



Prometheus

Maintainer Session

Richard “RichiH” Hartmann

Grafana Labs, @RichiH

Prometheus team members

Show of hands



What is Prometheus?

Metrics-based monitoring & alerting stack.

- Instrumentation for applications and systems
- Metrics collection and storage
- Querying, alerting, dashboarding
- For all levels of the stack!
- Default format across Kubernetes, all cloud-native

Made for dynamic cloud environments.

History

- Started 2012 at SoundCloud
- Fully open-sourced in 2014
- Joined CNCF, Prometheus v1.0.0 released in 2016
- Prometheus v2.0.0 released in 2017
- Graduated as a CNCF project in 2018



<https://youtu.be/rT4fJNbfe14>





Growth in adoption

2016

2017

2018

2019

2020

2022

2023

2.8k

16k

54k

242k

571k

774k

868k

(Figures from Grafana Labs: count of Grafana installations with a Prometheus datasource)

Community



[prometheus](#) / [prometheus](#)



11,602



Star

49.9k



Contributors

826





Julien Pivotto

to prometheus-developers **Welcoming**

Dear community,

Welcoming Chris Sinjakli to the Prometheus team 118 views



Matthias Loibl (MetalMatze)

to Prometheus Developers

Hey everyone,

The Prometheus team is growing: I am happy to announce that Chris Sinjakli is jo

Chris is 3rd in contributions to [client_ruby](#) and has been active in client_ruby last y

<https://github.com/Sinjo>

Welcome Chris and thanks for your continuous work!

Cheers,
Matthias / metalmatze

Dear Prometheans,

The Prometheus team is growing: I am happy to announce that Kemal Akkoy

Kemal has been active as a maintainer in [prometheus/client_golang](#).
He has published releases such as v1.11 (June 2021), v1.12 (Jan 2022), and
Next to these contributions he is also a maintainer of projects like Promethe

<https://github.com/kakkoyun>

Welcome Kemal and thanks for your continuous work!

Cheers,
Matthias / metalmatze



Ganesh Vernekar <ganeshvern@gmail.com>

to Prometheus [Unsubscribe](#) ▼

Hi everyone,

Please join the Prometheus team in welcoming Jesús Vázquez (GH: [jesusvazquez](#)) as a new team member.

Jesús worked on adding out-of-order sample support to the Prometheus TSDB and has been helping contributors without their contributions. He plans to continue his efforts on the TSDB and I intend to welcome him as a TSDB maintainer as well :)

Welcome, Jesús!

Thanks,
Ganesh

Daniel is 2nd in contributions to [client_ruby](#) and has been active in client_ruby.

<https://github.com/dmagliola>

Welcome Daniel and thanks for your continuous work!

Cheers,
Matthias / metalmatze

[prometheus-developers] Welcome Jesús Vázquez to the Prometheus team ➡ [Inbox](#) ✕

Mon, Apr 3, 2:55 PM



Architecture

Architecture

Targets



web app

API
server

Instrumentation & Exposition

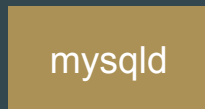
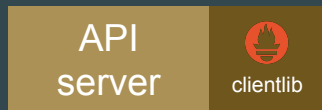
Architecture

Targets

web app	 clientlib
API server	 clientlib

Architecture






Targets



Instrumentation & Exposition

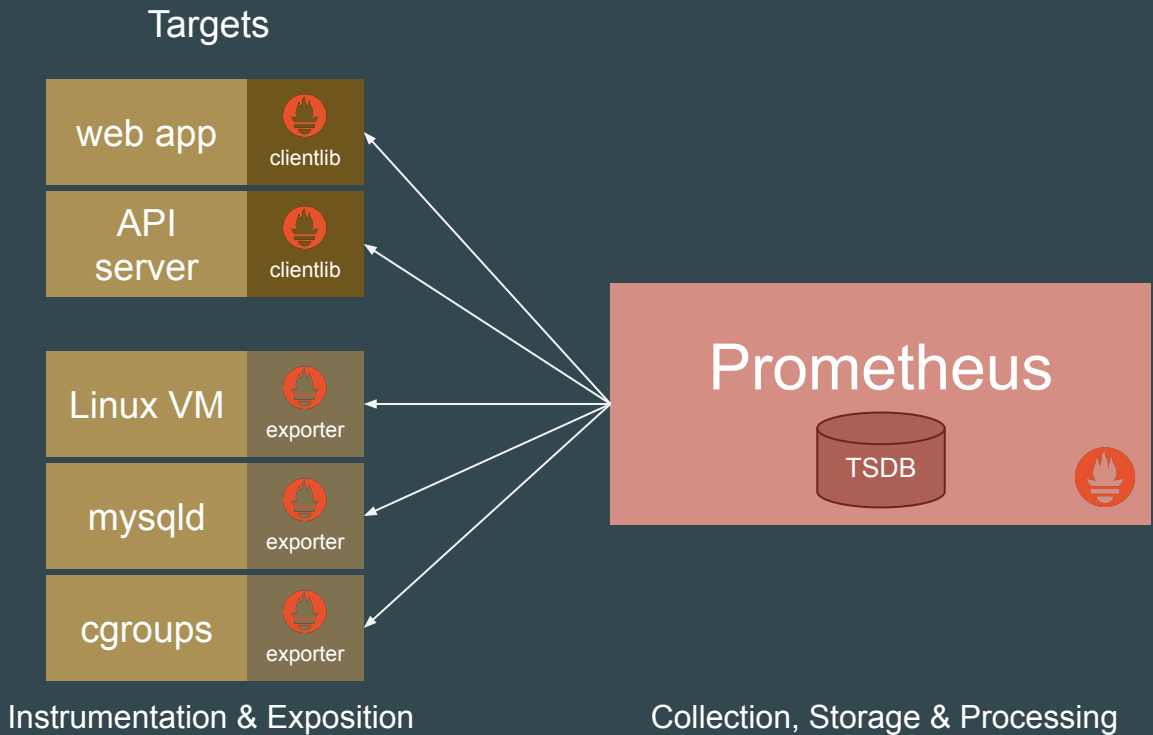
Architecture

Targets

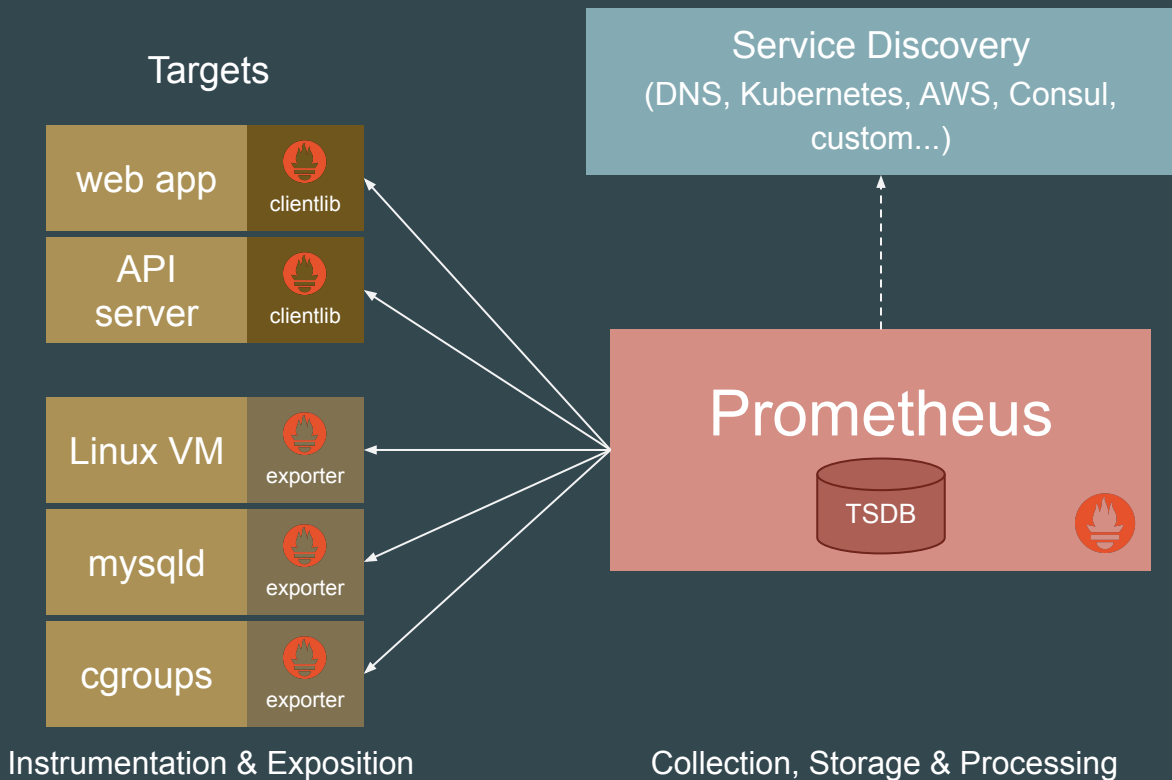
web app	 clientlib
API server	 clientlib
Linux VM	 exporter
mysqld	 exporter
cgroups	 exporter

Instrumentation & Exposition

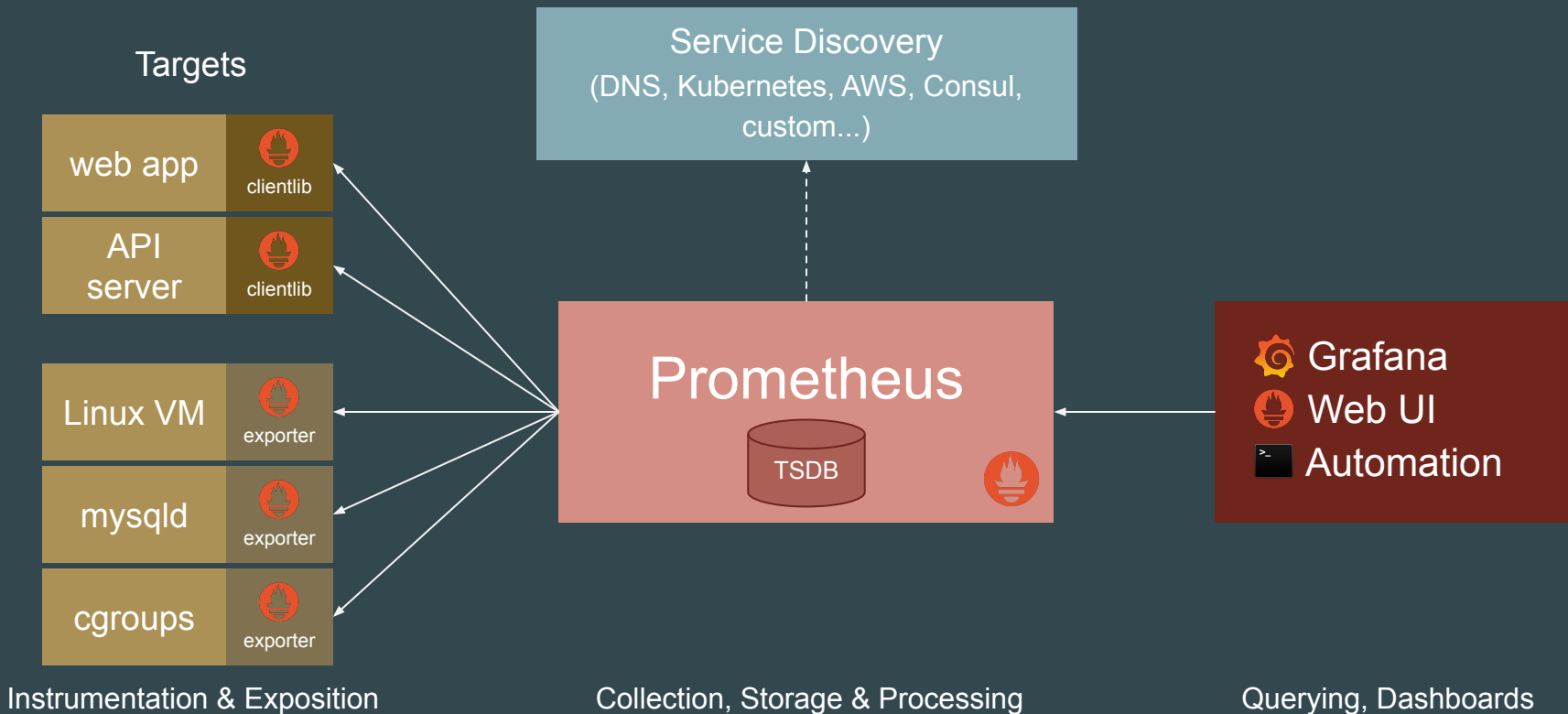
Architecture



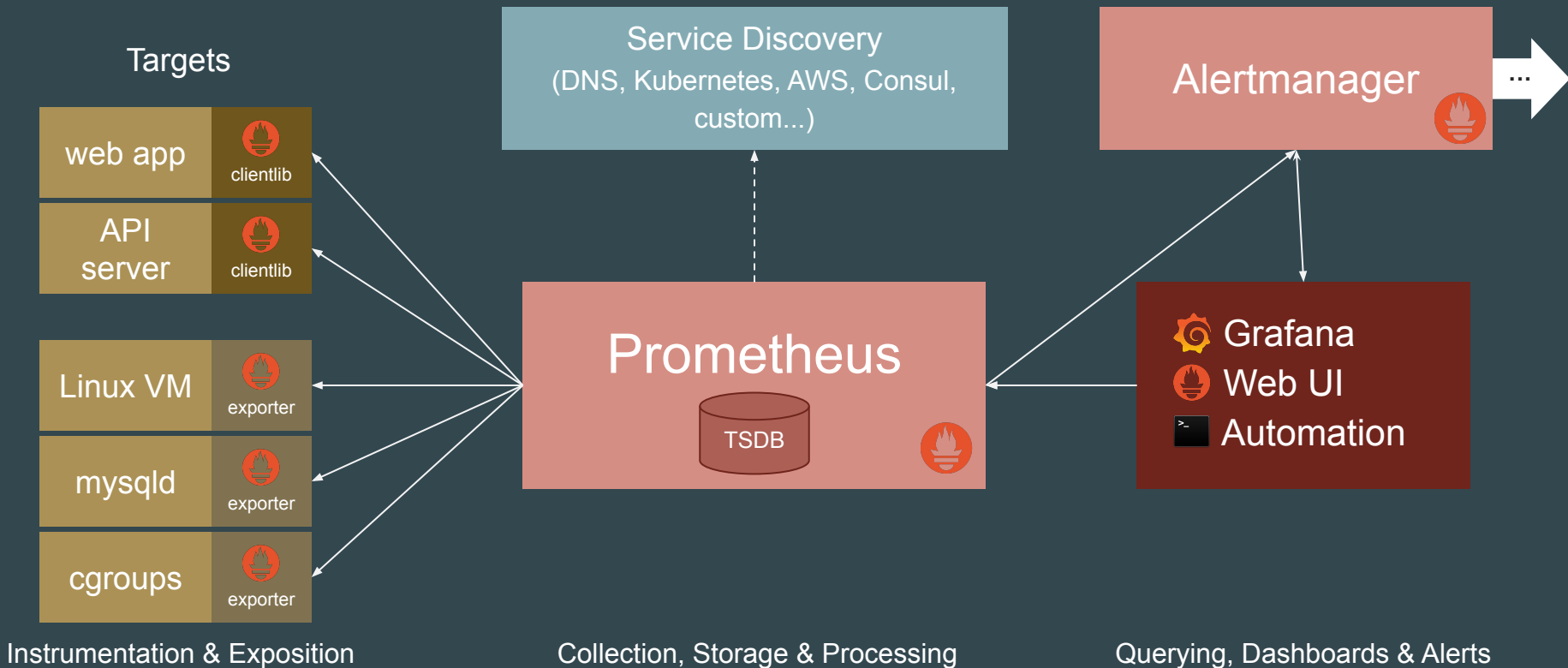
Architecture



Architecture



Architecture



What's new

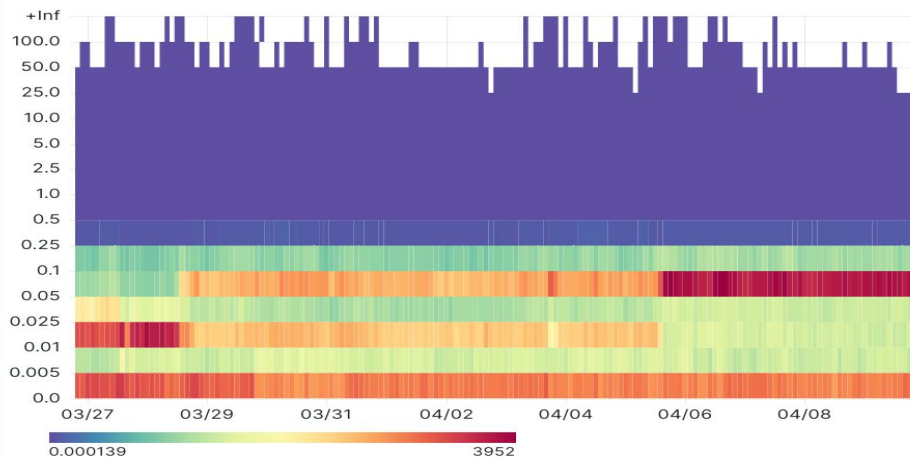
v2.39 - 2.47

Some of the new features released in the last ~9 months
only looking at [prometheus/prometheus](#)

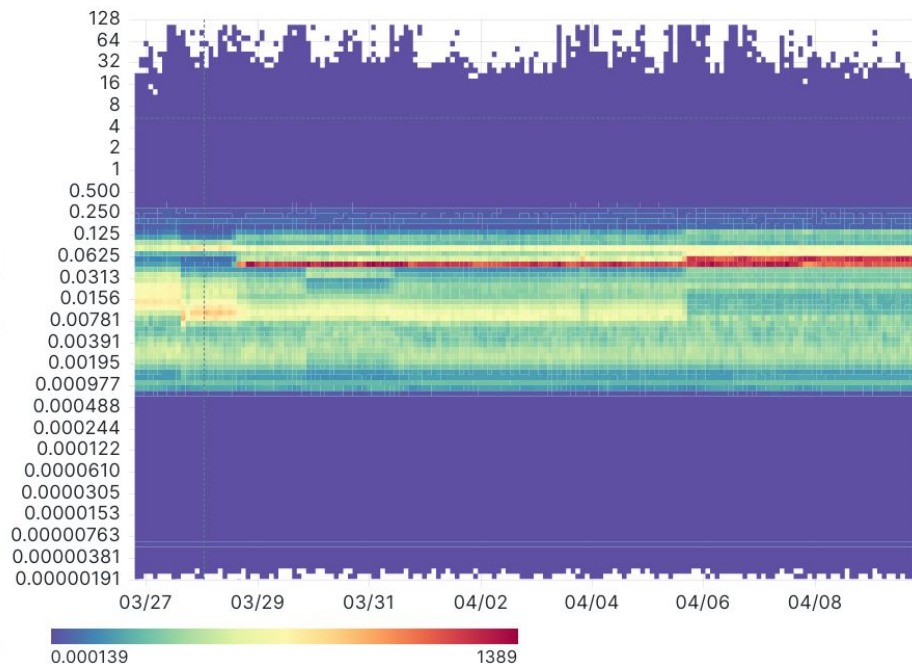
Native Histograms

v2.40 + 2.42

2xx classic histograms

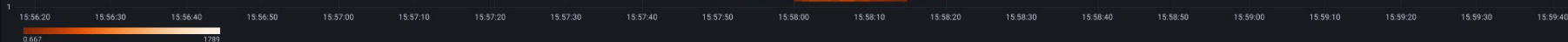


2xx native histogram



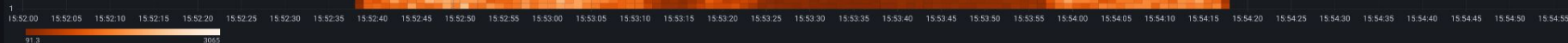


Storyteller

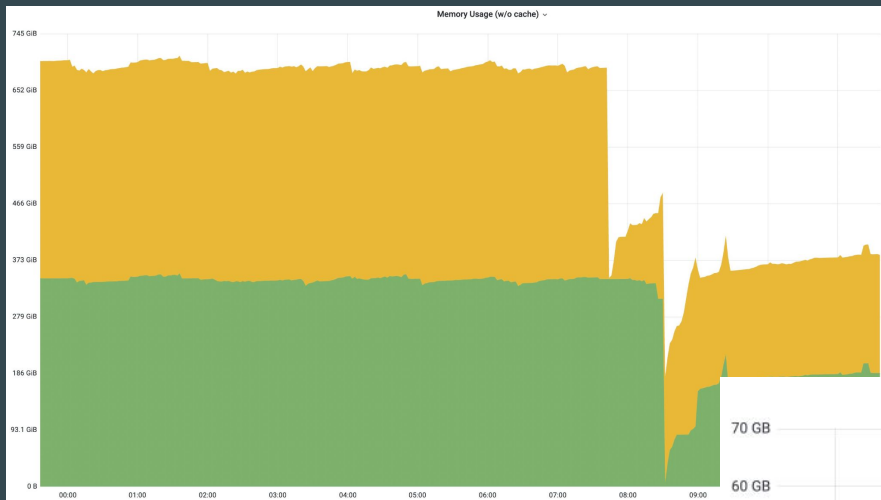




Storyteller

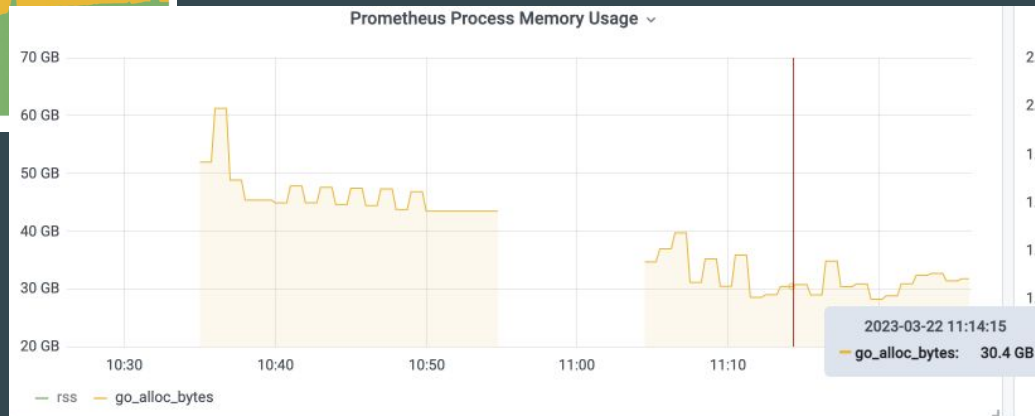


Memory Reductions



v2.39

v2.44



keep_firing_for v2.42

Add 'keep_firing_for' field to alerting rules

...

How long an alert will continue firing after
the condition that triggered it

has cleared.

[keep_firing_for: <duration> | default = 0s]

...

OTLP endpoint v2.47

Native ingestion of OpenTelemetry's OTLP

Working towards becoming the default metrics storage backend (same as for the rest of CNCF)


What's Coming

- New Alertmanager UI
 - New React UI to align with the rest of the Prometheus Ecosystem
- Metadata Improvements
 - Metric type
 - Created time
 - All of this persisted in TSDB
- Exemplar Improvements
 - Retained by recording rules
 - Persisted in TSDB
- Remote Write v2
 - Transactional remote write
 - Reduce bandwidth

We need you!

Friday, April 21 • 16:00 - 17:30

[Back To Schedule](#)

 **ContribFest: Prometheus - Hands-on Development and Contribution Workshop (Limited Availability; First-Come, First-Served)**

[Sign up](#) or [log in](#) to save this to your schedule, view media, leave feedback and see who's attending!

 <https://sched.co/1Hzc>



Tweet



Share

[Download the code](#) ahead of time. **DCO Required.**

Wished you know how to write exporter in Go for Prometheus? How to use Prometheus APIs programmatically? Need to quickly instrument you Go code with Prometheus metrics? Join us to learn how to contribute, develop and test Prometheus integrations useful in day to day use. Unblock yourself and others! It's easier than you think!

We will go through useful resources and ways to interact with the project and community, to create meaningful applications that use Prometheus effectively!

e.g.

Upgrade to github.com/Azure/azure-sdk-for-go/sdk #11860



Open

mmorel-35 wants to merge 3 commits into [prometheus:main](#) from [mmorel-35:azure-sdk-for-go](#)



Conversation 9



Commits 3



Checks 22



Files changed 4



mmorel-35 commented on Jan 18 • edited by kakkoyun ▾

Contributor

Tip ...

I had troubles with my commits signature so I recreated this branch with everything merged.

Replaces [#11849](#)

Fixes [#10942](#)

xref: https://github.com/Azure/azure-sdk-for-go/blob/main/documentation/MIGRATION_GUIDE.md

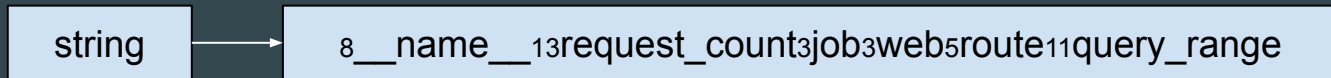
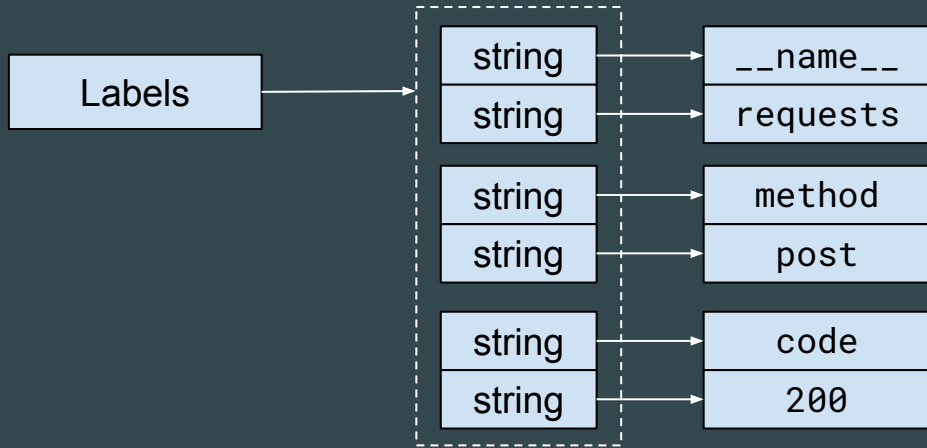
Signed-off-by: Matthieu MOREL matthieu.morel35@gmail.com



Q&A

Thanks!

Labels data structure



Out-of-order ingestion

v2.39

```
$ cat config.yml  
...  
storage:  
  tsdb:  
    out_of_order_time_window: 2h  
...
```

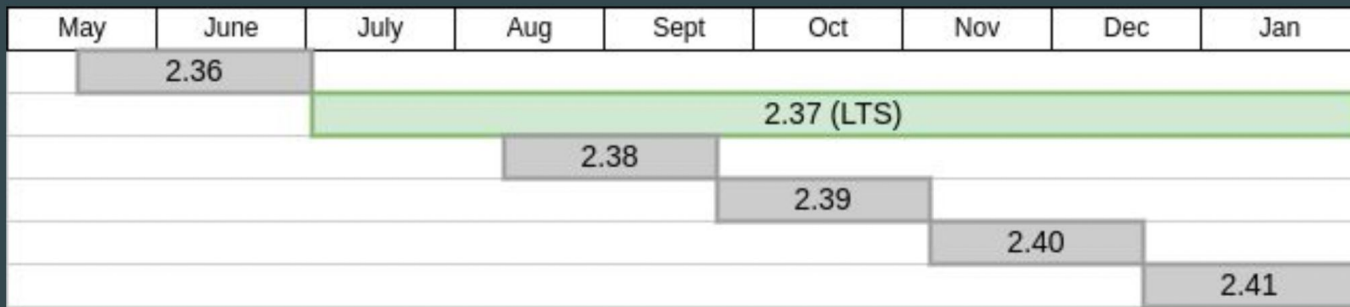
<https://promcon.io/2022-munich/talks/out-of-order-support-in-promethe>



LTS releases

LTS for Long Term Support.

A release of Prometheus supported for 6+ months.



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

Selling Points

- Dimensional data model
- Powerful query language (PromQL)
- Simple & efficient server
- Service discovery integration

Data Model

What is a time series?

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



string



int64



float64

Data Model

What identifies a time series?

```
http_requests_total{job="nginx",instance="1.2.3.4:80",status="200"} 28
```



metric name



labels

- Flexible
- No hierarchy
- Explicit dimensions

Querying

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
- Service discovery integration