

Distributed Timeseries Database in Go



Go is the future of NoSQL/NewSQL

Databases written in Go

- Prometheus
- CockroachDb
- InfluxDb
- Dgraph
- EtcD
- Consul



Talk about architecture

What is a timeseries



Use cases for timeseries

- Stocks
- Monitoring
- IOT

About timeseries

- Timeseries can be lossy
- Timeseries compress uniquely on data sets
- Write heavy
- Key, Time, DataPoint
 - CNX:IND, June 15 12:23, \$23.40

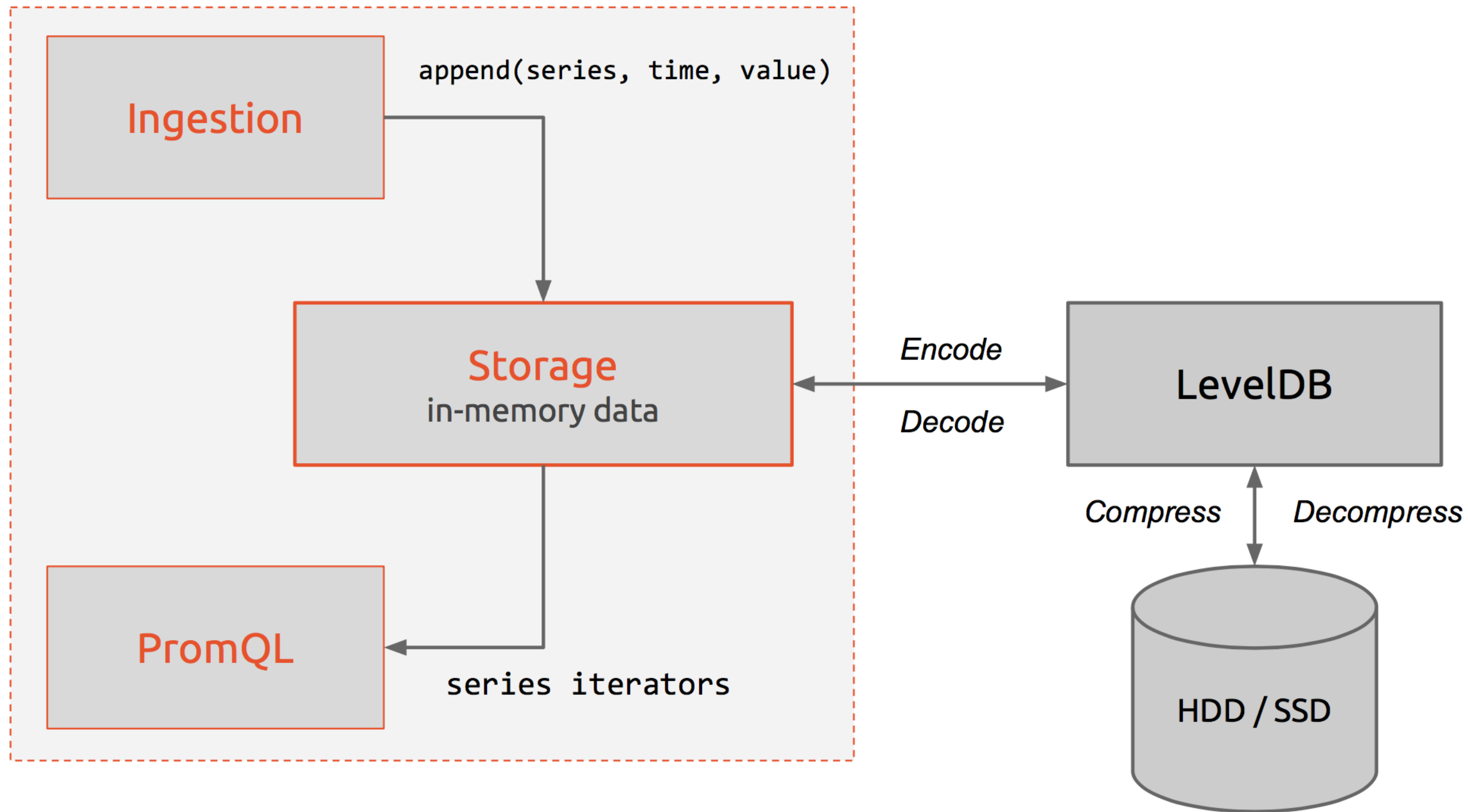
Dark days

- Graphite
- InfluxDb
- Mysql storing metrics
- OpenTSDB (UGGHHHHH)



Prometheus





```
rate(http_request_latency[1m])
```



Julius Volz

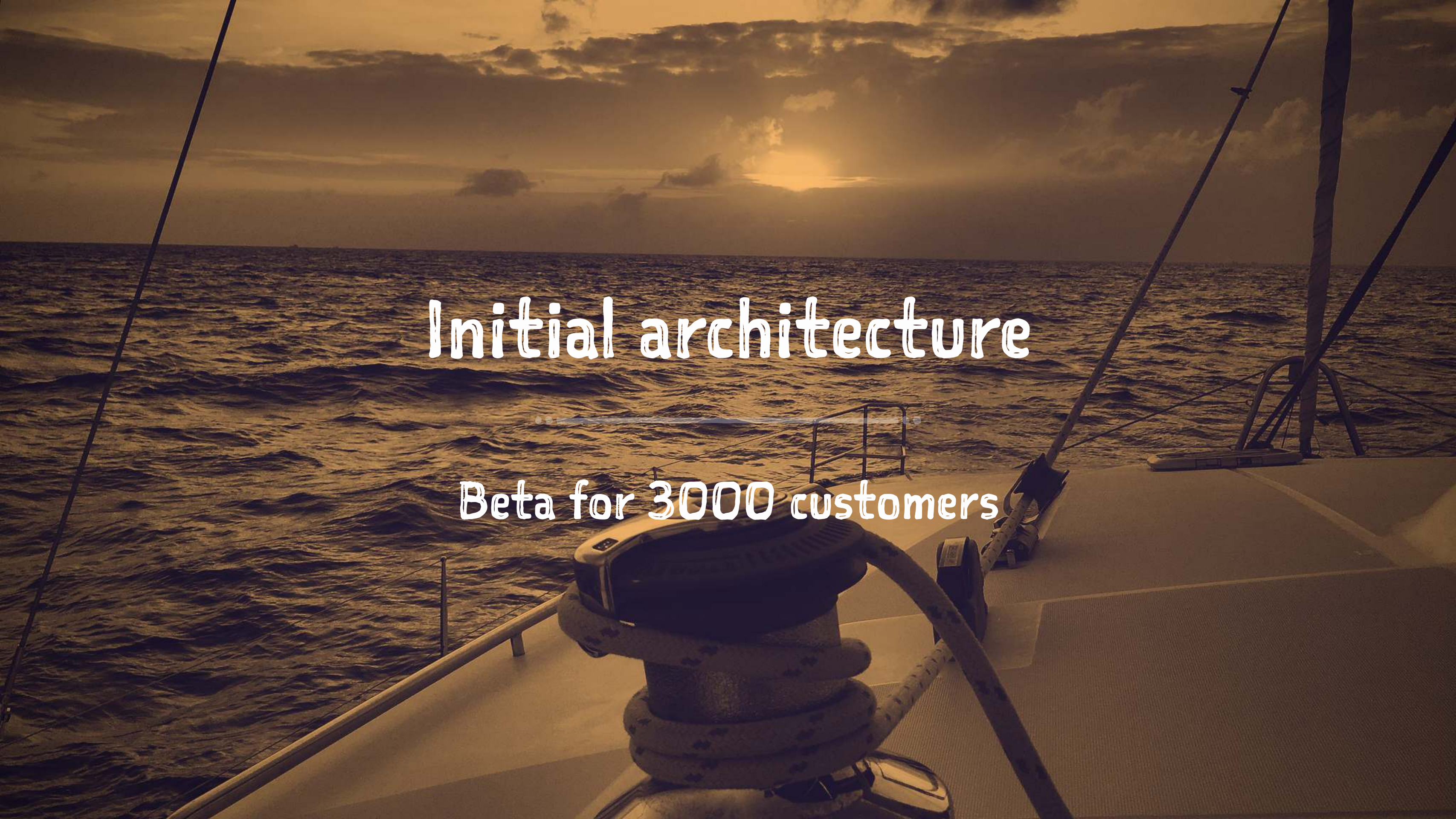
@juliusvolz

You ask why [@PrometheusIO](#) has PromQL and not some SQL-like dialect for time series computations? Behold:

PromQL: `errors{job="foo"} / total{job="foo"}`

SQL:

`SELECT errors.job, errors.instance, [...more labels...], errors.value / total.value FROM errors, total WHERE errors.job="foo" AND total.job="foo" JOIN [...some more complicated stuff here...]`

A photograph of a sunset over the ocean, taken from the deck of a boat. In the foreground, a rope winch is visible on the left. The sun is low on the horizon, creating a warm, golden glow across the sky and water. The text "Initial architecture" is overlaid in white, stylized font in the center of the image.

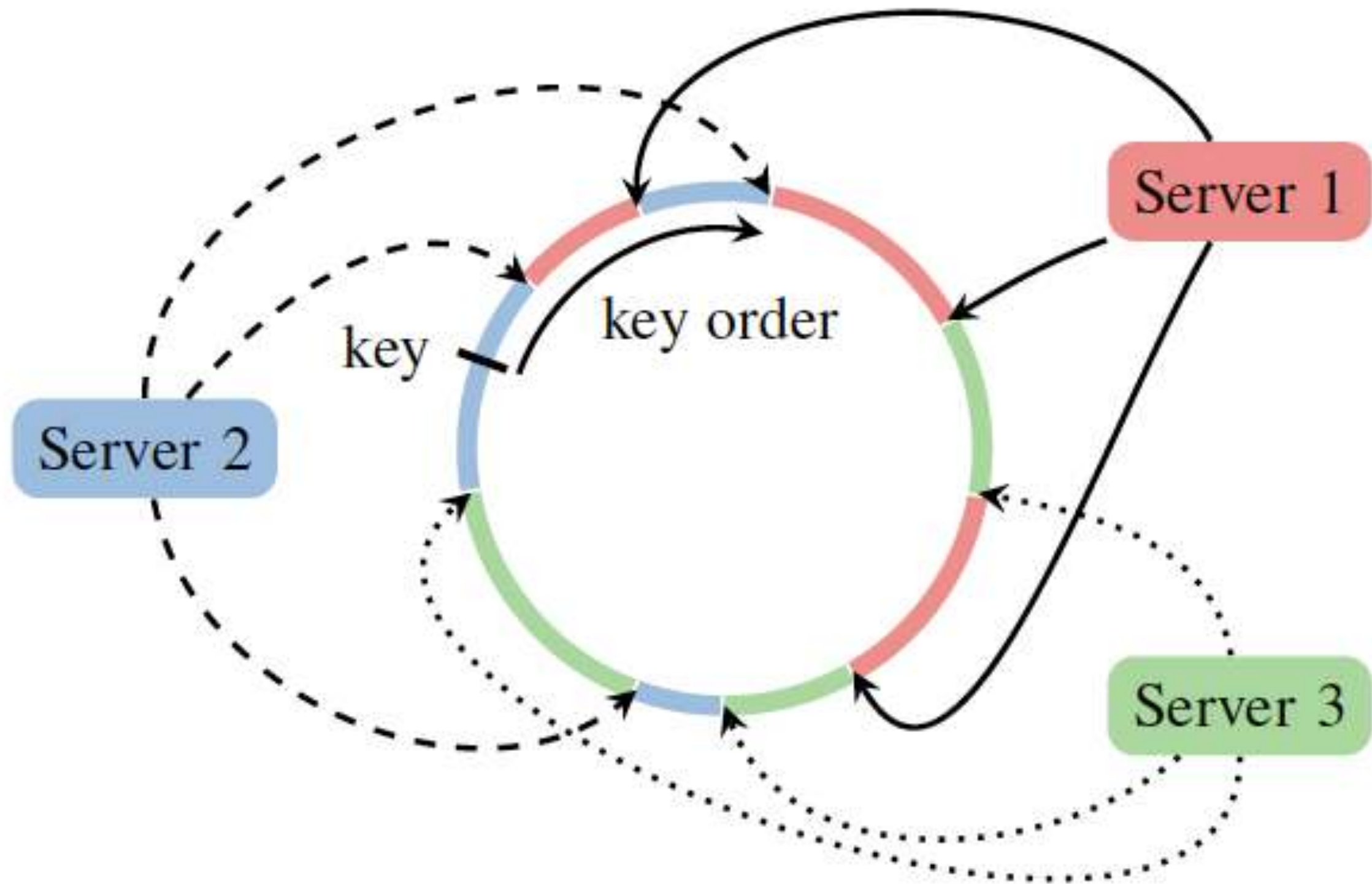
Initial architecture

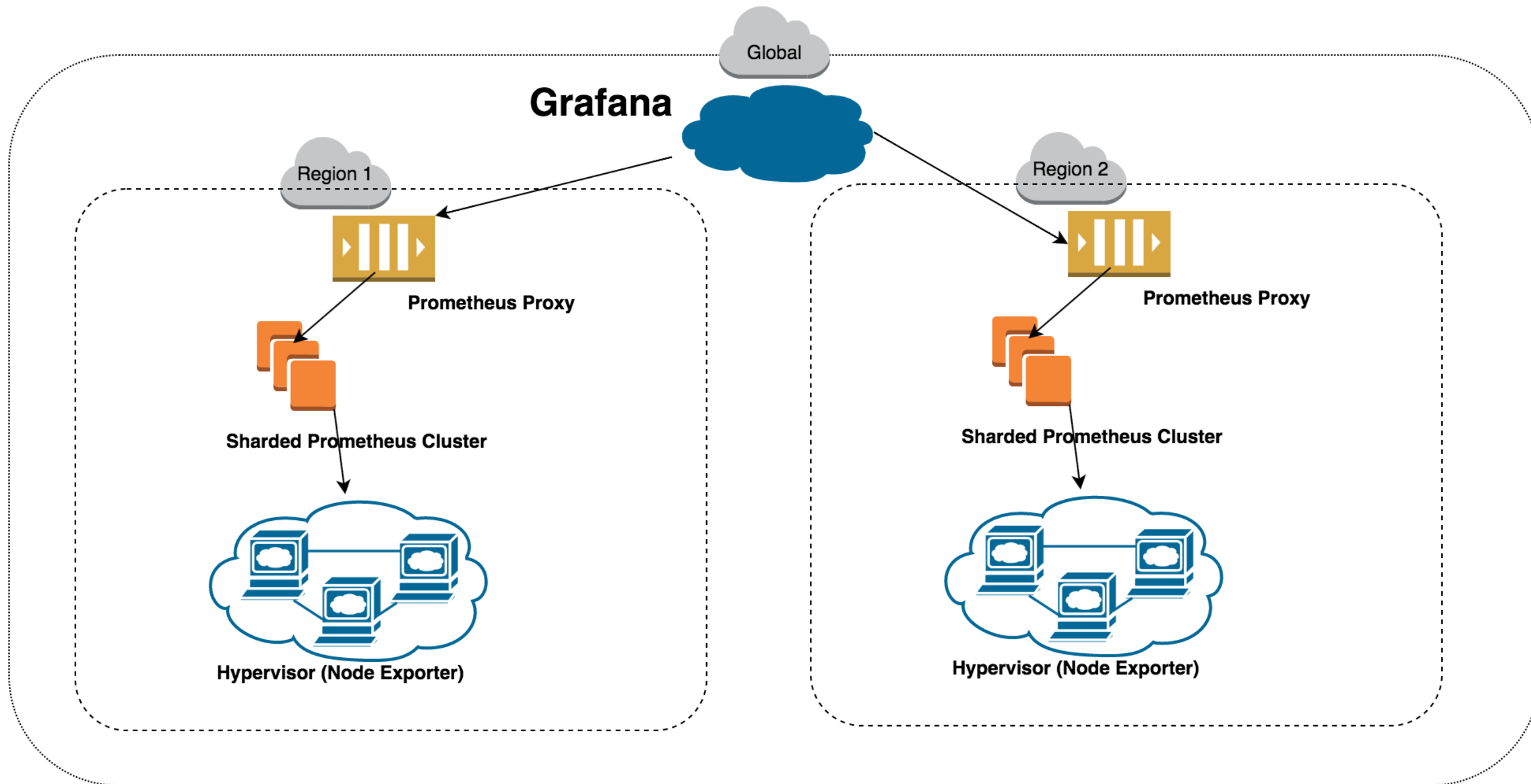
...

Beta for 3000 customers

Hash sharded Prometheus

3-4 per datacenter





Performance requirements

- 3 Gbits/sec of traffic
- 100k Writes a second
- 50ms Reads
- 100,000 customers to start
- 20 TB of storage

Introducing Vulcan



<https://github.com/digitalocean/vulcan>



Strange PRs

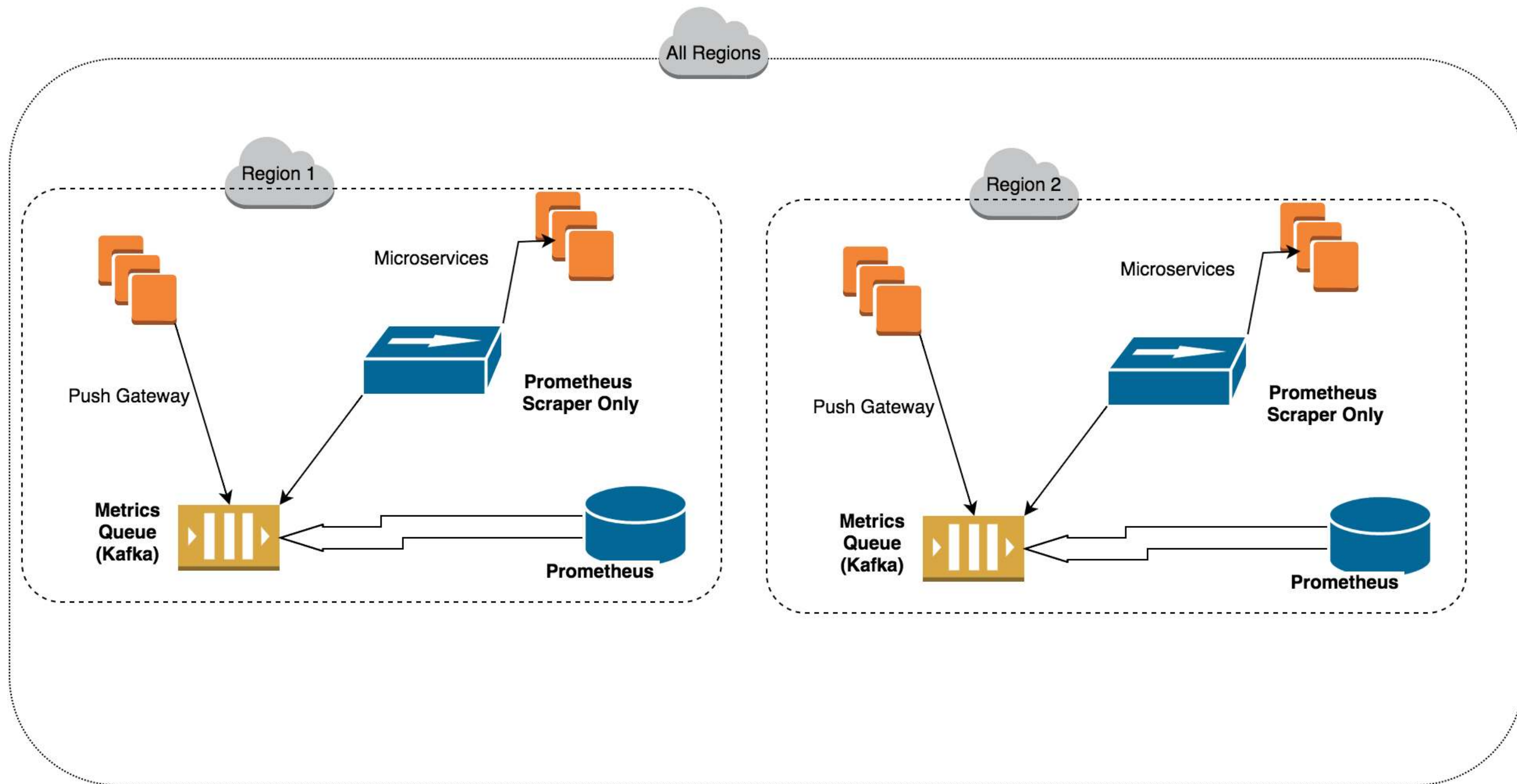
A fateful meeting at Soundcloud...

Architecture changes

- Split to microservices
- Containerization
- Message Queues

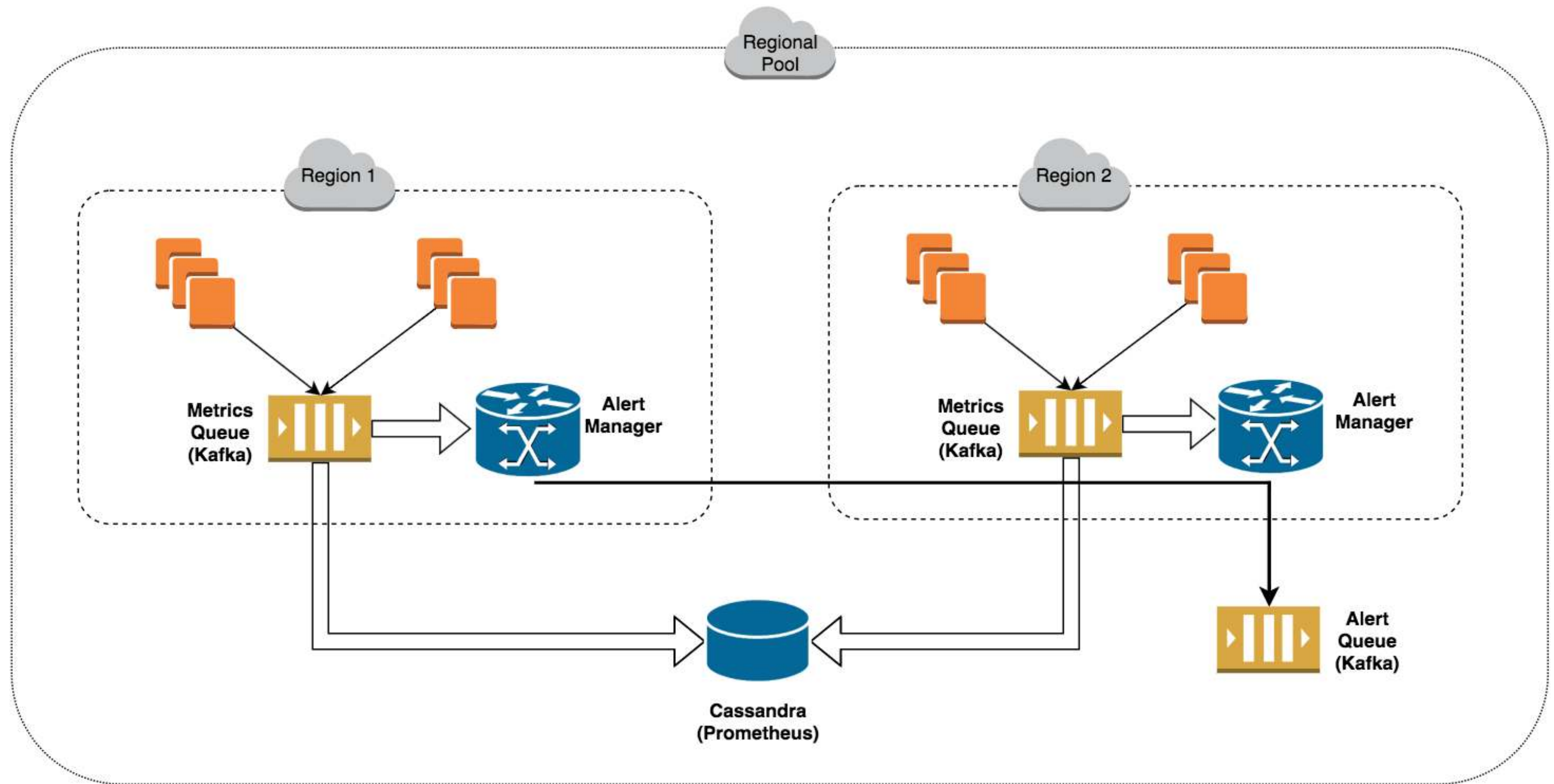
Pipelining data

FAIL



A low-angle, upward-looking shot of a multi-story brick building at night. The building's facade is made of dark brown bricks, and the windows are arranged in a grid-like pattern. Most of the windows are illuminated from within, casting a warm, yellowish-orange glow. The perspective creates a sense of height and scale. The text "Scaling storage" is overlaid in the center of the image in a white, stylized font.

Scaling storage



Metrics format

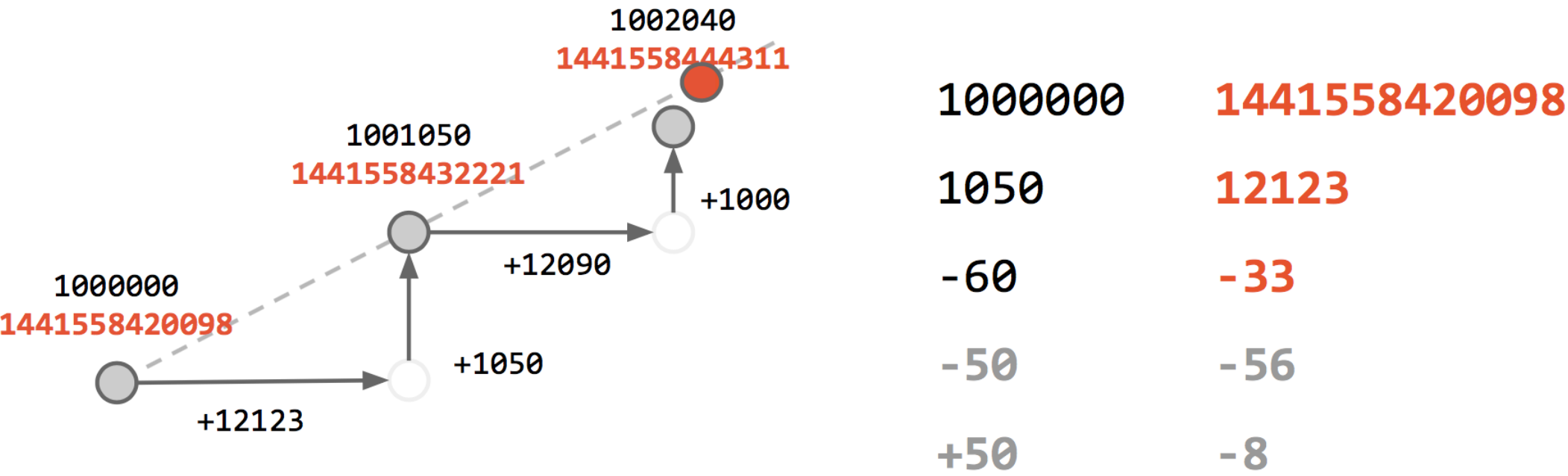
KEY			VALUE
Metric name	Dimensions aka Labels	Timestamp	Sample Value
...			
http_requests_total	{status="200",method="GET"}	@1434317560938	⇒ 94355
http_requests_total	{status="200",method="GET"}	@1434317561287	⇒ 94934
http_requests_total	{status="200",method="GET"}	@1434317562344	⇒ 96483
http_requests_total	{status="404",method="GET"}	@1434317560938	⇒ 38473
http_requests_total	{status="404",method="GET"}	@1434317561249	⇒ 38544
http_requests_total	{status="404",method="GET"}	@1434317562588	⇒ 38663
http_requests_total	{status="200",method="POST"}	@1434317560885	⇒ 4748
http_requests_total	{status="200",method="POST"}	@1434317561483	⇒ 4795
http_requests_total	{status="200",method="POST"}	@1434317562589	⇒ 4833
http_requests_total	{status="404",method="POST"}	@1434317560939	⇒ 122
...			

Timeseries Schema

- VI Timeseries Table
 - key (Combined Key)
 - timestamp (Combined Key)
 - datapoint (float64)

→ V2 Chunks (1 KB)

5 bytes header	base time	Δ time	ΔΔ time	ΔΔ time	ΔΔ time	... (one per timestamp)
	base value	Δ value	ΔΔ value	ΔΔ value	ΔΔ value	... (one per value)



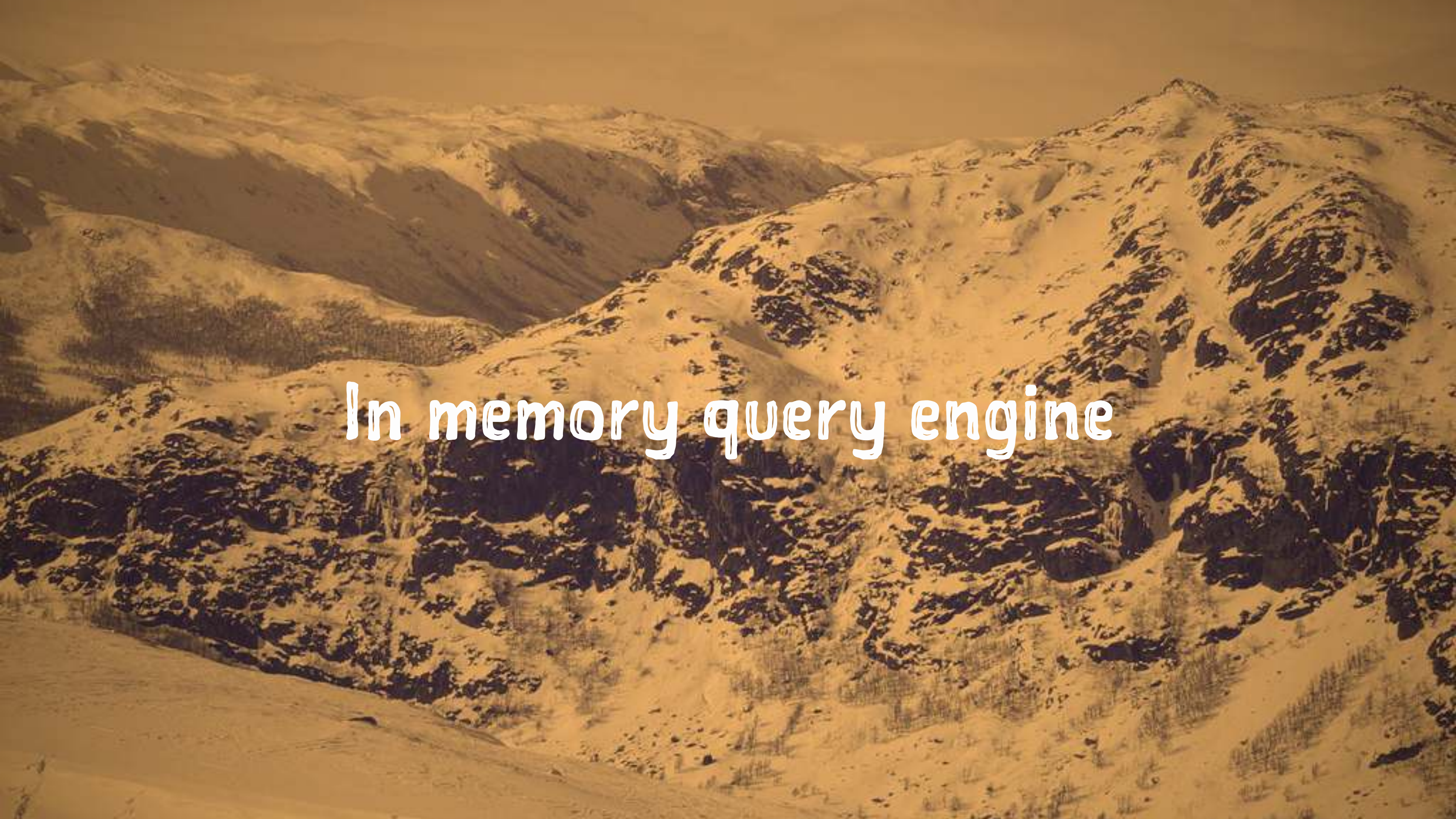
→ V2 Timeseries Table

→ key (Combined Key)

→ timestamp range (2hours) (Combined Key)

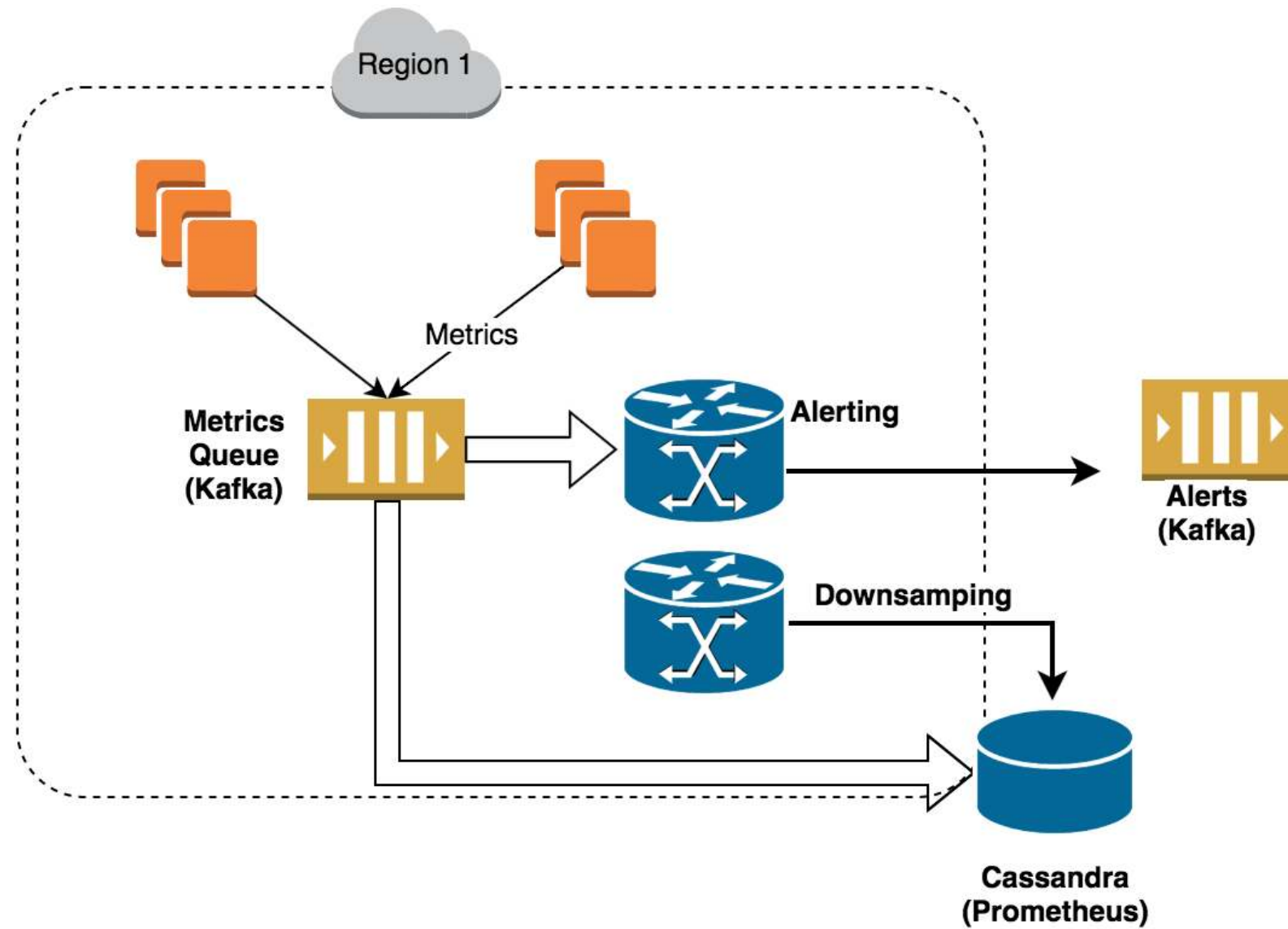
→ raw data (1kb blob)

- Index Table
 - Customer (Combined key)
 - keyPrefix (Combined key)
 - time
 - key

An aerial photograph of a vast, arid landscape. The terrain is characterized by rolling hills and valleys, with a warm, golden-brown color palette. The hills are covered in sparse, low-lying vegetation, and the valleys are filled with a mix of light and dark patches, suggesting different soil types or vegetation. The overall scene conveys a sense of isolation and natural beauty.

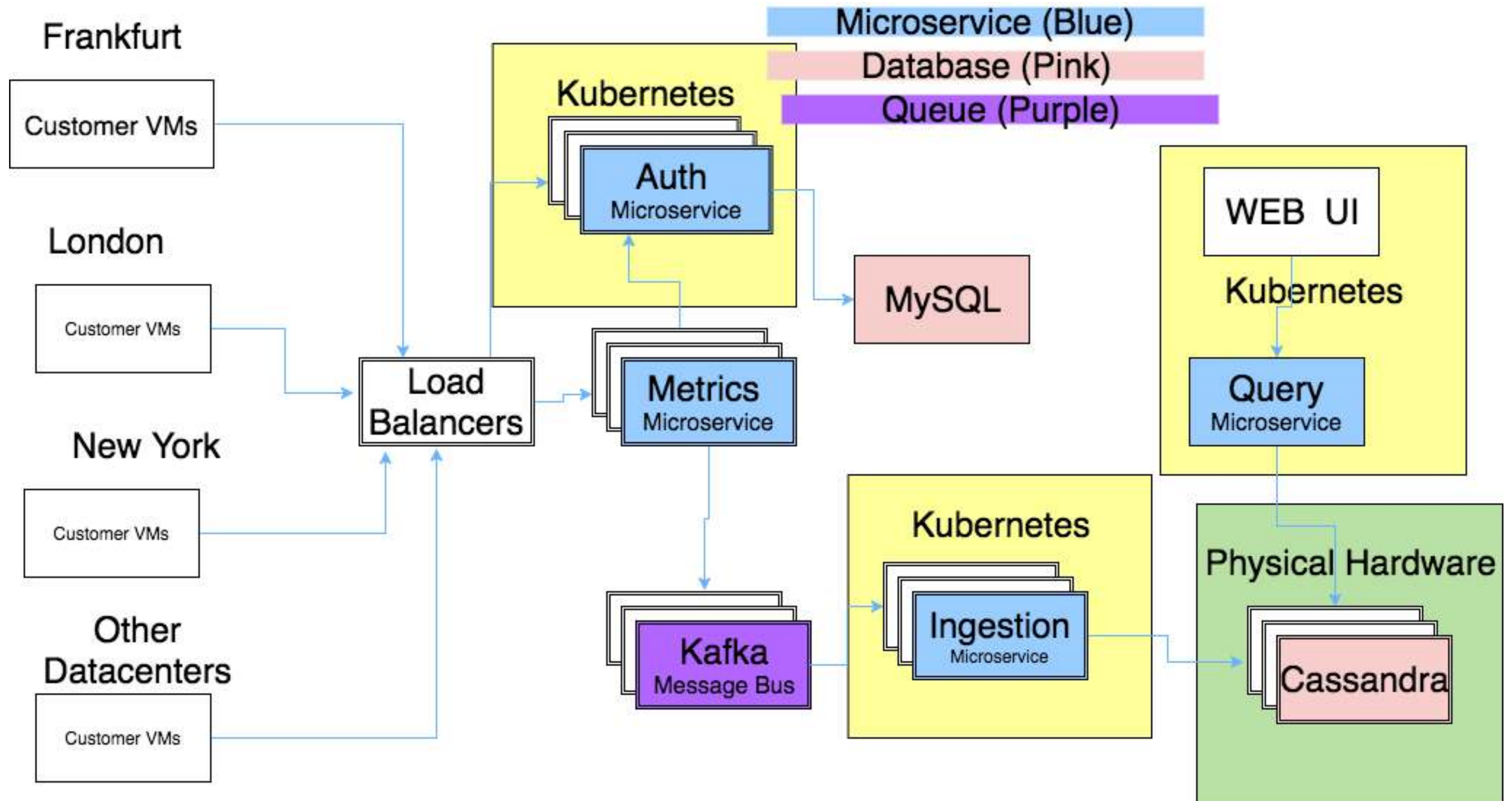
In memory query engine

Downsampling



Final Architecture





A sepia-toned photograph of a wooden boat named 'Noocun' beached on a sandy shore. The boat is angled towards the left, with its bow in the foreground. A large, dark, cylindrical object, possibly a rolled-up mat or a piece of equipment, is leaning against the bow. The boat has a canopy and a ladder. The name 'Noocun' is written in Thai script and English on the side. The background shows the ocean and distant mountains under a cloudy sky at sunset. The word 'Questions?' is overlaid in white text on the boat's hull.

Questions?