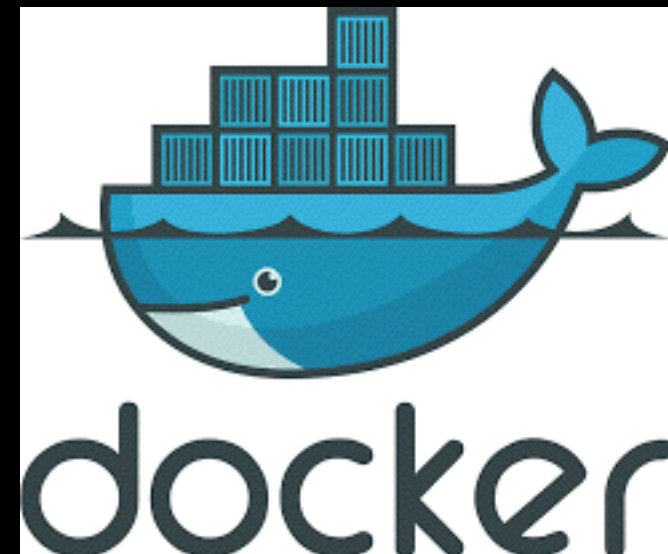# Prometheus: a modern monitoring system

~~May 22~~ July 16, 2018
Alberto Castro

History in Images

What is Prometheus?

- "Prometheus is an open-source systems monitoring and alerting toolkit originally built at SoundCloud."

- Prometheus is a Time Series Database.

What is a Time Series?

- A time series is a series of ordered values over time.

- Usually associated to measurements (CPU, Temperature, etc.)

- May be random, or with a random element.

Examples of metrics

- Temperature in a room (or a city)

- Total number of revolutions of an engine

- Seconds of CPU use

  - In one CPU

  - Aggregated over all the CPUs of one Machine

- Number of threads and processes at any given time

- Total number of http requests

Demo 1

Prometheus Project Structure & Components
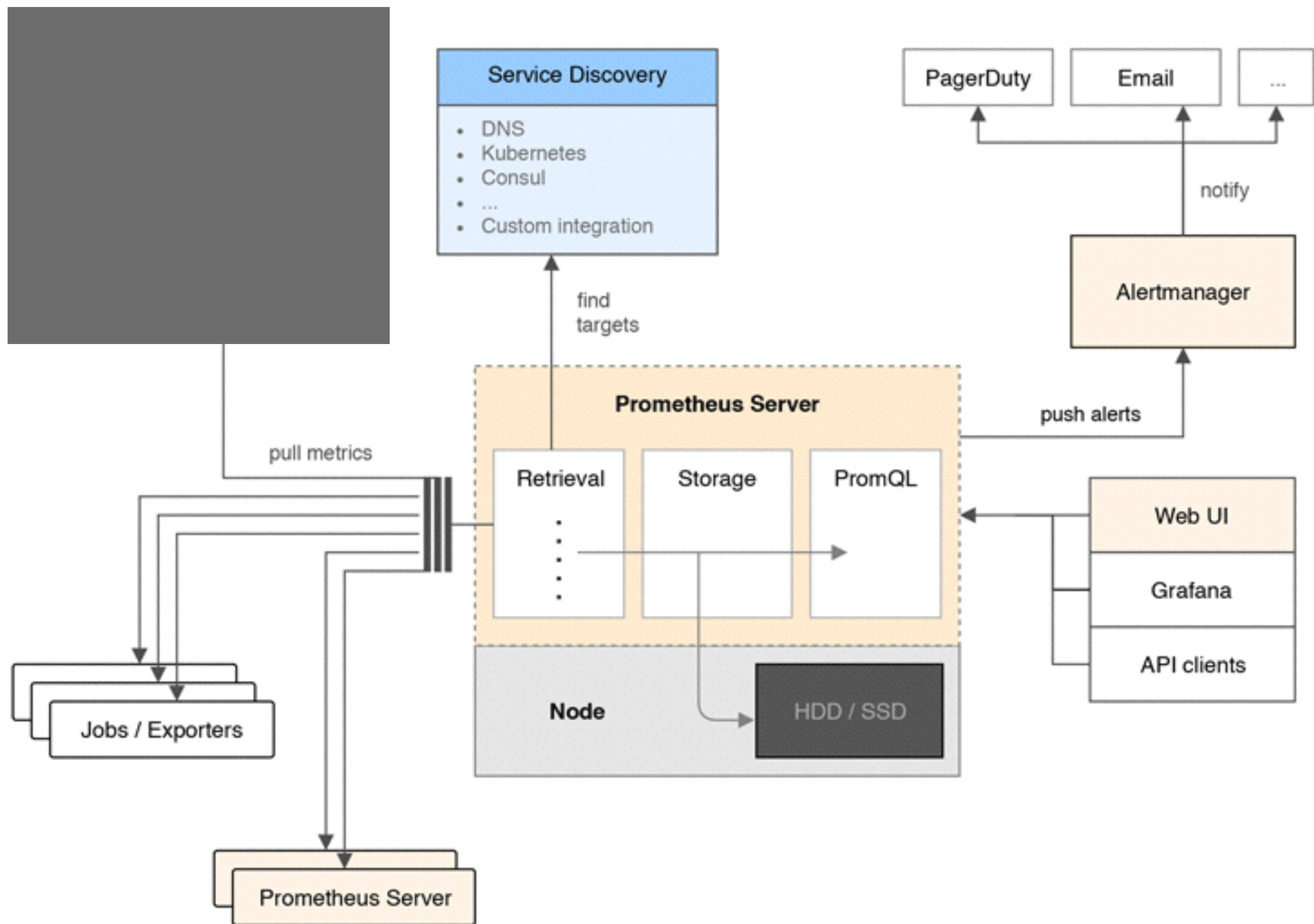
PromQL

- Query Language for Prometheus (Turing Complete!)

- Types:

  - Counters

  - Gauges

- Composed types

  - Summaries

  - Histogram

Labels: What are they?

- key-value pairs associated with time series

```
node_cpu{cpu="cpu1",instance="10.10.10.10:9100",
         job="node_exporter",mode="idle"}
```

```
cpu = cpu0, cpu1, cpu2, cpu3
instance= IP Range
mode = idle, user, iowait,…

job = group1, group2, …
product = product1, product2, …
team = dev, devops, dbadmin, …
```

Labels: Types and Examples

Types:

- instrumentation labels (describe the data)

- target labels (describe the scrape target)

Example:

```
node_cpu{cpu="cpu1",instance="10.10.10.10:9100",
         job="node_exporter",mode="idle"}
```

sum without(handler)
(rate(http_response_size_bytes_sum[5m]))

The _sum is a counter, those need to be rated and then added.
handler is a Label

Demo 2

Instrumentation

Official

- Go

- Python

- Java or Scala

- Ruby

Unofficial

- Bash

- C++

- Common Lisp

- Elixir

- Erlang

- Haskell

- Lua

- .NET / C#

- Node.js

- PHP

- Rust

Exporters (official)

- blackbox_exporter

- consul_exporter

- graphite_exporter

- haproxy_exporter

- memcached_exporter

- mysqld_exporter

- node_exporter

- statsd_exporter

Exporters (unofficial)

The list of unofficial exporters is too long to list here are 2 links that give an idea of the possibilities

- https://prometheus.io/docs/instrumenting/exporters/graphite_exporter

- https://github.com/prometheus/prometheus/wiki/Default-port-allocations

Demo 3

Alerts

- Alerts are generated by Prometheus

- However alerts are not handled by Prometheus but by the Alertmanager

- The Alertmanager can:

  - Submit alerts to email/Slack/Pager Duty/…

  - Silences alerts

  - Can set a hierarchy of alerts (if a group is down do not send the individual alerts)

  - Provides an interface to look at the alerts

Service Discovery

- Static

- EC2

- Kubernetes

- File SD

- Consul

- DNS

- Openstack

- GCE

- Azure

- Marathon

- Serverset

- …

- …

- …

And there is more!

- Relabelling

- Advanced configurations

- Remote Storage

- Templates for custom graphs

- Snapshots of the database

- Pushgateway for batch jobs

- *Prometheus: Up & Running*, Brian Brazil O'Reilly
  http://shop.oreilly.com/product/0636920147343.do

- Prometheus Site https://prometheus.io

- Grafana https://grafana.com

- CNCF https://www.cncf.io

- Robust Perception Blog:
  https://www.robustperception.io/blog/

- Promcon in YouTube

  - 2017 :https://youtu.be/jZRGDZkPH9w