Prometheus, the future!

Goutham Veeramachaneni

Grafana Labs

About Me

- Prometheus maintainer
- Cortex maintainer
- Loki maintainer
- BIKING

Prometheus: The monitoring system

- Made by frustrated Xooglers at Soundcloud

- Was really good

- People loved it

Prometheus: The monitoring system

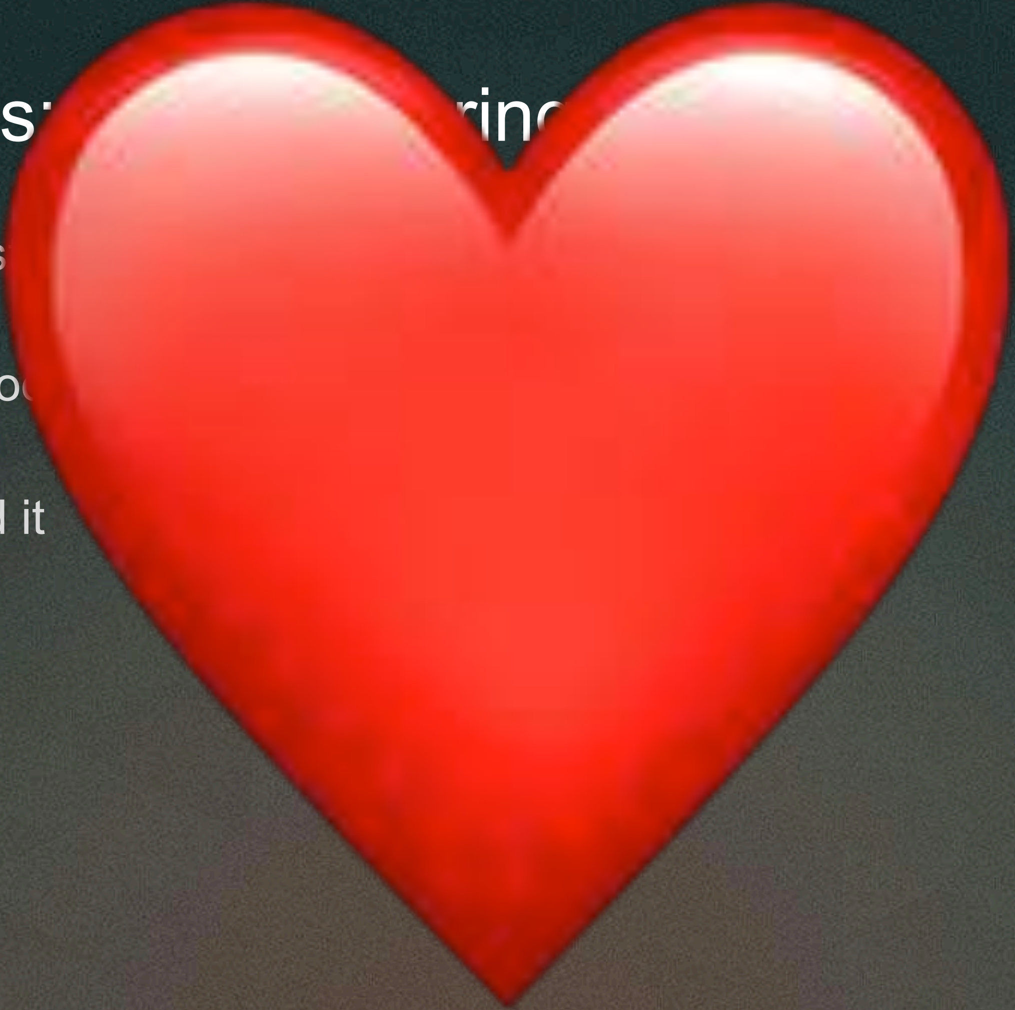
- Made by frustrated Xooglers at Soundcloud
- Was really good
- People loved it ❤️

Prometheus: The monitoring system

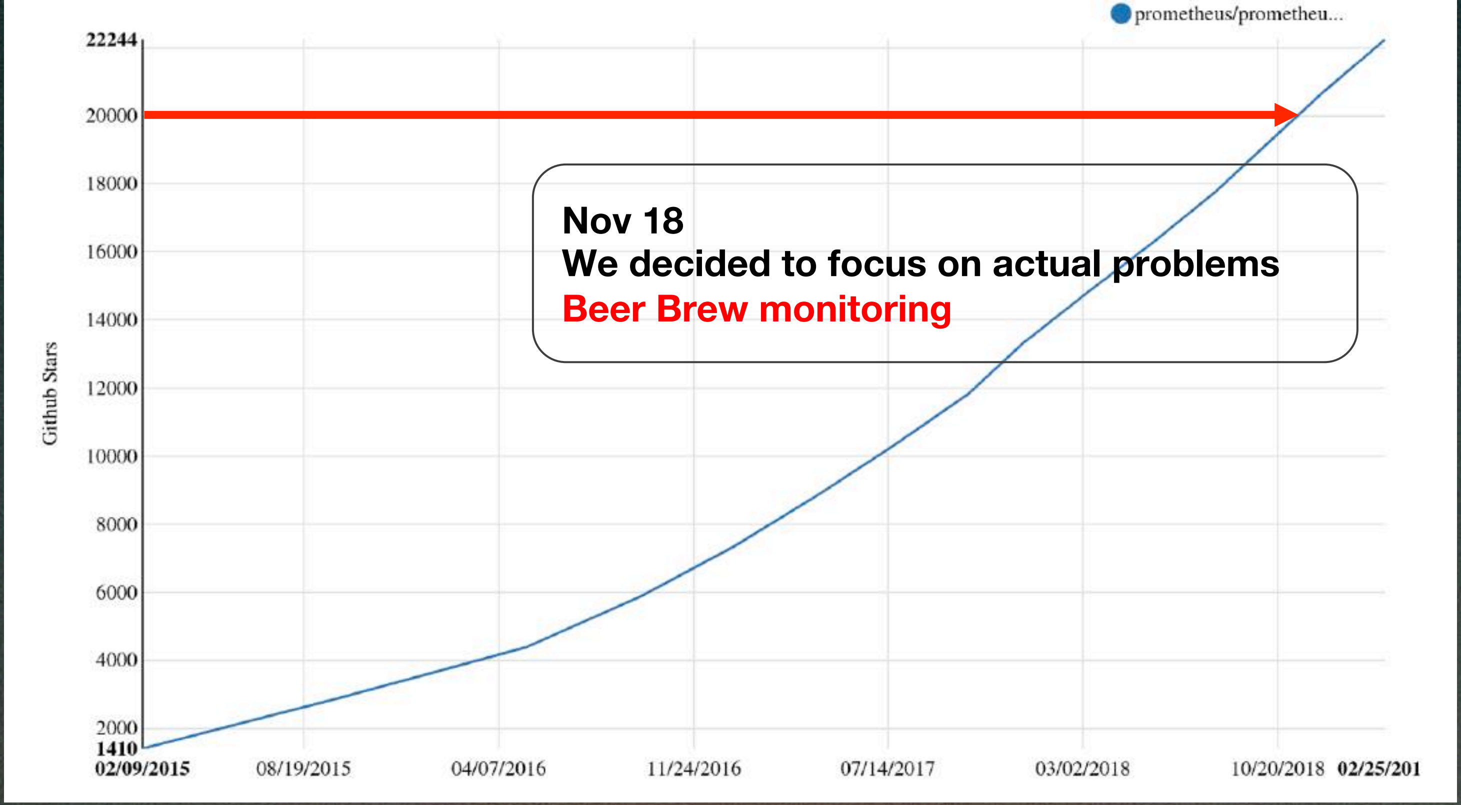
- Made by frustrated Xoogle Soundcl
- Was really good
- People loved it

Prometheus: rin

- Made by frus
- Was really go
- People loved it

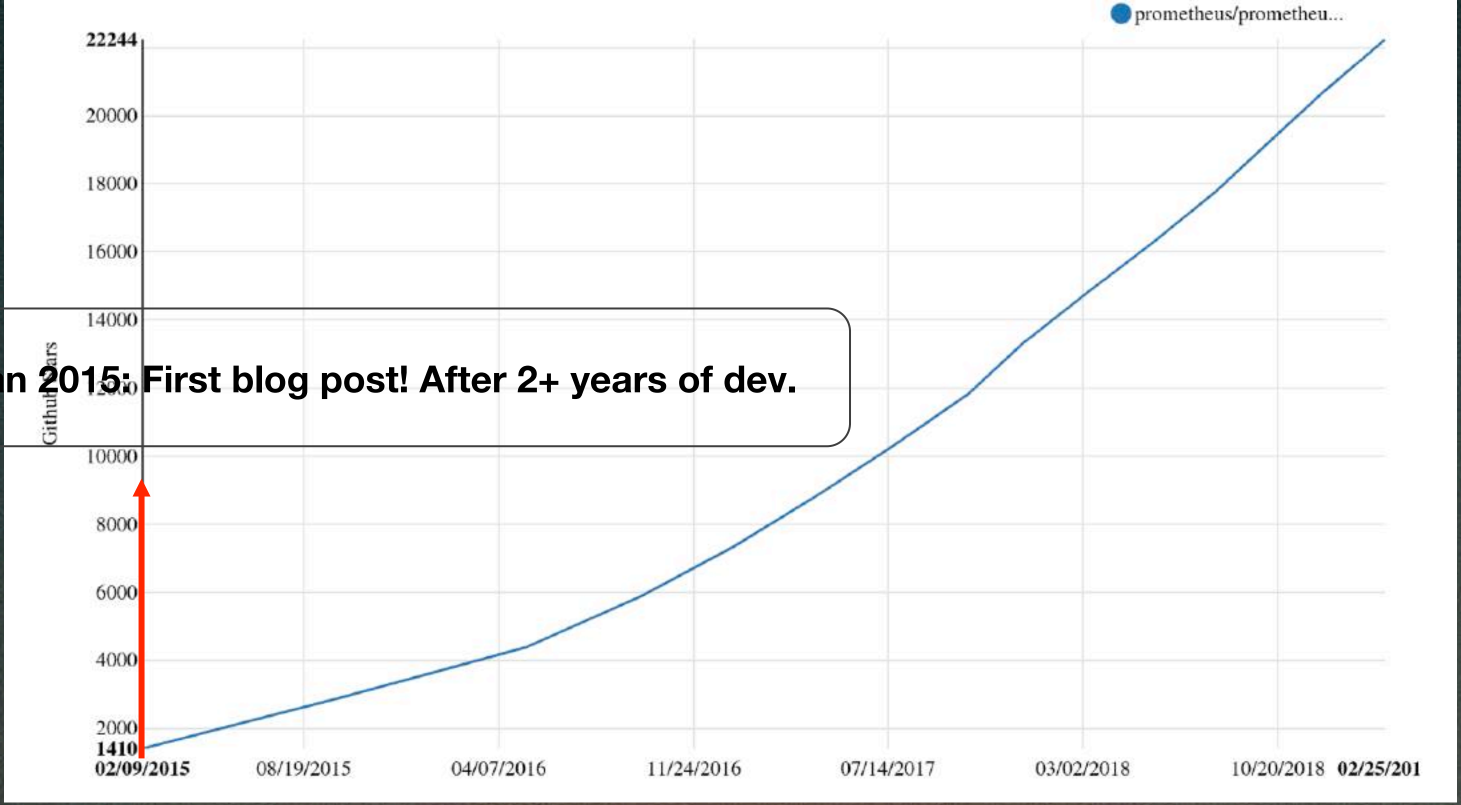


Prometheus: The monitoring system



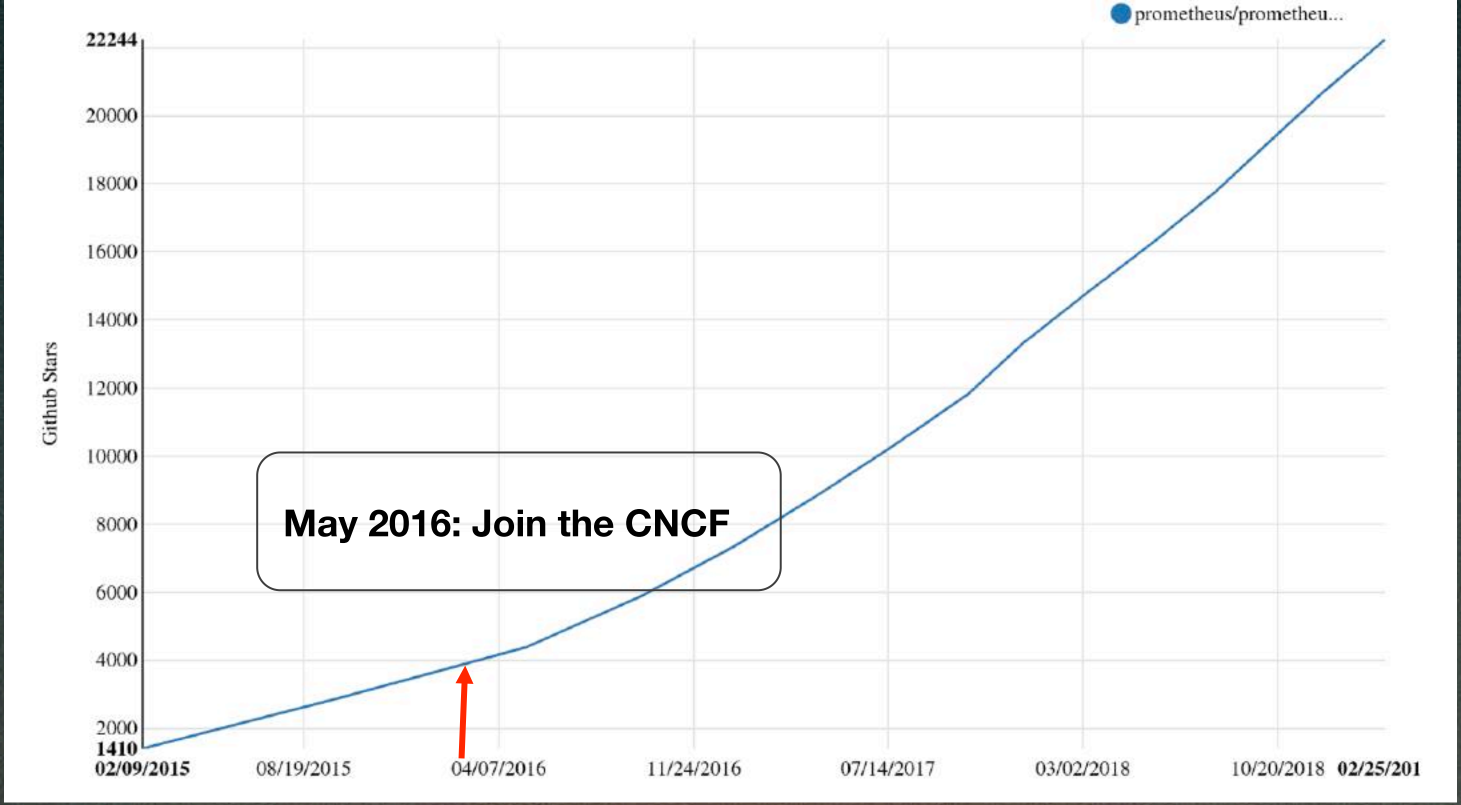
Nov 18
We decided to focus on actual problems
Beer Brew monitoring

Prometheus: The monitoring system



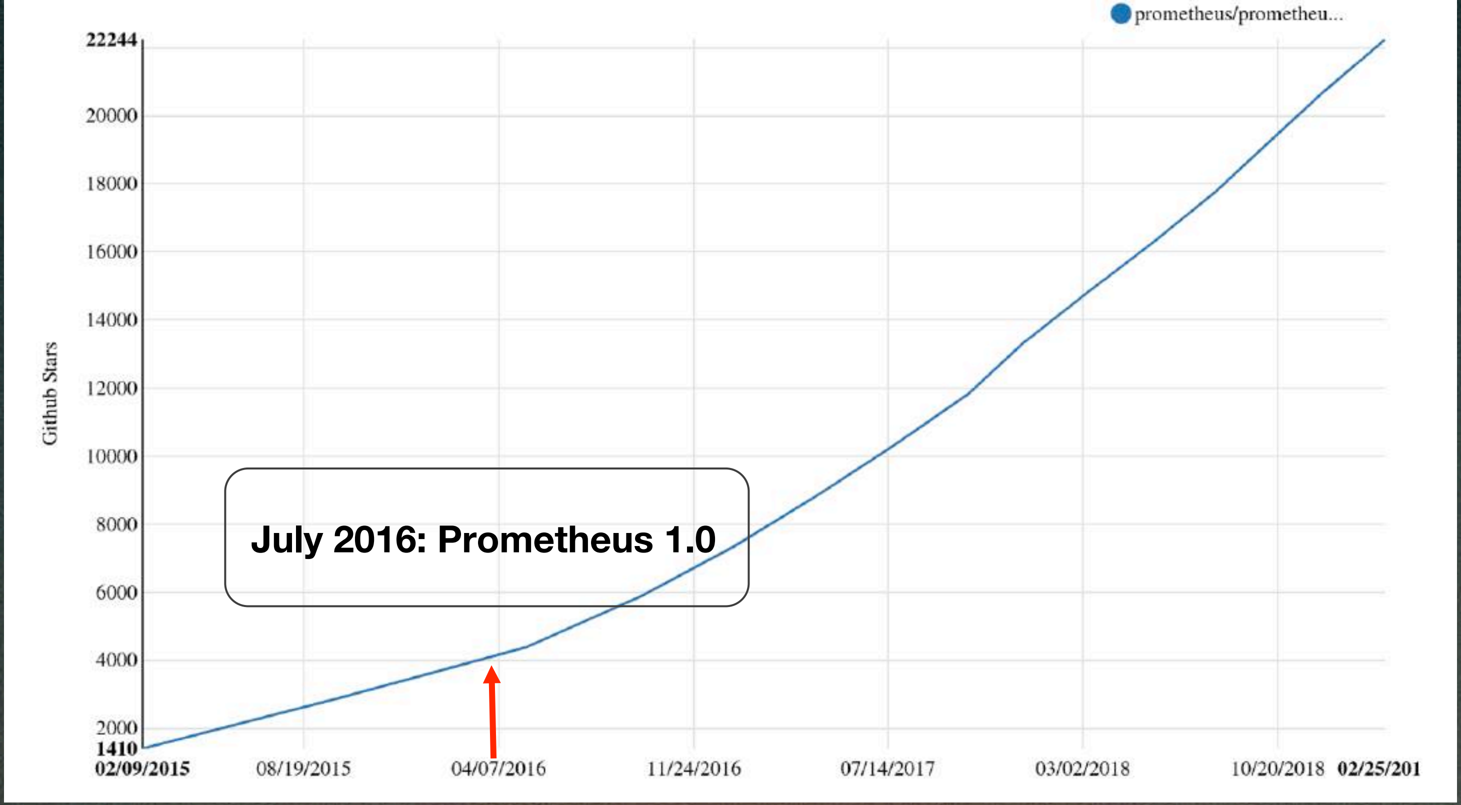
Jan 2015: First blog post! After 2+ years of dev.

Prometheus: The monitoring system



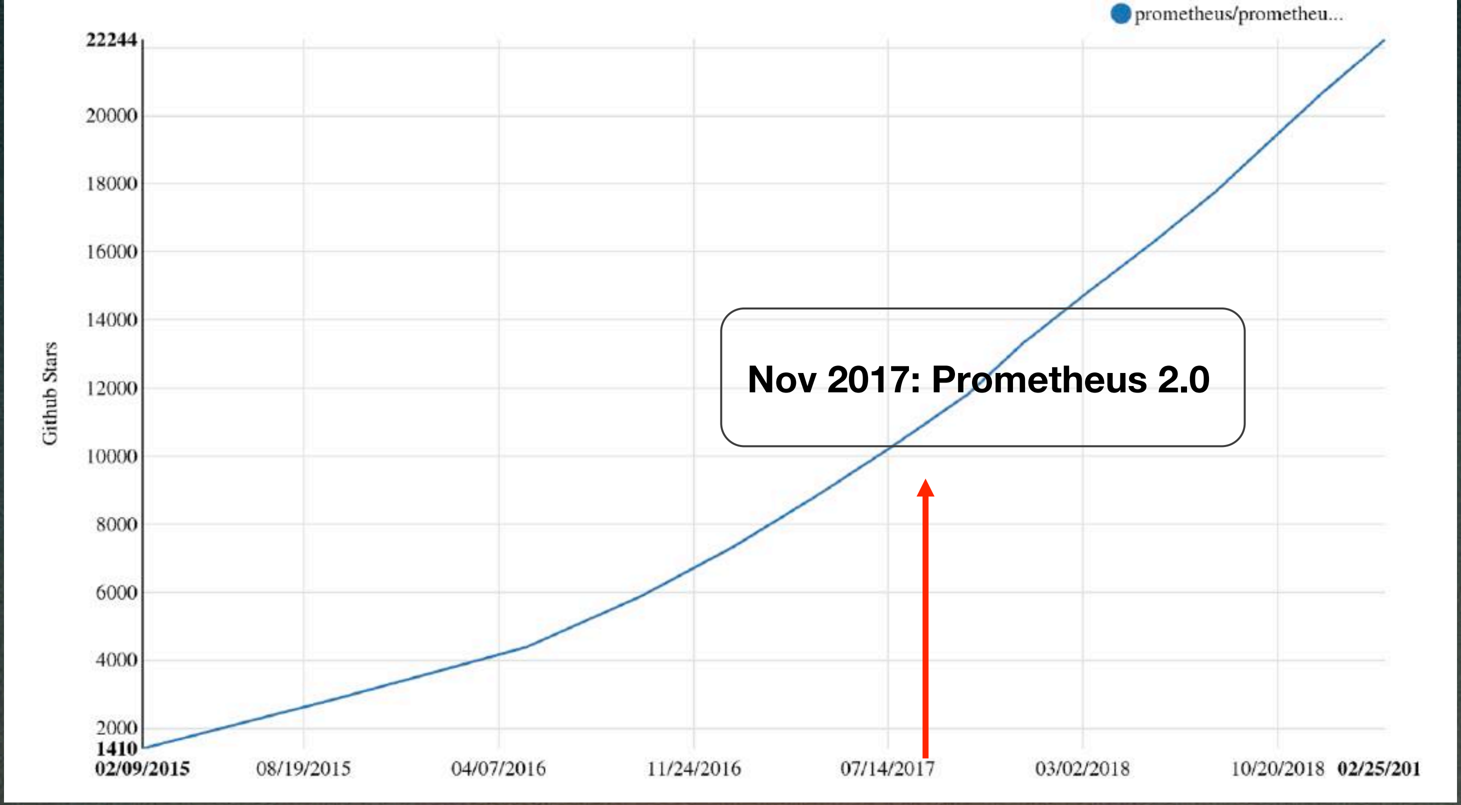
May 2016: Join the CNCF

Prometheus: The monitoring system



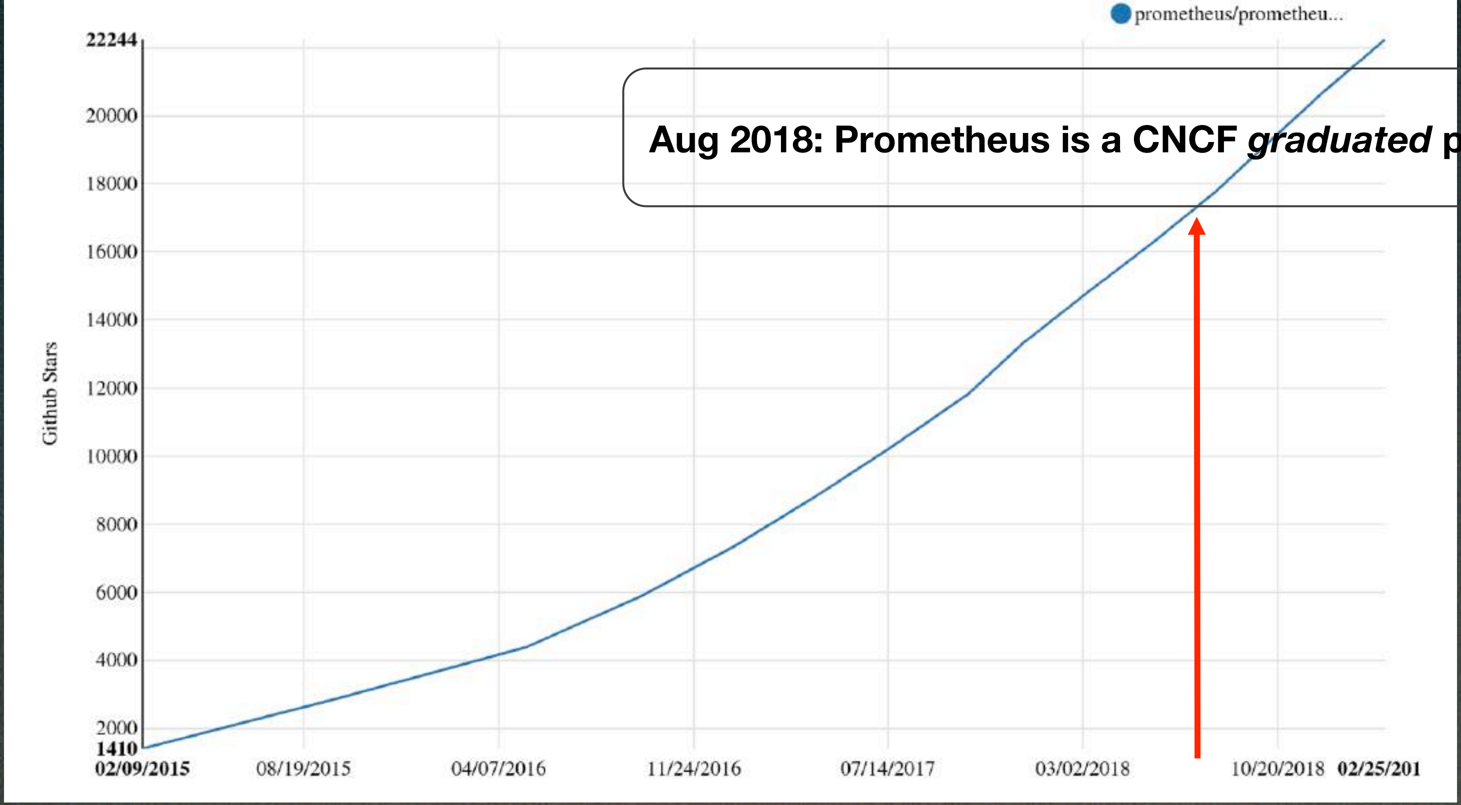
July 2016: Prometheus 1.0

Prometheus: The monitoring system

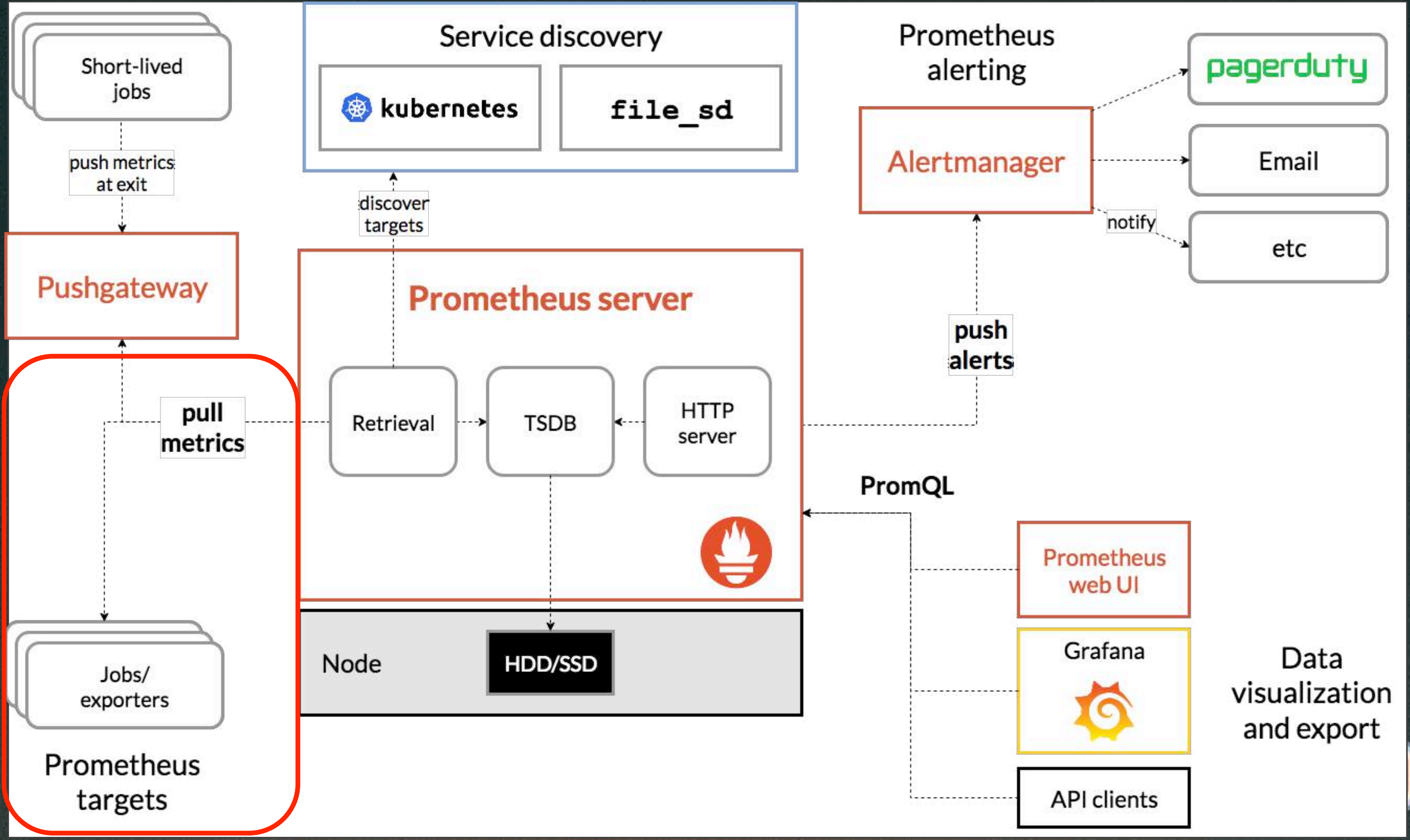


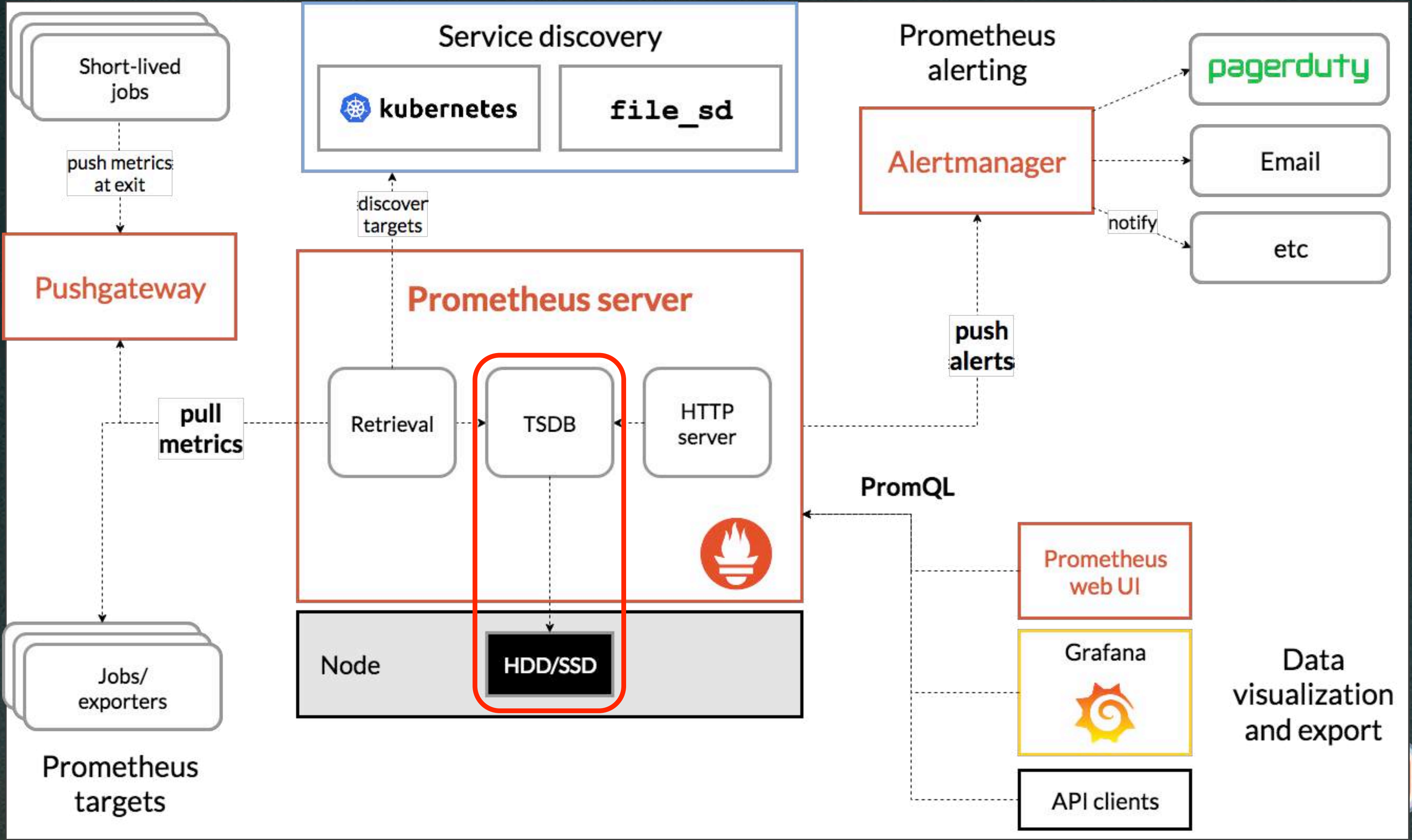
Nov 2017: Prometheus 2.0

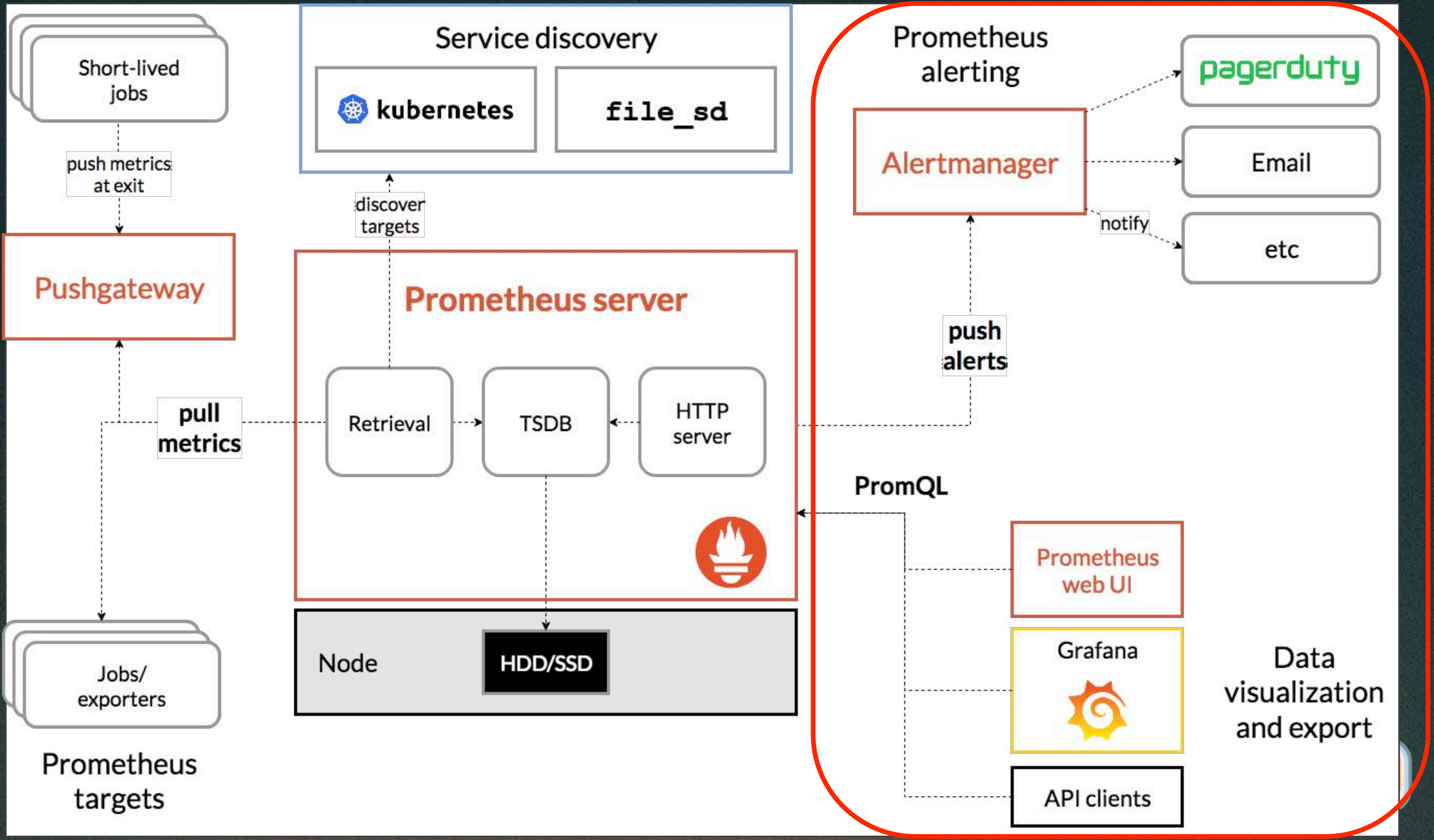
Prometheus: The monitoring system



Aug 2018: Prometheus is a CNCF *graduated* project


Short-lived jobs
push metrics at exit
Pushgateway
pull metrics
Jobs/ exporters
Prometheus targets
Service discovery
kubernetes
file_sd
discover targets
Prometheus server
Retrieval
TSDB
HTTP server
Node
HDD/SSD
Prometheus alerting
Alertmanager
pagerduty
Email
etc
notify
push alerts
PromQL
Prometheus web UI
Grafana
API clients
Data visualization and export


Short-lived jobs
push metrics at exit
Pushgateway
pull metrics
Jobs/ exporters
Prometheus targets
Service discovery
kubernetes
file_sd
discover targets
Prometheus server
Retrieval
TSDB
HTTP server
Node
HDD/SSD
Prometheus alerting
Alertmanager
pagerduty
Email
etc
notify
push alerts
PromQL
Prometheus web UI
Grafana
API clients
Data visualization and export



Short-lived jobs

push metrics at exit

Pushgateway

pull metrics

Jobs/ exporters

Prometheus targets

Service discovery

kubernetes

file_sd

discover targets

Prometheus server

Retrieval

TSDB

HTTP server

Node

HDD/SSD

Prometheus alerting

Alertmanager

push alerts

notify

pagerduty

Email

etc

PromQL

Prometheus web UI

Grafana

API clients

Data visualization and export

Major Milestone: Prometheus 2.0

- Completely re-thought a lot of things, re-wrote the storage engine.
- 2-10x improvement across the board.
- Fix-***ing*** EVERYTHING.
- 2.0 was Nov 2017

Expanding the team

3 more team-members past year!

Release Process

- 1.0:
  - We did it when someone wanted to do it.
  - Worked really well until it didn’t.
- No testing, huge set of changes

- 2.4+: Every 6 weeks

- We fixed it, maybe a little too well ;)

Release Process

- 1.0:
  - We did it when someone wanted to do it.
  - Worked really well until it didn't.
- No testing, huge set of changes
- 2.4+: Every 6 weeks
- We fixed it, maybe a little too well ;)

Github: @sipian

Data Integrity

- 1.0: We made no promises about your data
- 1.0: Still *really, really* good!

Data Integrity

- 1.0: We made no promises about your data
- 1.0: Still *really, really* good!
- 2.0: Backups and Restore!

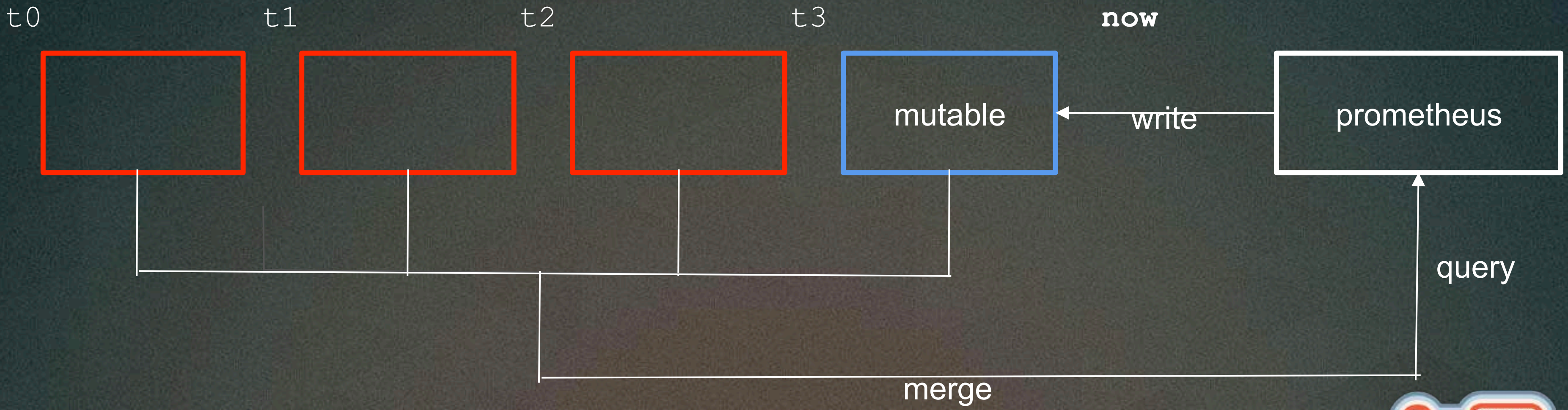
Data Integrity

- 1.0: We made no promises about your data
- 1.0: Still *really, really* good!
- 2.0: Backups and Restore!
- Coming soon to a Prometheus near you: Backfilling

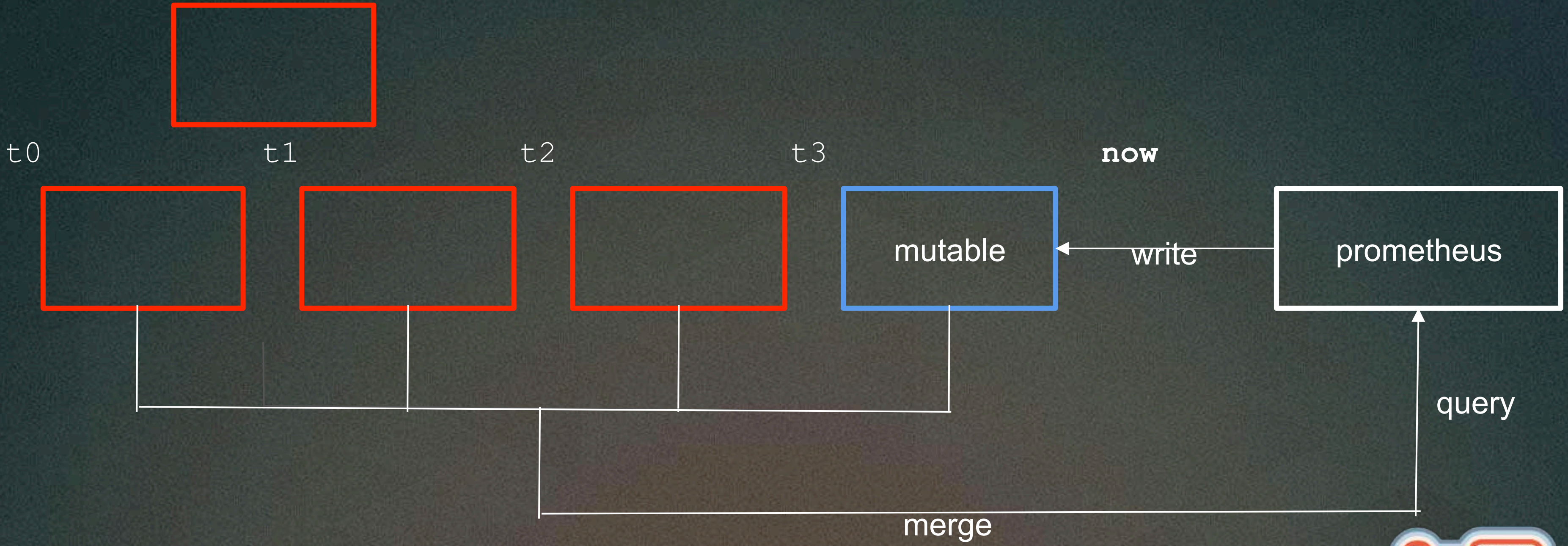
Backfilling

- TONS OF REQUESTS! No good answer.
- In *master*, will be in 2.8

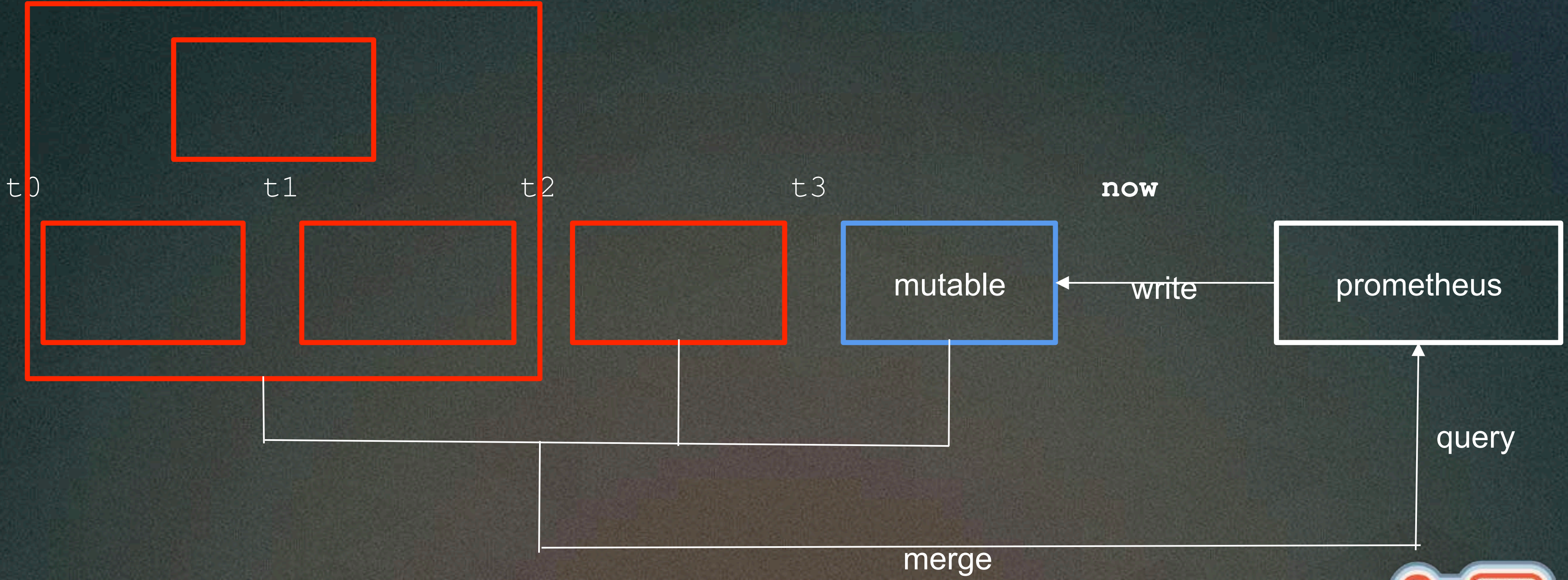
Backfilling



Backfilling



Backfilling

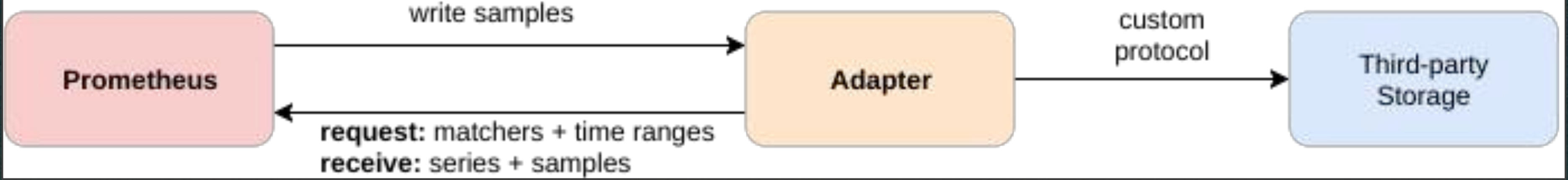


Data Integrity

- Still a single node system

Long Term Storage

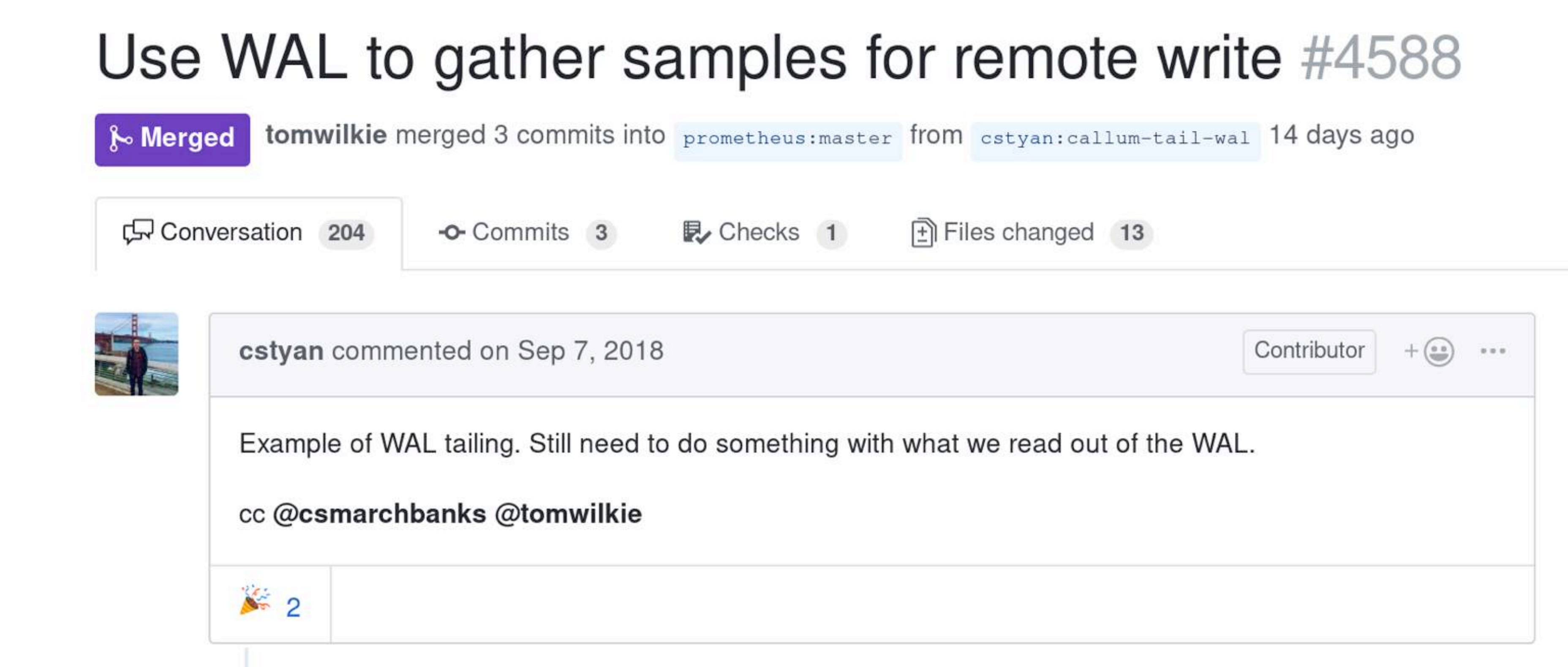
Via the *remote_write* and *remote_read*


write samples
Prometheus
Adapter
custom protocol
Third-party Storage
request: matchers + time ranges
receive: series + samples

Remote Write

- snappy-compressed protocol buffer encoding over HTTP
- Uses an in-memory sample buffer in-case remote is down
- OOMs when remote is unreachable
- Dataloss when remote is down for more than few mins

Remote Write



Use WAL to gather samples for remote write #4588

Merged **tomwilkie** merged 3 commits into `prometheus:master` from `cstyan:callum-tail-wal` 14 days ago

cstyan commented on Sep 7, 2018

Example of WAL tailing. Still need to do something with what we read out of the WAL.

cc **@csmarchbanks** **@tomwilkie**

🎉 2

Aaaaand more!

- Alerts unit testing
- Metadata API
- New shiny UI (almost there)
- Even MOAR faster
- Subqueries!

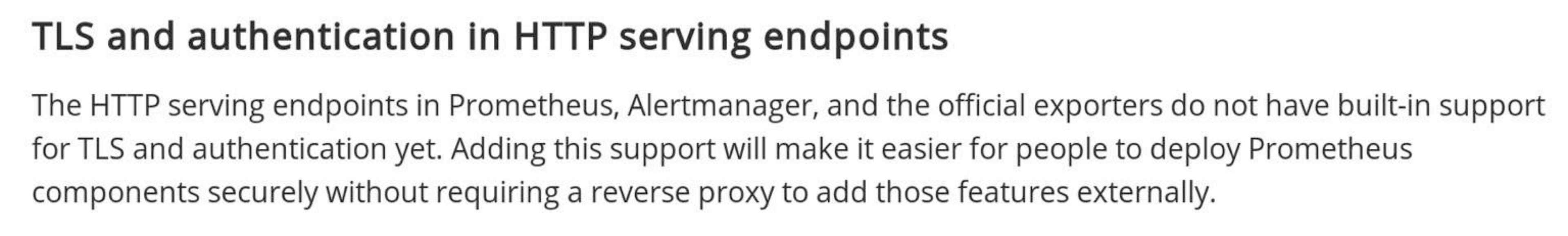
WHAT'S NEXT?

Security

- 1.x: Secure it yourself
- Security Audit: Everything is ~great, but give a default way to secure things

Security

- 1.x: Secure it yourself
- Security Audit: Everything is ~great, but give a default way to secure things



TLS and authentication in HTTP serving endpoints

The HTTP serving endpoints in Prometheus, Alertmanager, and the official exporters do not have built-in support for TLS and authentication yet. Adding this support will make it easier for people to deploy Prometheus components securely without requiring a reverse proxy to add those features externally.

BIGGEST THING

BIGGEST THING

Community

Community

- We changed the world

- Now, we need to CONQUER it!

OpenMetrics

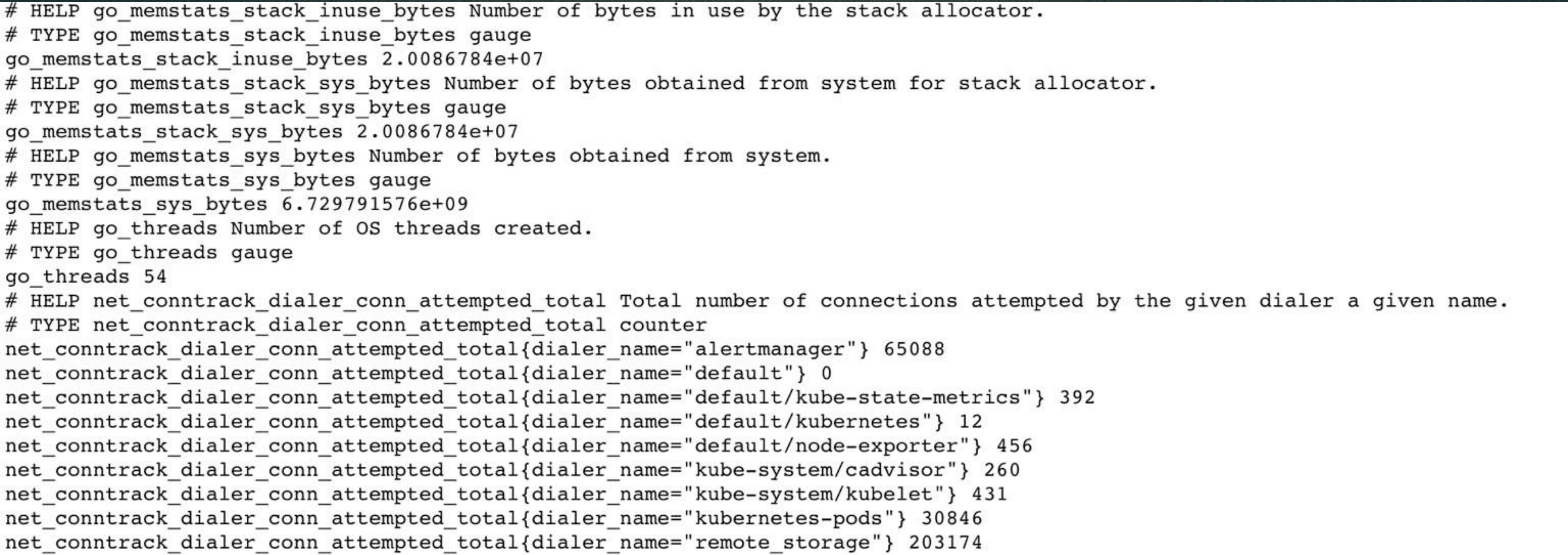
- The Prometheus exposition format is pretty f***** good!
- Let’s make it a standard!

OpenMetrics

- The Prometheus exposition format is pretty f***** good!
- Let’s make it a standard!

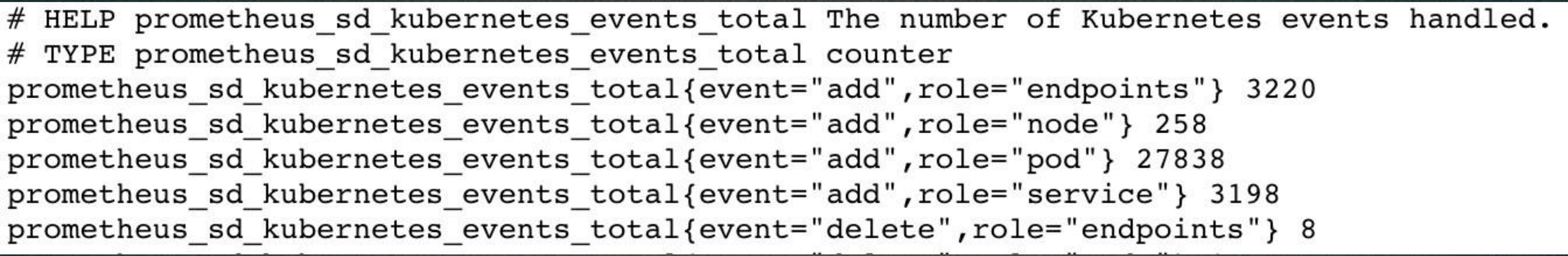
OPEN METRICS

Why? Cuz it’s simple and naaice!



```
# HELP go_memstats_stack_inuse_bytes Number of bytes in use by the stack allocator.
# TYPE go_memstats_stack_inuse_bytes gauge
go_memstats_stack_inuse_bytes 2.0086784e+07
# HELP go_memstats_stack_sys_bytes Number of bytes obtained from system for stack allocator.
# TYPE go_memstats_stack_sys_bytes gauge
go_memstats_stack_sys_bytes 2.0086784e+07
# HELP go_memstats_sys_bytes Number of bytes obtained from system.
# TYPE go_memstats_sys_bytes gauge
go_memstats_sys_bytes 6.729791576e+09
# HELP go_threads Number of OS threads created.
# TYPE go_threads gauge
go_threads 54
# HELP net_conntrack_dialer_conn_attempted_total Total number of connections attempted by the given dialer a given name.
# TYPE net_conntrack_dialer_conn_attempted_total counter
net_conntrack_dialer_conn_attempted_total{dialer_name="alertmanager"} 65088
net_conntrack_dialer_conn_attempted_total{dialer_name="default"} 0
net_conntrack_dialer_conn_attempted_total{dialer_name="default/kube-state-metrics"} 392
net_conntrack_dialer_conn_attempted_total{dialer_name="default/kubernetes"} 12
net_conntrack_dialer_conn_attempted_total{dialer_name="default/node-exporter"} 456
net_conntrack_dialer_conn_attempted_total{dialer_name="kube-system/cadvisor"} 260
net_conntrack_dialer_conn_attempted_total{dialer_name="kube-system/kubelet"} 431
net_conntrack_dialer_conn_attempted_total{dialer_name="kubernetes-pods"} 30846
net_conntrack_dialer_conn_attempted_total{dialer_name="remote_storage"} 203174
```

Why? Cuz it’s simple and naaice!



```
# HELP prometheus_sd_kubernetes_events_total The number of Kubernetes events handled.
# TYPE prometheus_sd_kubernetes_events_total counter
prometheus_sd_kubernetes_events_total{event="add",role="endpoints"} 3220
prometheus_sd_kubernetes_events_total{event="add",role="node"} 258
prometheus_sd_kubernetes_events_total{event="add",role="pod"} 27838
prometheus_sd_kubernetes_events_total{event="add",role="service"} 3198
prometheus_sd_kubernetes_events_total{event="delete",role="endpoints"} 8
```

Why?

- Explosion of compatible metric endpoints
- Avoid lock-in
- Kill SNMP ;)

Status

- CNCF Project
- Spec shelled out, now being written
- Prometheus 2.5 has support for it
- The prometheus python client is first client that can expose OM
- Google, Uber will write another reference parser

First commitments

Cloudflare

CNCF at large

GitLab

Google

Grafana

InfluxData

Prometheus!

RobustPerception

SpaceNet

Uber

….. Too many to list ;)

Community: Enable it

- MOAR exporters
- MOAR language support
- https://github.com/prometheus-community

THANKS!

Have any questions about our conquest of the world?