



Prometheus Introduction

Julius Volz

Co-founder
Prometheus

Founder
PromLabs

@juliusvolz



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@juliusvolz



Prometheus Introduction

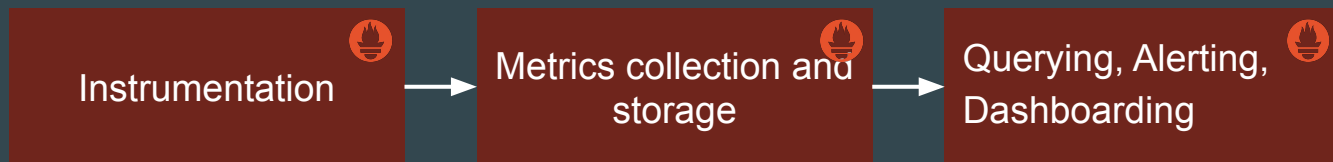
Matthias Rampke

Team member Prometheus Engineer SoundCloud

@matthiasr

What is Prometheus

OSS metrics-based monitoring & alerting stack.



Works for all levels of the stack!

Made for dynamic cloud environments.

Architecture

Architecture

Targets



web app

API
server

Instrumentation & Exposition

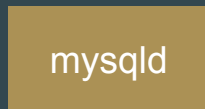
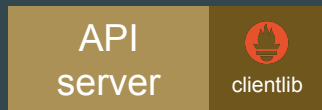
Architecture

Targets

web app	 clientlib
API server	 clientlib

Architecture






Targets



Instrumentation & Exposition

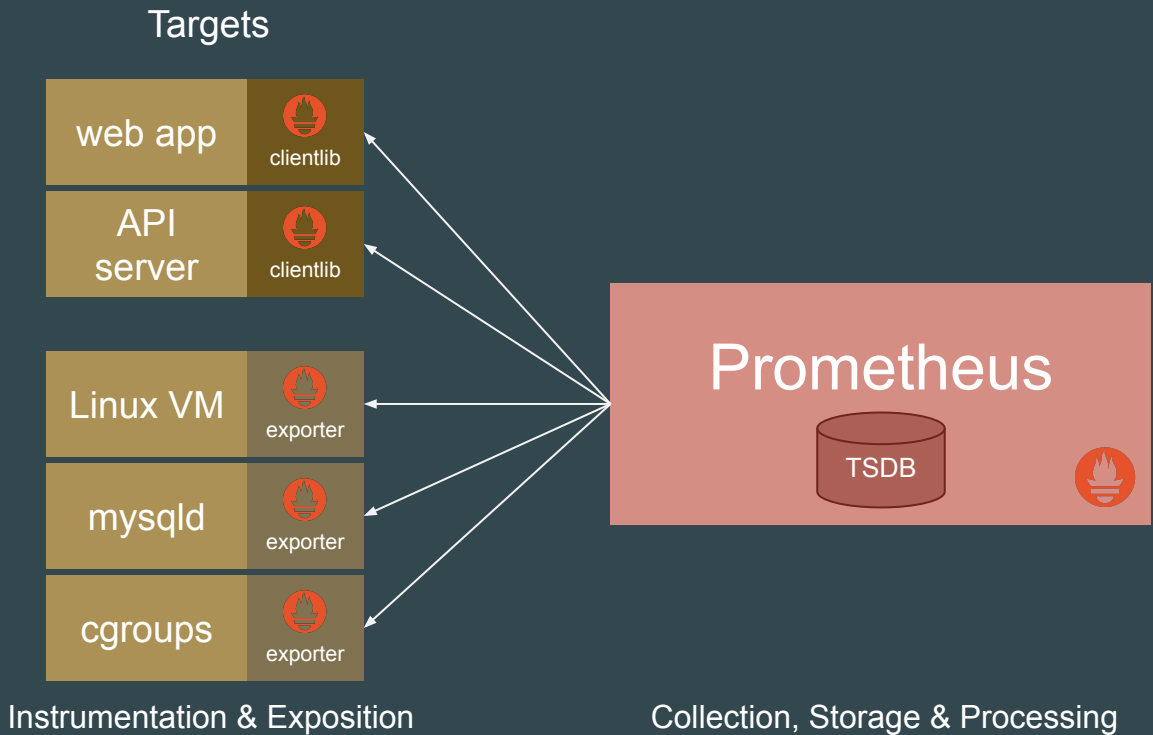
Architecture

Targets

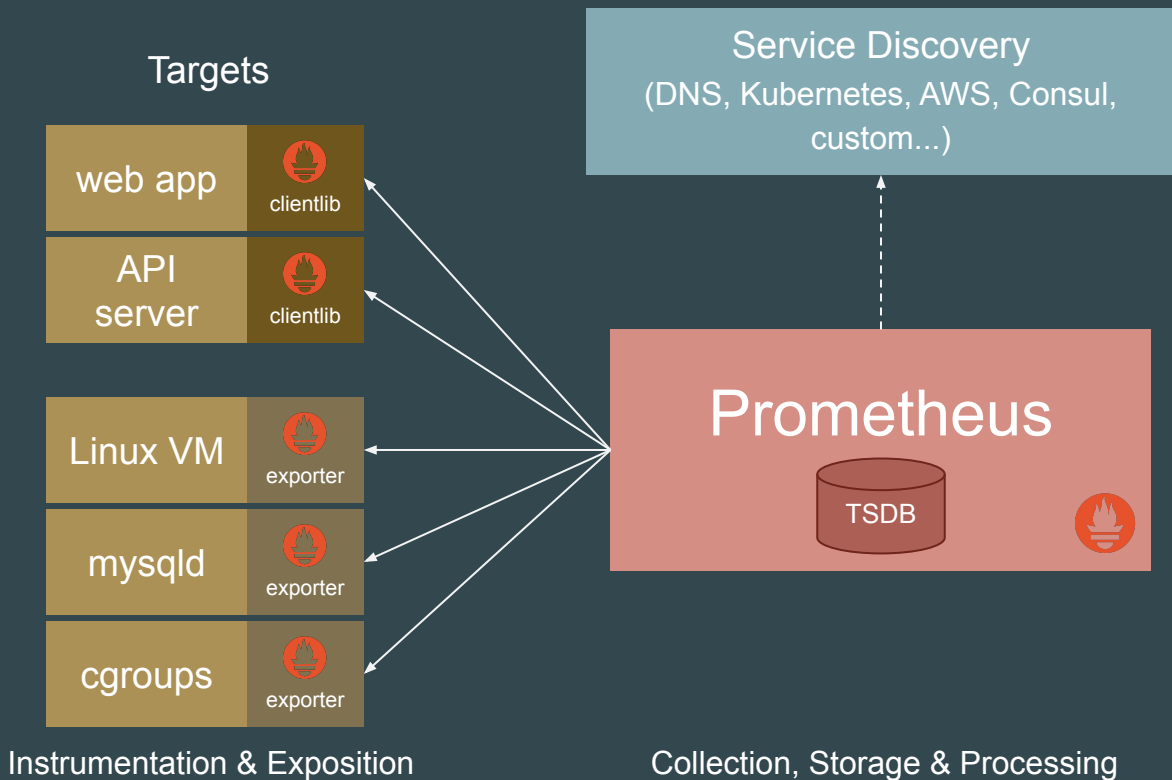
web app	 clientlib
API server	 clientlib
Linux VM	 exporter
mysql	 exporter
cgroups	 exporter

Instrumentation & Exposition

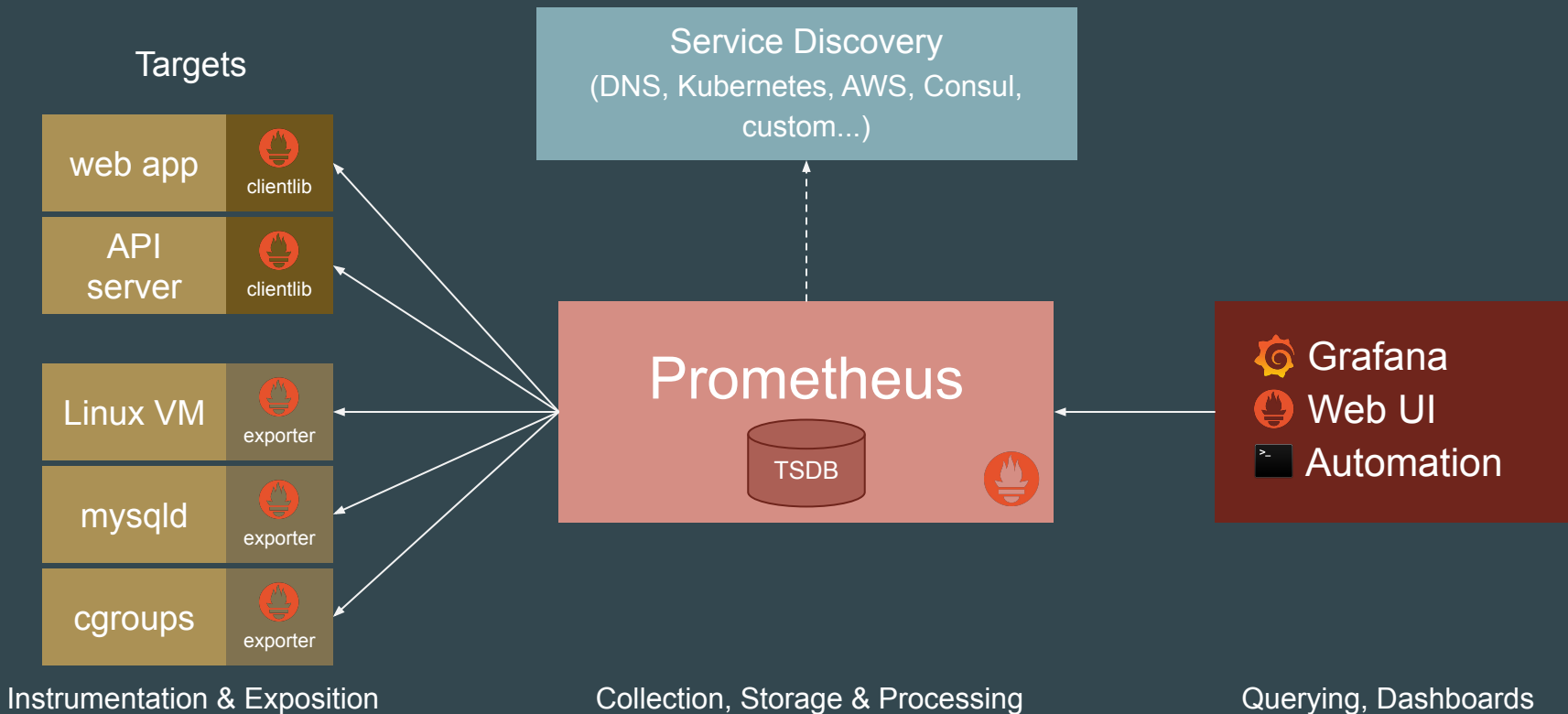
Architecture



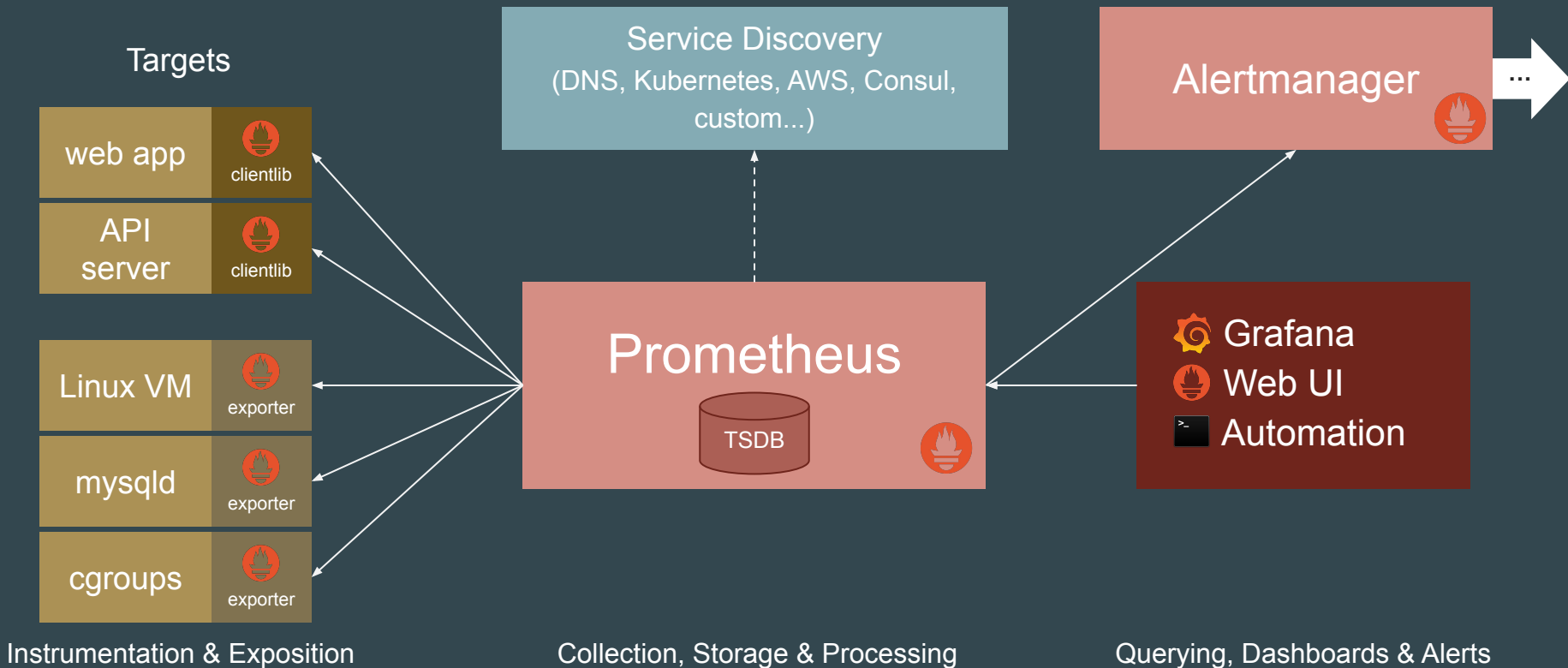
Architecture



Architecture



Architecture



Selling Points

- Dimensional data model
- Powerful query language
- Simple architecture & efficient server
- Service discovery integration

Data Model

What is a time series?

`<identifier> → [(t0, v0), (t1, v1), ...]`

Data Model

What is a time series?

`<identifier> → [(t0, v0), (t1, v1), ...]`



What is this?



int64



float64

Data Model

What identifies a time series?

```
http_requests_total{job="nginx",instance="1.2.3.4:80",path="/home",status="200"}
```



metric name



labels

Querying

PromQL

- Functional query language
- Great for time series computations
- Not SQL-style

Querying

All partitions in my entire infrastructure with more than 100GB capacity that are not mounted on root?

```
node_filesystem_bytes_total{mountpoint!=" /"} / 1e9 > 100
```

{device="sda1", mountpoint="/home", instance="10.0.0.1"}	118.8
{device="sda1", mountpoint="/home", instance="10.0.0.2"}	118.8
{device="sdb1", mountpoint="/data", instance="10.0.0.2"}	451.2
{device="xdvc", mountpoint="/mnt", instance="10.0.0.3"}	320.0

Querying

What's the ratio of request errors across all service instances?

```
sum(rate(http_requests_total{status="500"}[5m]))  
/ sum(rate(http_requests_total[5m]))
```

```
{}
```

```
0.029
```

Querying

What's the ratio of request errors across all service instances?

```
sum by (path) (rate(http_requests_total{status="500"}[5m]))  
/ sum by (path) (rate(http_requests_total[5m]))
```

{path="/status"}	0.0039
{path="/"}	0.0011
{path="/api/v1/topics/:topic"}	0.087
{path="/api/v1/topics"}	0.0342

Alerting

generate an alert for each
path with an error rate of >5%



```
alert: Many500Errors
expr: |
  (
    sum by(path) (rate(http_requests_total{status="500"}[5m]))
    /
    sum by(path) (rate(http_requests_total[5m]))
  ) * 100 > 5
for: 5m
labels:
  severity: "critical"
annotations:
  summary: "Many 500 errors for path {{$labels.path}} ({{$value}}%)"
```

Efficiency

Local storage is scalable enough for many orgs:

- 1 million+ samples/s
- Millions of series
- 1-2 bytes per sample

Good for keeping a few weeks or months of data. Some people keep years, with careful backups.

Bridging the gap

Not everything speaks Prometheus – exporters help

- Translate from other metric systems (statsd, CloudWatch, ...)
- Transform system-specific metrics (Linux, MySQL, HAProxy, ...)
- Do it yourself (JSON exporter, Python, Go, ...)

Conclusion

Prometheus helps you make sense of complex dynamic environments via its:

- Dimensional data model
- Powerful query language
- Simplicity + efficiency
- Integrations and exporters



Prometheus Deep Dive

Julien Pivotto

CoFounder, O11y

Björn Rabenstein

Engineer, Grafana Labs

What's new

Some of the new features released in the last ~12 months
...only looking at prometheus/prometheus

New in v2.25: Feature flags

```
$ prometheus --enable-feature=agent,promql-at-modifier
```

<https://prometheus.io/blog/2021/02/17/introducing-feature-flags/>

Introducing Feature Flags

Posted at: February 17, 2021 by Ganesh Vernekar

We have always made hard promises around stability and breaking changes following the SemVer model. That will remain to be the case.

As we want to be bolder in experimentation, we are planning to use feature flags more.

Starting with v2.25.0, we have introduced a new section called [disabled features](#) which have the features hidden behind the `--enable-feature` flag. You can expect more and more features getting added to this section in the future releases.

The features in this list are considered experimental and comes with following considerations as long as they are still behind `--enable-feature`:

What's new in PromQL

`temperature_kelvin - avg_over_time(temperature_kelvin[1d] offset -12h)`

`rate(http_requests_total[1m])`

v2.25 (feature flag) v2.33 (stable)

`and`

`topk(5, rate(http_requests_total[1h] @ end()))`

`sin(rad(wind_turbine_angle_degrees))`

`x_value atan2 y_value`

v2.31

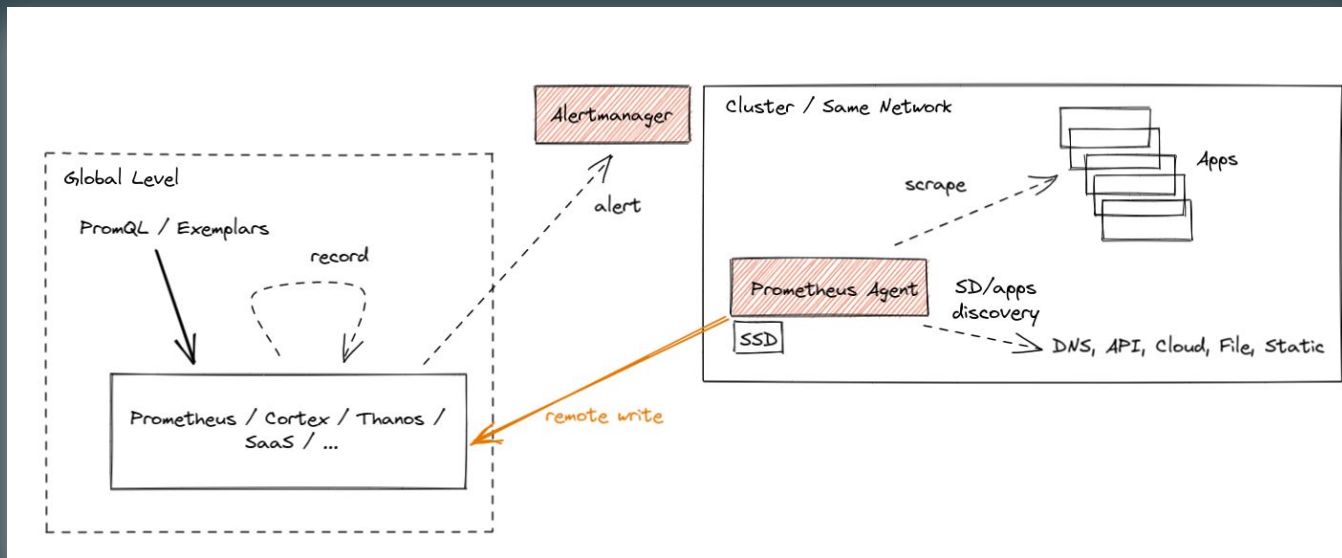
`present_over_time(http_requests_total[1h])`

v2.29

New in v2.32: Agent mode

```
$ prometheus --enable-feature=agent
```

<https://prometheus.io/blog/2021/11/16/agent/>



New in v2.25: Remote write receiver

```
$ prometheus --enable-feature=remote-write-receiver
```

(stable in v2.33)

New in v2.27: Env-var expansion

```
$ prometheus --enable-feature=expand-external-labels
```

```
global:
```

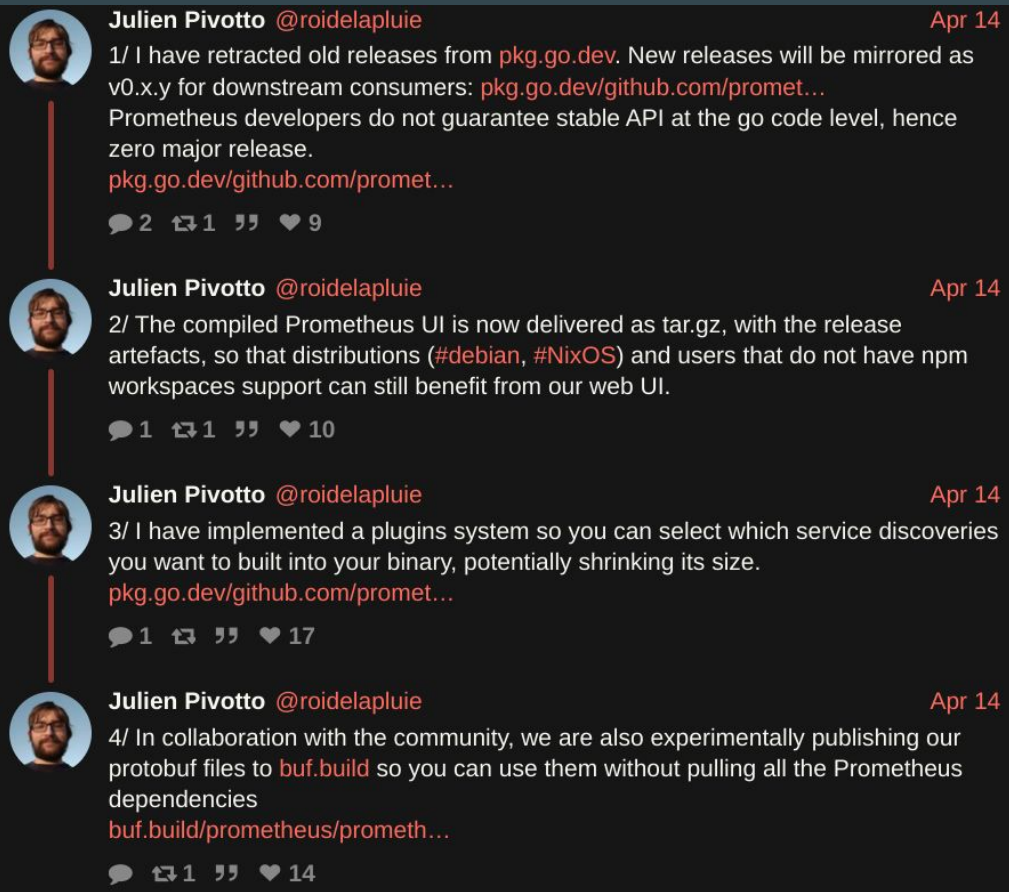
```
  external_labels:
```

```
    __replica__: ${POD_NAME}
```

```
    cluster: eu-central-4
```


New in v2.35:

Improvements for downstream distribution and library users



Julien Pivotto @roidelapluie Apr 14
1/ I have retracted old releases from pkg.go.dev. New releases will be mirrored as v0.x.y for downstream consumers: pkg.go.dev/github.com/promet...
Prometheus developers do not guarantee stable API at the go code level, hence zero major release.
pkg.go.dev/github.com/promet...
2 1 9

Julien Pivotto @roidelapluie Apr 14
2/ The compiled Prometheus UI is now delivered as tar.gz, with the release artefacts, so that distributions ([#debian](#), [#NixOS](#)) and users that do not have npm workspaces support can still benefit from our web UI.
1 1 10

Julien Pivotto @roidelapluie Apr 14
3/ I have implemented a plugins system so you can select which service discoveries you want to built into your binary, potentially shrinking its size.
pkg.go.dev/github.com/promet...
1 1 17

Julien Pivotto @roidelapluie Apr 14
4/ In collaboration with the community, we are also experimentally publishing our protobuf files to buf.build so you can use them without pulling all the Prometheus dependencies
buf.build/prometheus/prometh...
1 1 14

<https://nitter.net/roidelapluie/status/1514743490684633095>

What's coming

Imminent new features presented in these two talks later today.

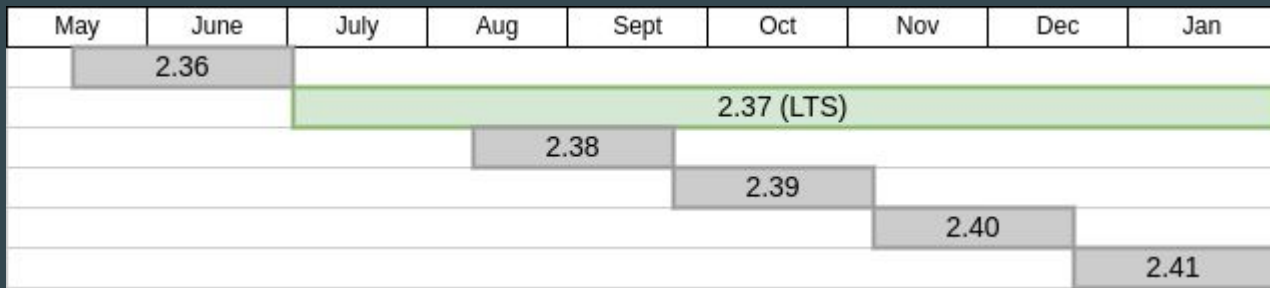
14:30 CEST	 Prometheus Intro and Deep Dive - Julius Volz, PromLabs; Björn Rabenstein, Grafana Labs; Julien Pivotto, Inuits; Matthias Rampke, SoundCloud
15:25 CEST	 Alerting in the Prometheus Ecosystem: The Past, Present and Future - Josue (Josh) Abreu, Grafana Labs
16:30 CEST	 Prometheus Sparse High-Resolution Histograms in Action - Ganesh Vernekar, Grafana Labs

Crystal ball: Bottom part of <https://prometheus.io/docs/introduction/design-doc/>

Prometheus v2.37 LTS

LTS for Long Term Support.

A release of Prometheus supported for 6+ months.



<https://prometheus.io/docs/introduction/release-cycle/>

Thanks!