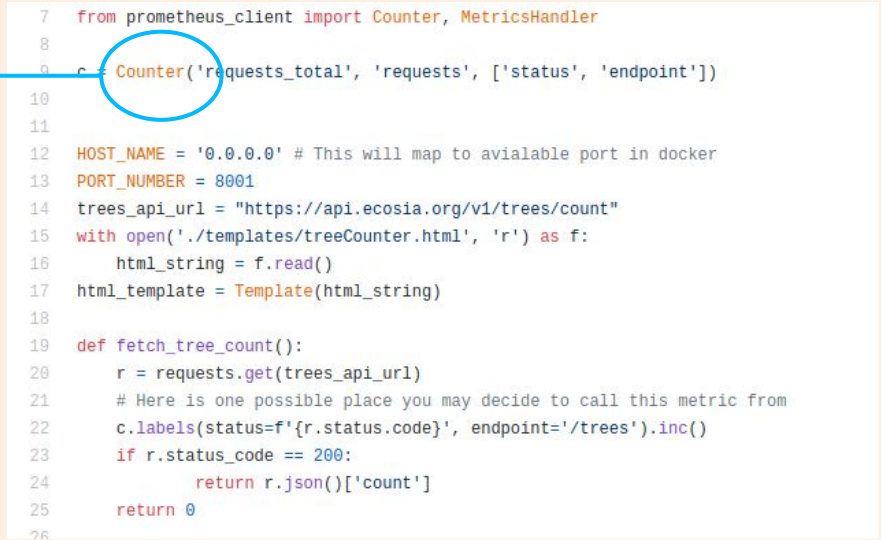

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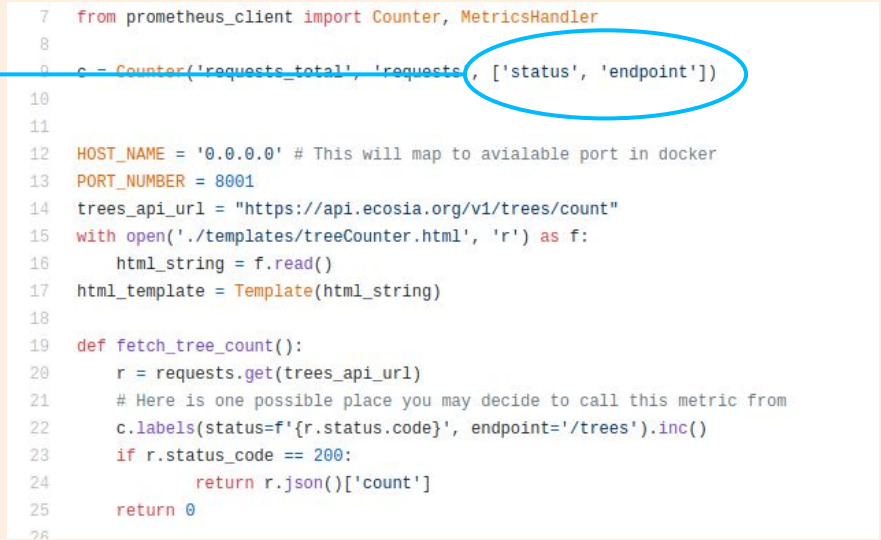

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Calling the Custom Metrics

- We use the increment method to call our custom metric counter

** Note there are different places where we can place this, and the placement has an effect on what the metric tells us**

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How Custom Metrics Look

```
# HELP requests_total Requests
# TYPE requests_total counter
requests_total{endpoint="/tree",status="200"} 1.0
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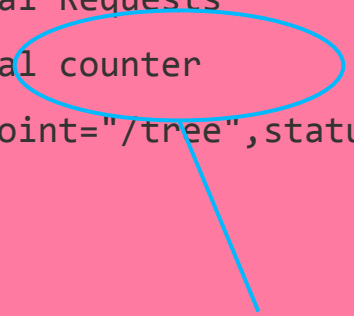

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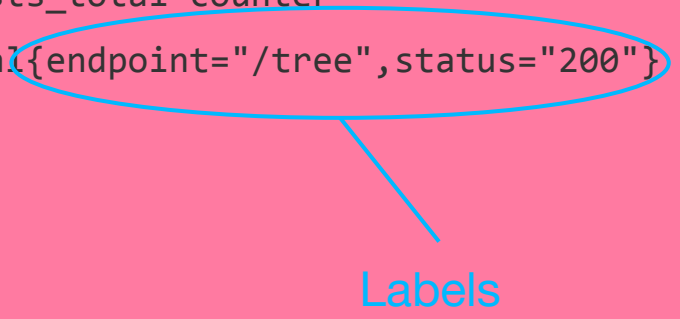

Challenge 2 - custom metrics

1. Add a custom counter metric. It will count requests with the status code as a label.
2. Re-run the server by stopping it and then re-starting it.
3. Refresh the main application page (/treecounter) a few times and check /metrics

https://github.com/ecosia/pycon22-prometheus-workshop

BREAK


And now for something completely different
Scraping metrics & creating dashboards

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Monitoring your metrics

Prometheus:

http://localhost:9090

App:

http://localhost:8001

Grafana:

http://localhost:3000

https://github.com/ecosia/pycon22-prometheus-workshop

docker-compose up

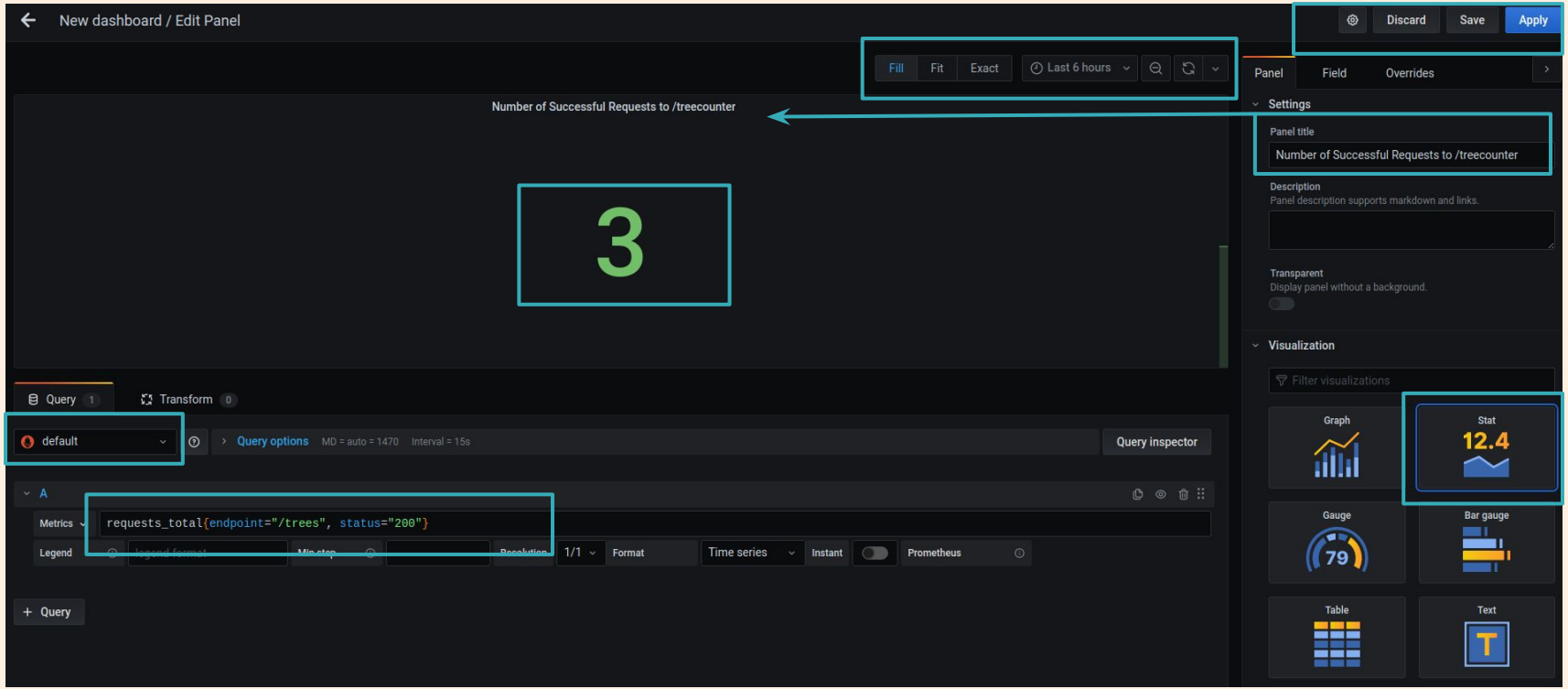
Challenge 3 - PromQL queries

(section 3 of readme)

1. Run the app and prometheus with docker-compose
2. Query your metrics in the prometheus UI using PromQL

https://github.com/ecosia/pycon22-prometheus-workshop

Creating a panel in your dashboard



Challenge 4 - Build a Dashboard

(section 3 of readme)

1. Run the app, prometheus and Grafana with docker-compose
2. Go to localhost:3000
3. Create a Grafana Dashboard
4. Create a panel to visualise your custom metric (split by labels, irate or cumulative)

https://github.com/ecosia/pycon22-prometheus-workshop

Q&A

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Go forth and monitor!

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Resources

https://prometheus.io

https://prometheus.io/docs/practices/histograms/

https://grafana.com/

https://tomgregory.com/the-four-types-of-prometheus-metrics/

https://github.com/ecosia/pycon22-prometheus-workshop