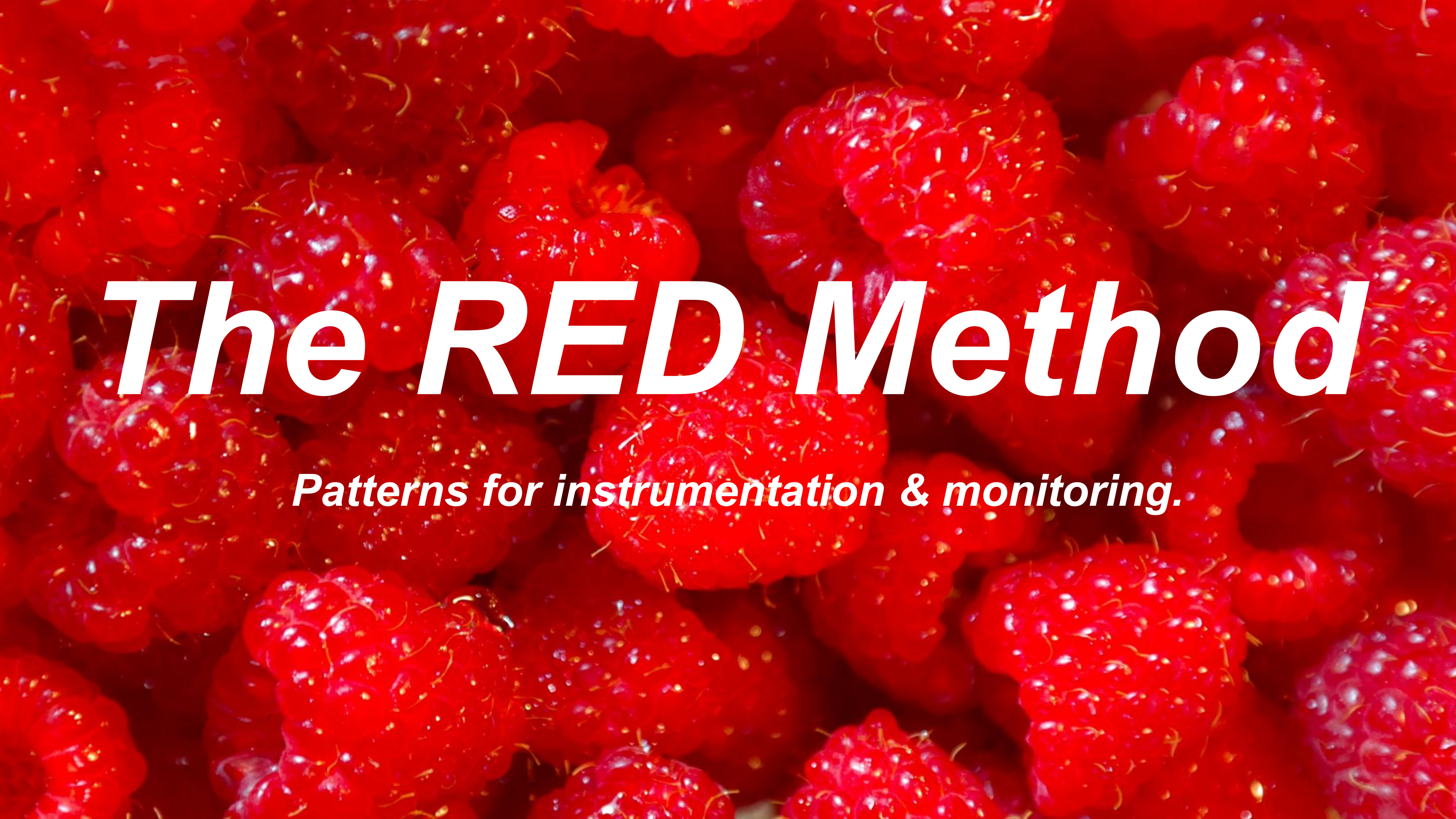


The RED Method

Patterns for instrumentation & monitoring.

Introduction
Why does this matter?

The USE Method
Utilisation, Saturation, Errors

The RED Method
Requests Rate, Errors, Duration..

The Four Golden Signals
RED + Saturation

THIS PRESENTATION IS AN ADAPTION FROM A PRESENTATION MADE BY GRAFANA LABS AND PUBLICLY AVAILABLE ON THE NET

The USE Method

For every resource, monitor

Utilization % time that the resource was busy

Saturation amount of work resource has to do, often queue length

Errors the count of error events

	Utilisation	Saturation	Errors
CPU	✓	✓	✓
Memory	✓	✓	✓
Disk	✓	✓	✓
Network	✓	✓	✗

http://www.brendangregg.com/usemethod.html

CPU Utilisation:

```
1 - avg(rate(node_cpu{job="default/node-exporter",mode="idle"}[1m]))
```

CPU Saturation:

```
sum(node_load1{job="default/node-exporter"})
/
sum(node:node_num_cpu:sum)
```

CPU USE in Prometheus

Memory USE in Prometheus

Memory Utilisation:

```
1 - sum(
  node_memory_MemFree{job=“…”} +
  node_memory_Cached{job=“…”} +
  node_memory_Buffers{job=“…”}
)
/ sum(node_memory_MemTotal{job=“…”})
```

Memory Saturation:

```
1e3 * sum(
  rate(node_vmstat_pgpgin{job=“…”}[1m]) +
  rate(node_vmstat_pgpgout{job=“…”}[1m]))
)
```

- CPU Errors, Memory Errors
- Hard Disk Errors!
- Disk Capacity vs Disk IO
- Network Utilisation
- Interconnects

Interesting / Hard Cases

More Details

- “The USE Method” - Brendan Gregg
- Kubernetes Mixin - https://github.com/grafana/jsonnet-libs

The RED Method

The RED Method

For every service, monitor request:

- **Rate** - number of requests per second
- **Errors** - the number of those requests that are failing
- **Duration** - the amount of time those requests take

Rate:

```
sum(rate(request_duration_seconds_count{job=“…”}[1m]))
```

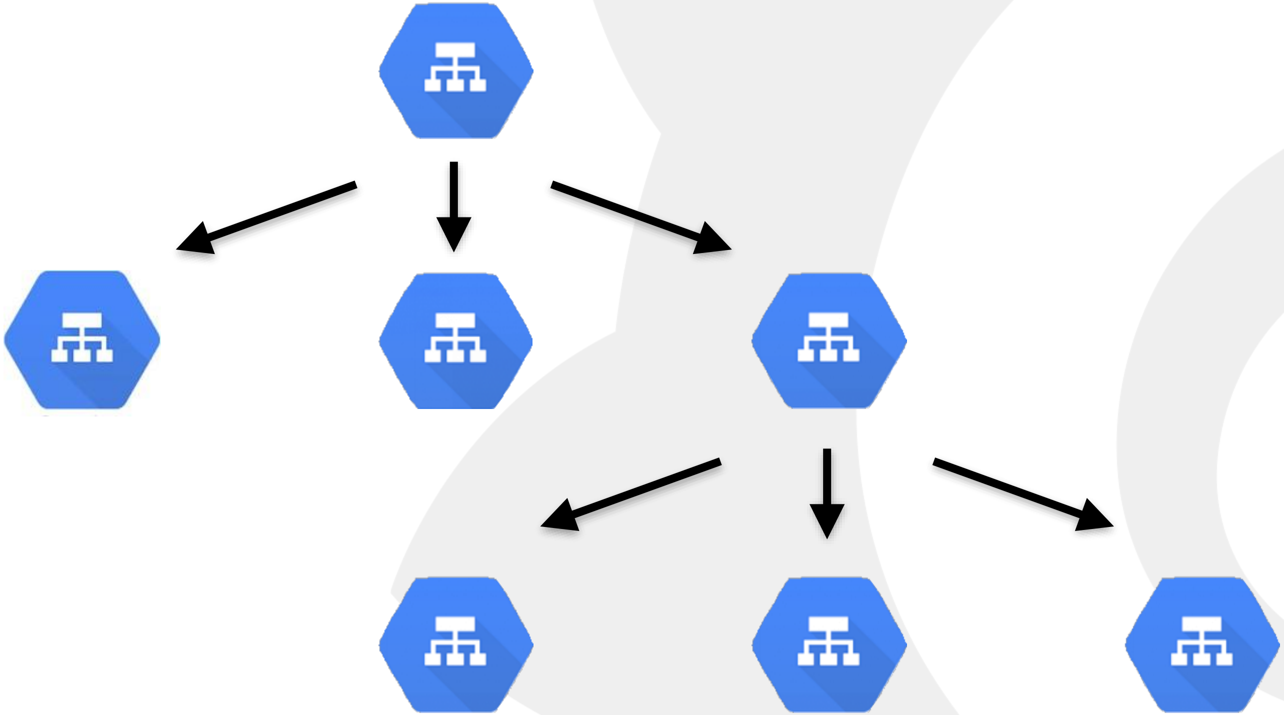
Errors:

```
sum(rate(request_duration_seconds_count{job=“…”,
status_code!~”2..”}[1m]))
```

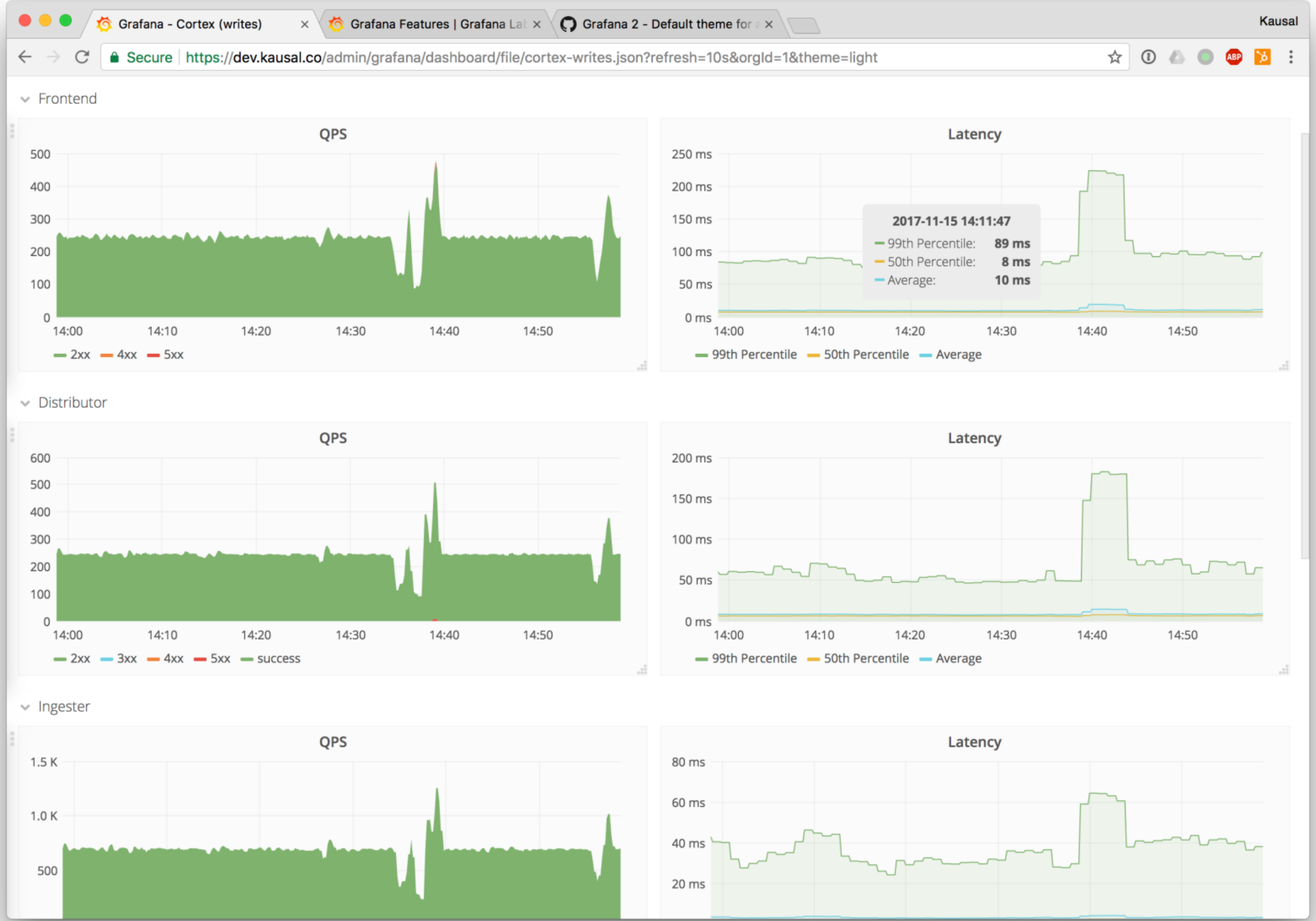
Duration:

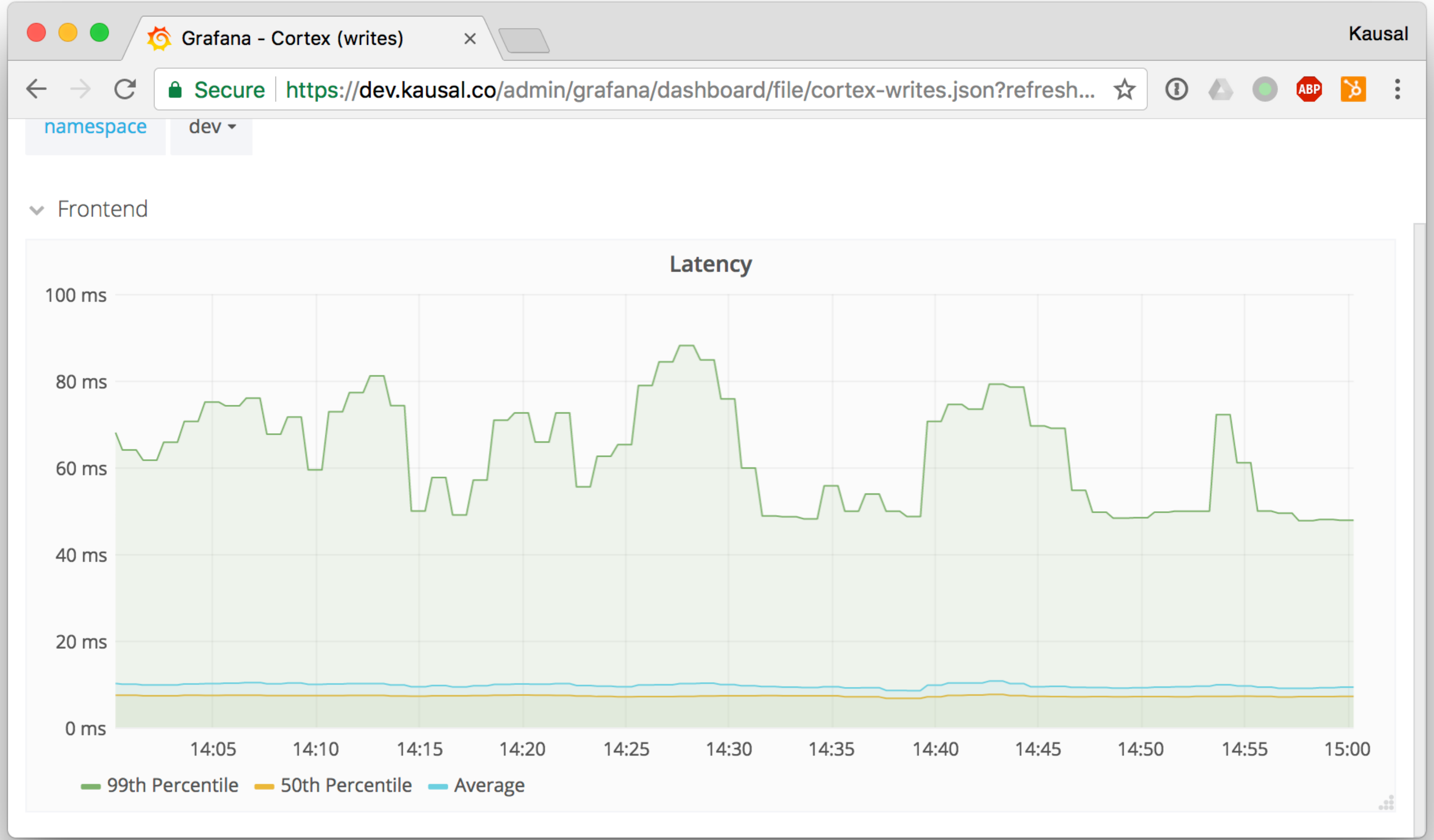
```
histogram_quantile(0.99,
sum(rate(request_duration_seconds_bucket {job=“…}[1m])) by (le))
```

Easy to query



DAG of Services


Grafana - Cortex (writes)
Grafana Features | Grafana Lab
Grafana 2 - Default theme for
Kausal
Secure
https://dev.kausal.co/admin/grafana/dashboard/file/cortex-writes.json?refresh=10s&orgId=1&theme=light
Frontend
QPS
500
400
300
200
100
0
14:00
14:10
14:20
14:30
14:40
14:50
2xx
4xx
5xx
Latency
250 ms
200 ms
150 ms
100 ms
50 ms
0 ms
14:00
14:10
14:20
14:30
14:40
14:50
2017-11-15 14:11:47
99th Percentile: 89 ms
50th Percentile: 8 ms
Average: 10 ms
99th Percentile
50th Percentile
Average
Distributor
QPS
600
500
400
300
200
100
0
14:00
14:10
14:20
14:30
14:40
14:50
2xx
3xx
4xx
5xx
success
Latency
200 ms
150 ms
100 ms
50 ms
0 ms
14:00
14:10
14:20
14:30
14:40
14:50
99th Percentile
50th Percentile
Average
Ingester
QPS
1.5 K
1.0 K
500
Latency
80 ms
60 ms
40 ms
20 ms



Latencies & Averages

- “Monitoring Microservices” - Weaveworks (slides)
- "The RED Method: key metrics for microservices architecture” - Weaveworks
- “Monitoring and Observability with USE and RED” - VividCortex
- “RED Method for Prometheus – 3 Key Metrics for Monitoring” - Rancher Labs
- “Logs and Metrics” - Cindy Sridharan
- "Logging v. instrumentation”, “Go best practices, six years in” - Peter Bourgon

More Details

The Four Golden Signals

For each service, monitor:

- **Latency** - time taken to serve a request
- **Traffic** - how much demand is places on your system
- **Errors** - rate or requests that are failing
- **Saturation** - how “full” your services is

The Four Golden Signals

- **Saturation** - how “full” your services is

More Details

- “The Four Golden Signals” - The Google SRE Book
- “How to Monitor the SRE Golden Signals” - Steve Mushero