

Amsterdam | April 2 - 3, 2019



# Monitoring OVH: 300k servers, 28 DCs... and one Metrics platform

Horacio Gonzalez  
@LostInBrittany

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# Who are we?

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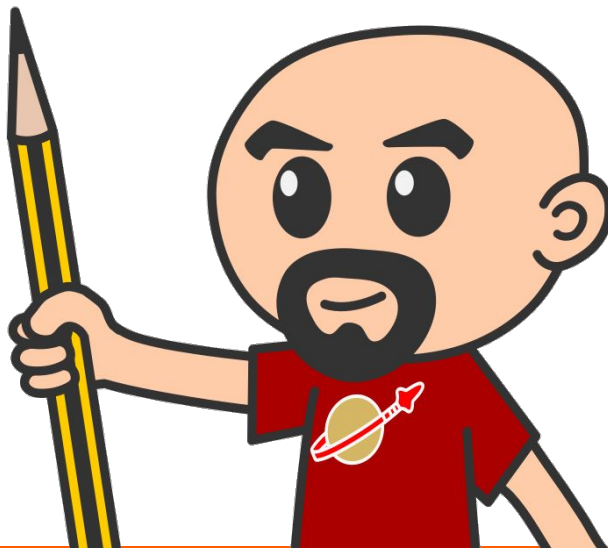
## Introducing myself and introducing OVH



# Horacio Gonzalez

@LostInBrittany

Spaniard lost in Brittany, developer,  
dreamer and all-around geek



# OVH : Key Figures

**1.3M** Customers worldwide in **138** Countries  
**1.5 Billions euros** investment over five years  
**28** Datacenters (growing)  
**350k** Dedicated Servers  
**200k** Private cloud VMs running  
**650k** Public cloud Instances created in a month  
**20TB** bandwidth capacity  
**35** Points of presence  
**4TB** Anti DDoS capacity  
Hosting capacity : **1.3M** Physical Servers

+ **2 500** Employees in **19** countries  
**18** Years of Innovation

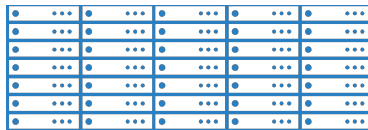


# OVH: A Global Leader on Cloud

200k Private cloud  
VMs running

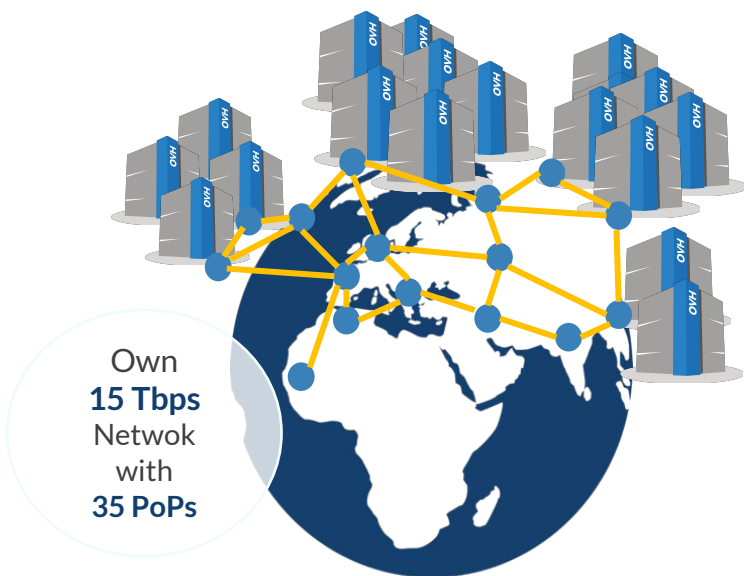


Dedicated IaaS  
Europe



Hosting capacity :  
**1.3M** Physical  
Servers

**360k**  
Servers already  
deployed



Own  
15 Tbps  
Network  
with  
35 PoPs

2018  
27 Datacenters



2020  
50 Datacenters

> **1.3M** Customers in **138** Countries



# Ranking & Recognition



**1<sup>st</sup> European** Cloud Provider\*

**1<sup>st</sup> Hosting** provider in Europe

**1<sup>st</sup> Provider** Microsoft Exchange

**Certified** vCloud Datacenter

**Certified** Kubernetes platform (CNCF)

Vmware **Global Service Provider** 2013-2016

**Veeam** Best Cloud Partner of the year (2018)



# OVH: Our solutions



## Cloud

VPS

Public Cloud

Private Cloud

Serveur dédié

Cloud Desktop

Hybrid Cloud



## Mobile Hosting

Containers

Compute

Database

Object Storage

Securities

Messaging



## Web Hosting

Domain names

Email

CDN

Web hosting

MS Office

MS solutions



## Telecom

VoIP

SMS/Fax

Virtual desktop

Cloud HubiC

Over theBox



# Because I love telling tales



# This talk is about a tale...



# A true one nevertheless



# And as in most tales



It begins with a mission



# And a band of heroes



Engulfed into the adventure



# They fight against mishaps



And all kind of foes



# They build mighty fortresses



Pushing the limits of possible



# And defend them day after day

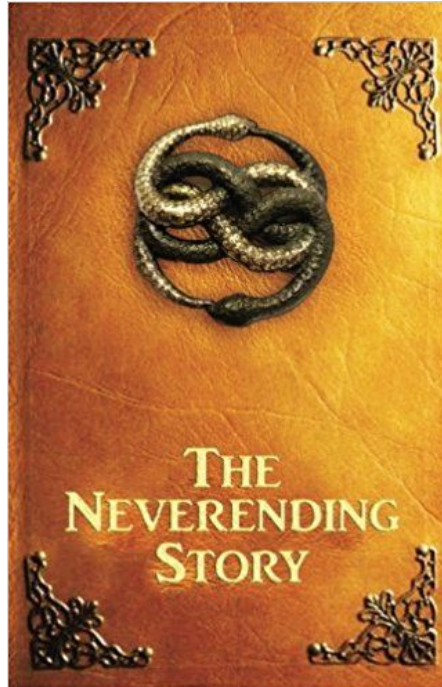


Against all odds



# But we don't know yet the end

---



Because this tale isn't finished yet



# It begins with a mission

---

**Build a metrics platform for OVH**



# Why do we need metrics?

---

To make better **decisions**  
by using **numbers**



# Why do we need metrics?

---

We want our **code** to add **value**



# Why do we need metrics?

---

We need to make better **decisions**  
about our **code**



# Why do we need metrics?

---

Code adds **value** when it **runs**  
*not* when we write it



# Why do we need metrics?

---

We need to know what our code  
**does** when it **runs**



# Why do we need metrics?

---

We can't do this  
unless we **measure** it



# Why do we need metrics?

---

We have a **mental model**  
of what our code **does**



# Why do we need metrics?

---

This **representation**  
can be **wrong**



# Why do we need metrics?

---

We can't **know** until  
we **measure** it



# Find the bottleneck



“The app is slow.” - User



# Find the bottleneck



“The app is slow.” - User

“The page takes 500ms!” - Ops



# Find the bottleneck



SQL Query?

Template Rendering?

Session Storage?



# Find the bottleneck



We don't know



# Find the bottleneck



With observability:

SQL Query.....53ms

Template Rendering.....1ms

Session Storage.....315ms



# Find the bottleneck



With observability:

SQL Query.....53ms

Template Rendering.....1ms

Session Storage.....315ms



# Why do we need metrics?

---

We improve our mental model by **measuring** what our code **does**



# Why do we need metrics?

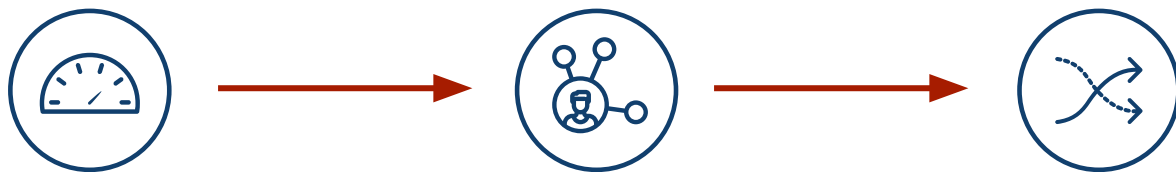
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We use our **mental model**  
to **decide** what to do



# Why do we need metrics?

A better **mental model** makes us better at **deciding** what to do



# Why do we need metrics?

Better **decisions** makes us  
better at generating **value**



# Why do we need metrics?

---

**Measuring** make your  
App **better**



# It began with a mission

---

Build a **metrics** platform for **OVH**





@LostInBrittany



# Building OVH Metrics

---

One Platform to unify them all,  
One Platform to find them,  
One Platform to bring them all  
and in the Metrics monitor them



# What is OVH Metrics?

---

Managed Cloud Platform  
for Time Series



# OVH monitoring story

We had lots of partial solutions...



OPENTSDDB



mongoDB®



graphite



influxdb



# OVH monitoring story

---

One Platform to unify them all

What should we build it on?



# OVH monitoring story

---

Including a really big



OPENTSDDB



# OpenTSDB drawbacks

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OpenTSDB RowKey Design

metrics timestamp tagk1 tagv1 tagk2 tagv2



# OpenTSDB Rowkey design flaws

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- `.*regex.*` => full table scans
- High cardinality issues (Query latencies)



We needed something able to manage **hundreds of millions** time series



OpenTSDB didn't **scale** for us



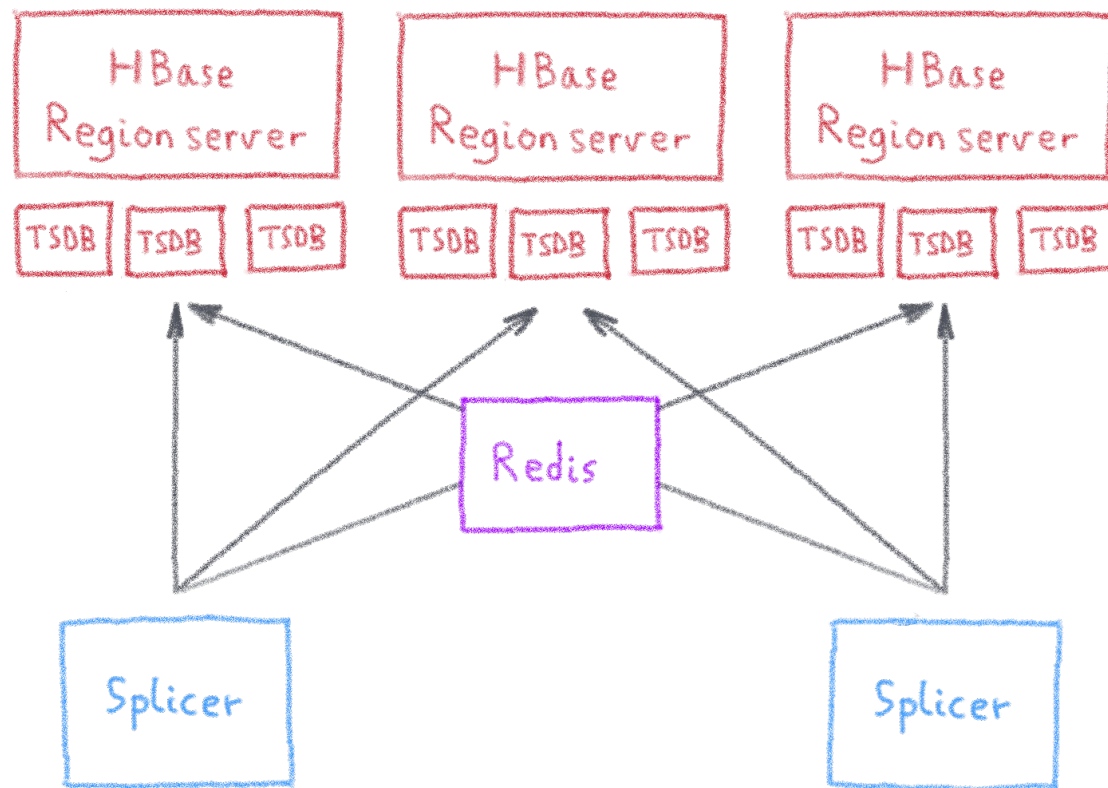
# OpenTSDB other flaws

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- Compaction (or append writes)
- /api/query : 1 endpoint per function?
- Asynchronous
- Unauthenticated
- ...



# Scaling OpenTSDB



# Metrics needs

---

First **need**:

To be **massively** scalable



# Analytics is the key to success



Fetching data is only the tip of the iceberg



# Analysing metrics data



To be scalable, analysis must be done in the database, not in user's computer



# Metrics needs

---

Second **need**:

To have **rich query** capabilities



# Enter Warp 10...

Open-source  
Time series  
Database



# More than a Time Series DB

Warp 10 is a software platform that

- Ingests and stores time series
- Manipulates and analyzes time series



# Manipulating Time Series with Warp 10

A true Time Series analysis toolbox

- Hundreds of functions
- Manipulation frameworks
- Analysis workflow

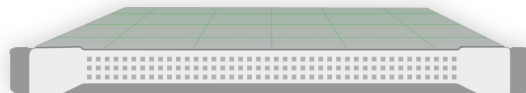
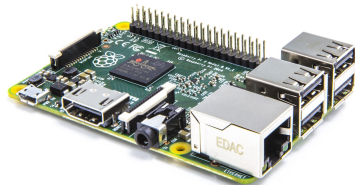


# Manipulating Time Series with Warp 10

A Time Series manipulation language



# Did you say scalability?



From the smallest to the largest...



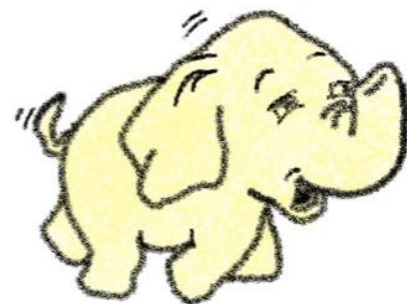
# More Warp 10 goodness

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- Secured & multi tenant
- In memory Index
- No cardinality issues
- Lockfree ingestion
- WarpScript Query Language
- Support more data types
- Synchronous (transactions)
- Better Performance
- Better Scalability
- Versatile  
(standalone, distributed)



# OVH Observability Metrics Platform



# Metrics Data Platform



# Building an ecosystem

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From Warp 10 to OVH Metrics



# Multi-protocol

Why to choose? We need them all!

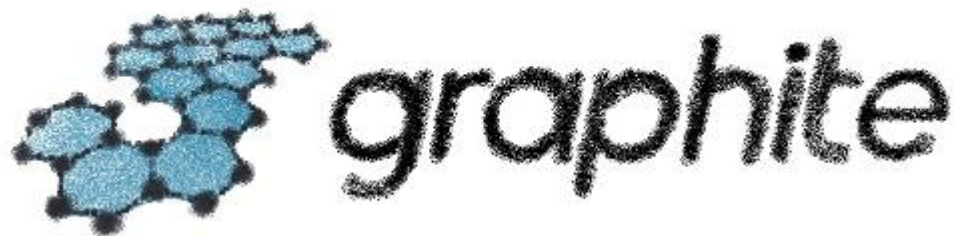


# Open source monitoring tools



# Open source monitoring tools

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# Open source monitoring tools

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OPENTSDDB



# Open source monitoring tools

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# Open source monitoring tools

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# Open source monitoring tools

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# Open source monitoring tools

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Why choose?  
Let's support all of them!



# Metrics Platform



# Metrics Platform

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**graphite**

**influx**

https://

**opentsdb**

.<region>.metrics.ovh.net

**prometheus**

**warp10**

...

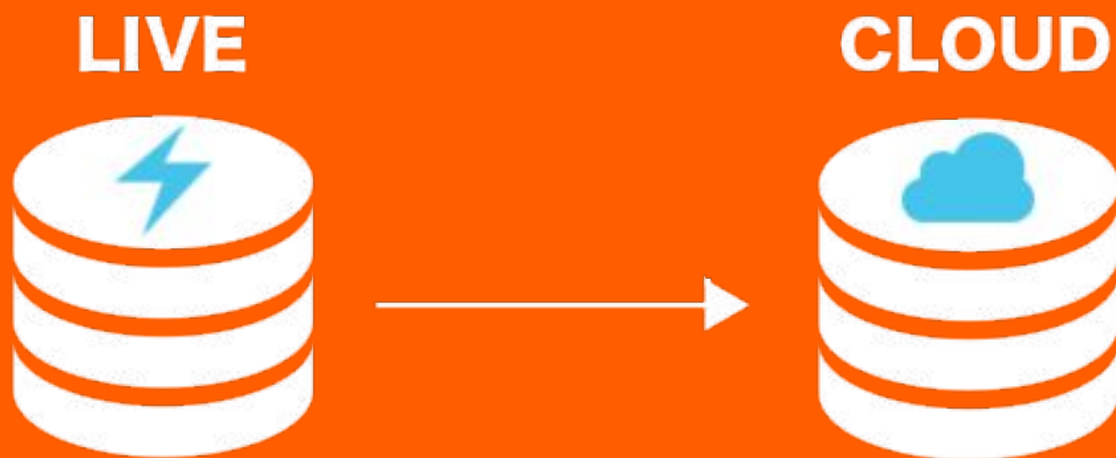


# Metrics Live

In-memory, high-performance Metrics instances



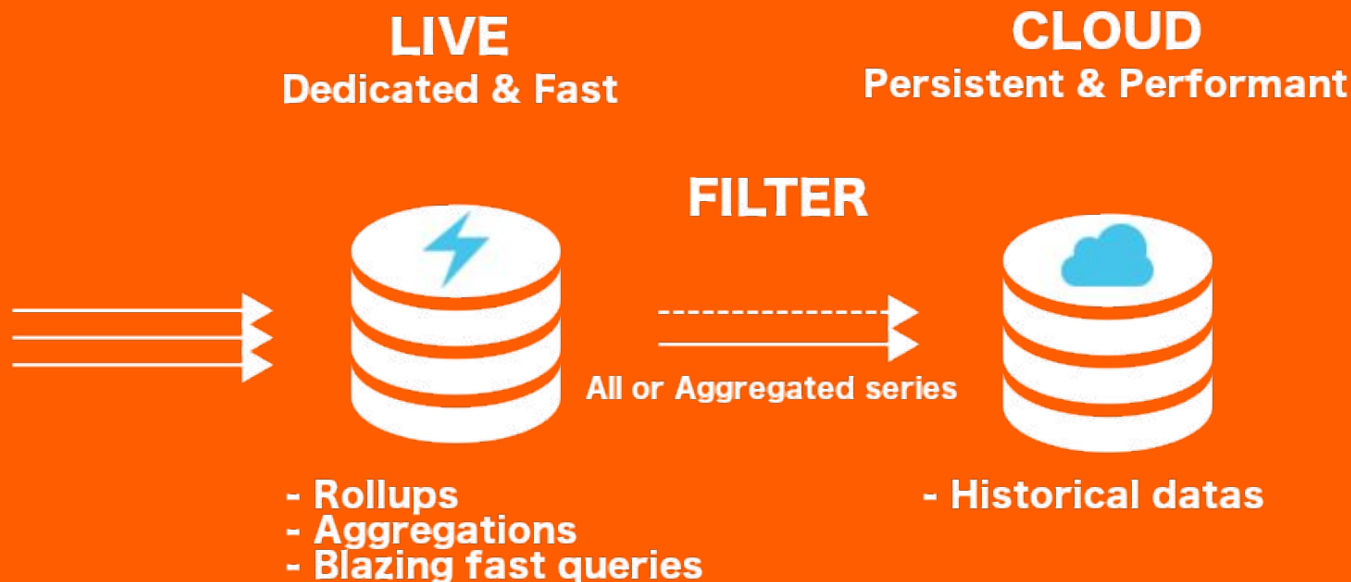
# In-memory: Metrics live



+120 million of writes/s



# In-memory: Metrics live



# In-memory: Metrics live

## STAGE 1

Short retention - hours  
Fine grained monitoring  
Raw data



## STAGE 2

Short retention - days  
Consolidated aggregations  
Global infra monitoring



## STAGE 3

Customer metrics  
Historical datas



# Monitoring is only the beginning

OVH Metrics answer to many other use cases



# Use cases families

- Billing .....(e.g. bill on monthly max consumption)
- Monitoring .....(APM, infrastructure, appliances,...)
- IoT .....(Manage devices, operator integration, ...)
- Geo Location .....(Manage localized fleets)



# Use cases

- DC Temperature/Elec/Cooling map
- Pay as you go billing (PCI/IPLB)
- GSCAN
- Monitoring
- ML Model scoring (Anti-Fraude)
- Pattern Detection for medical applications



# SREing Metrics

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**With a great power  
comes a great responsibility**



# Metrics' own metrics

432 000 000 000  
datapoints / day



# Metrics' own metrics

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10 Tb / day



# Metrics' own metrics

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5 000 000 dp/s



# Metrics' own metrics

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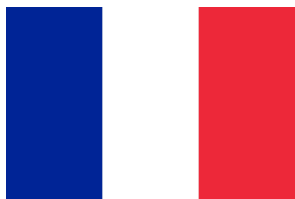
500 000 000 series



# Our clusters size

## GRA:

- 150 nodes
- 2 PB
- 1.1 Gbps

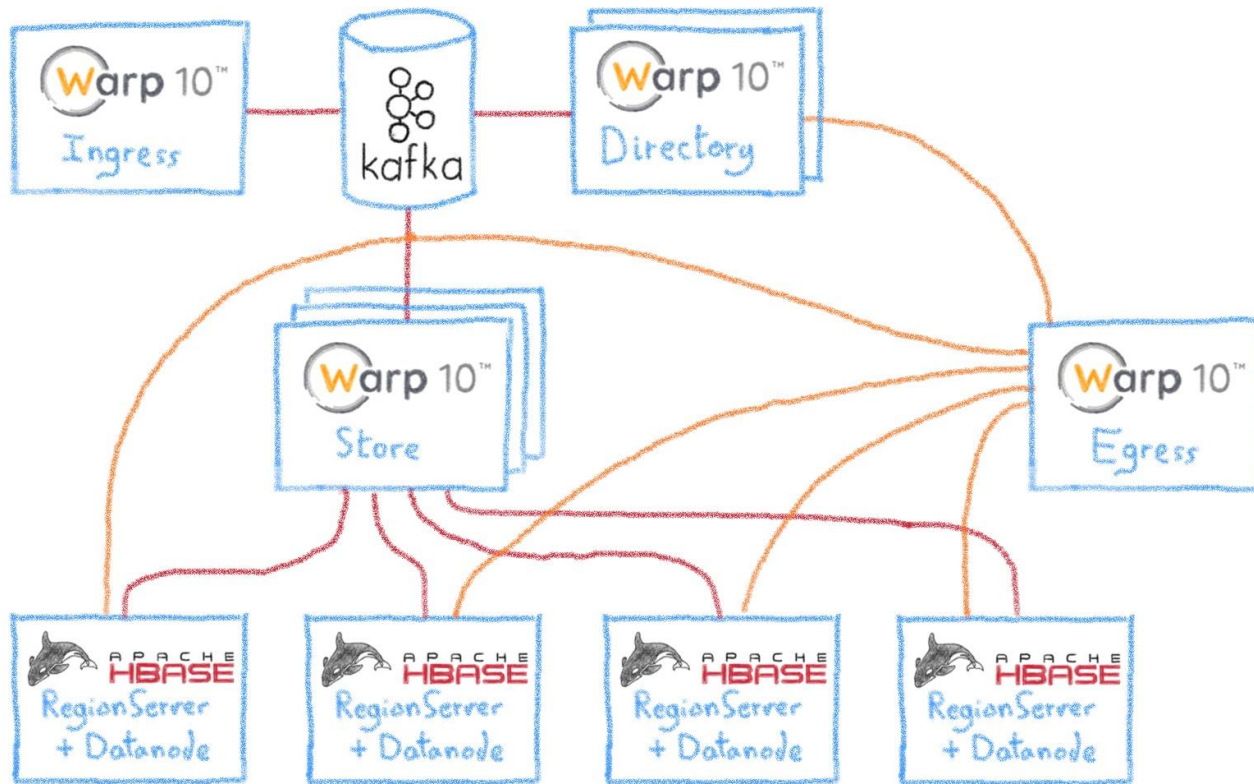


## BHS:

- 30 nodes
- 400 TB
- 120 Mbps



# Our cluster architecture



# Detecting errors

## Before it's too late



# Extract errors from logs

```
1. metrics@GW_B-GRA: ~/ansible/ansible-hadoop (ssh)
root@dn-1.hadoop.B.GRA:~# cat /var/log/hbase/hbase-hbase-regionserver-dn-1.hadoop.B.GRA.infra.metrics.ovh.net.log.1 | grep FATAL
2018-09-04 00:56:49,604 FATAL [regionserver/dn-1.hadoop.B.GRA.infra.metrics.ovh.net/10.0.0.1:16020.logRoller] regionserver.HRegionServer: ABORTING region server dn-1.hadoop.b.gra.infra.metrics.ovh.net,16020,1530281936345: Failed log close in log roller
2018-09-04 00:56:49,604 FATAL [regionserver/dn-1.hadoop.B.GRA.infra.metrics.ovh.net/10.0.0.1:16020.logRoller] regionserver.HRegionServer: RegionServer abort: loaded coprocessors are: [org.apache.hadoop.hbase.coprocessor.example.BulkDeleteEndpoint]
root@dn-1.hadoop.B.GRA:~# |
```



# Tailor

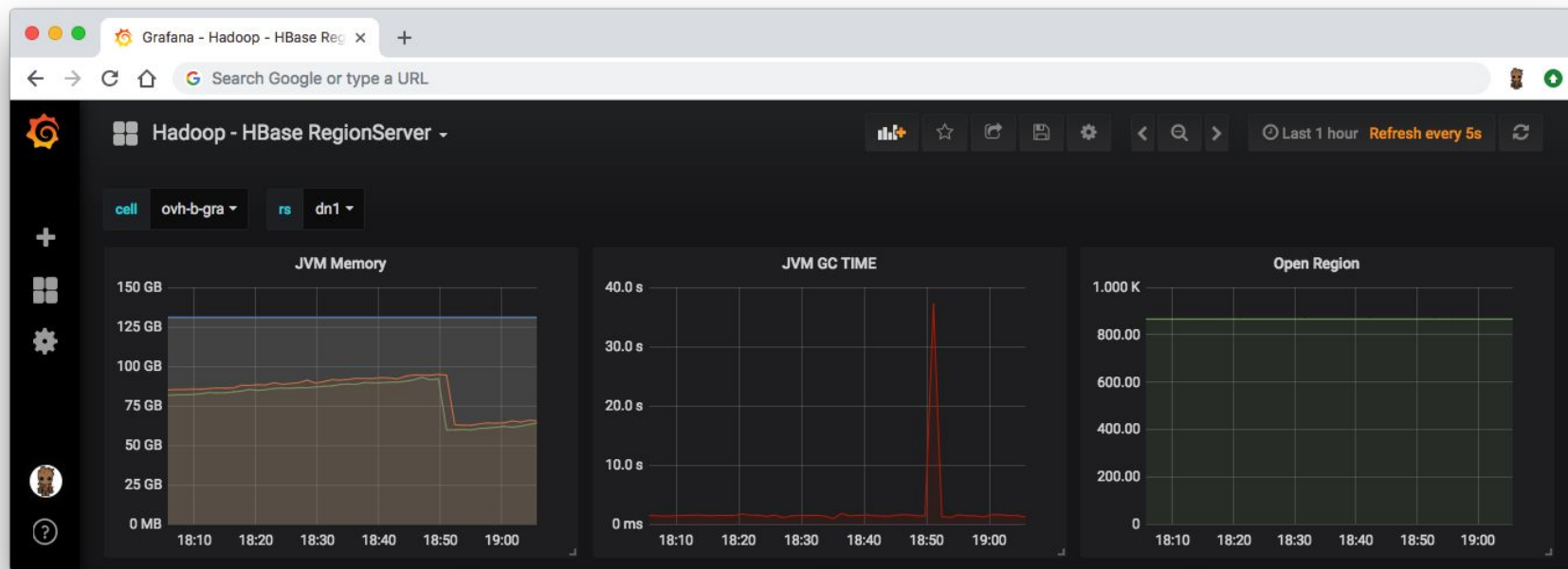
---



Forward logs and extract metrics!



# Monitoring the JVM



# Documentation

---

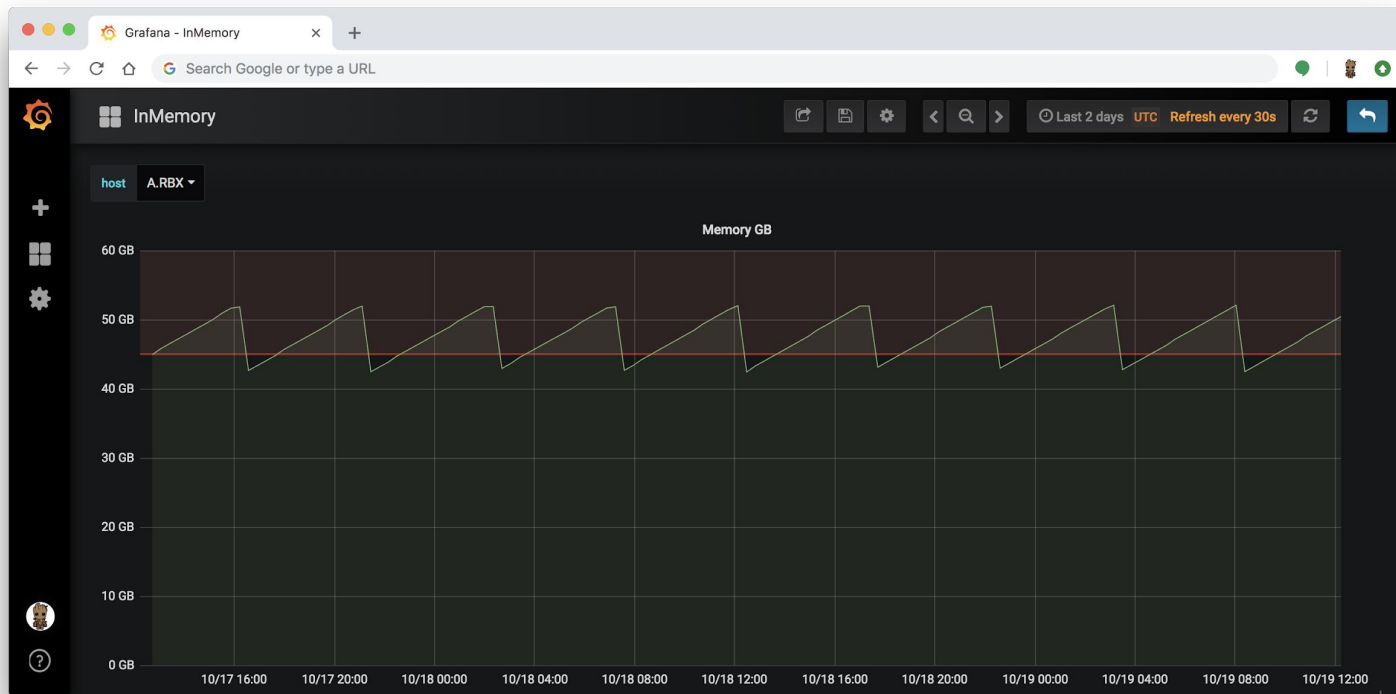


# JVM GC

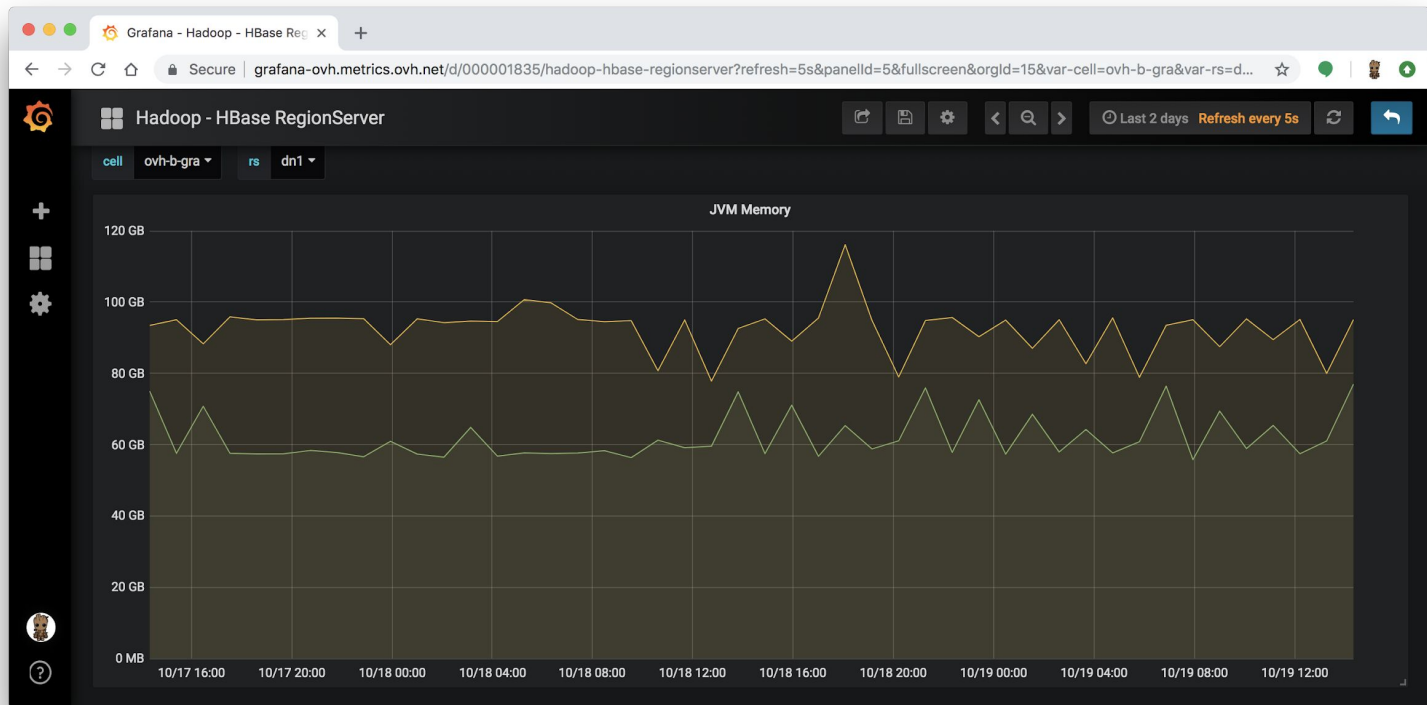
The good, the bad  
and the ugly



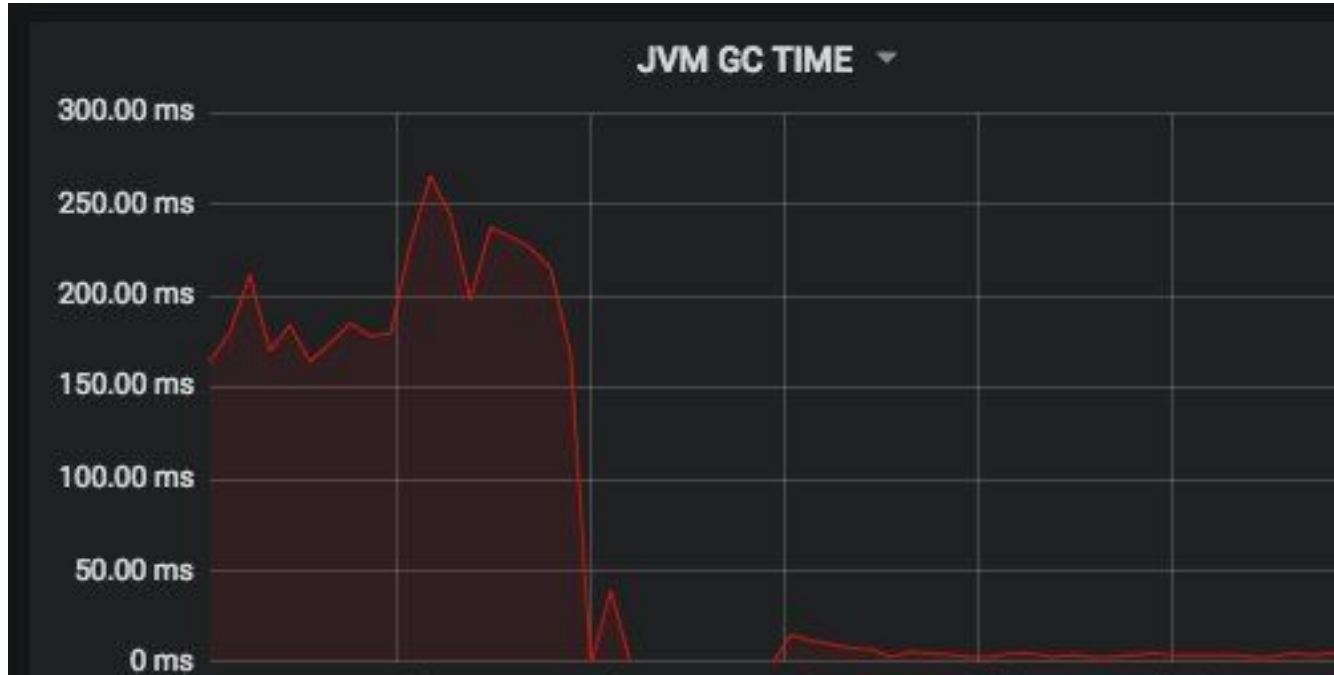
# The good



# The bad



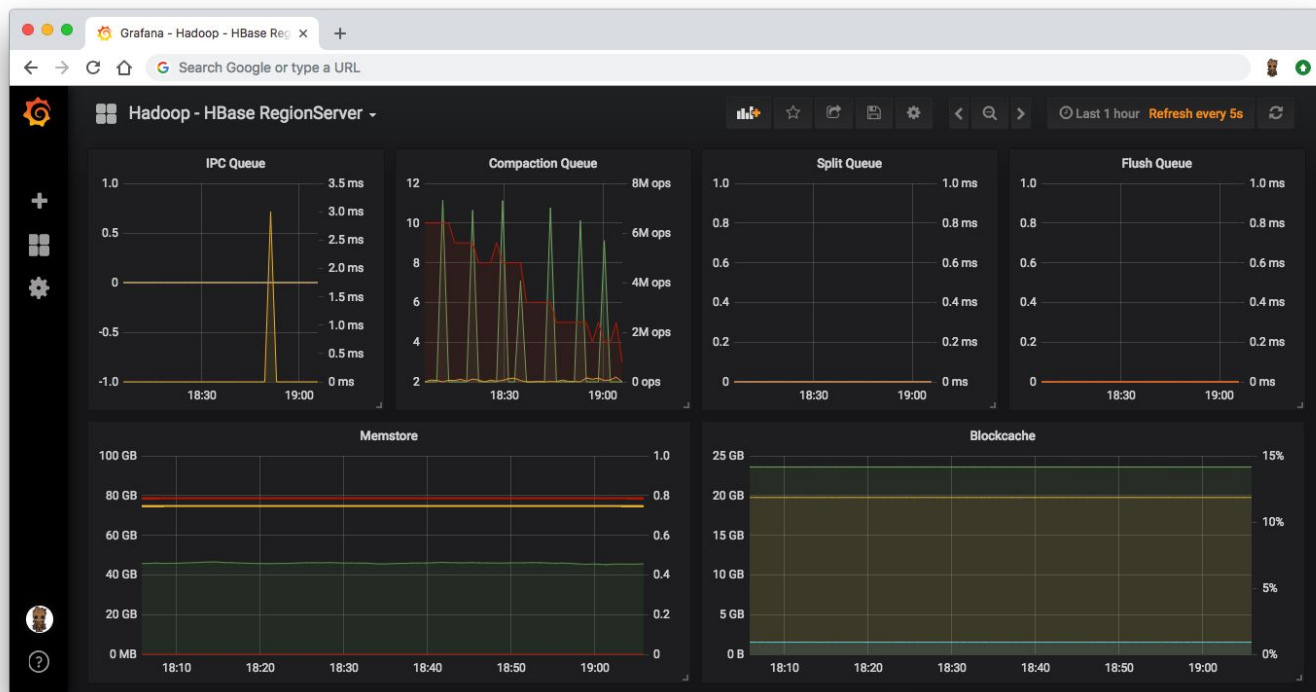
# ... and the ugly



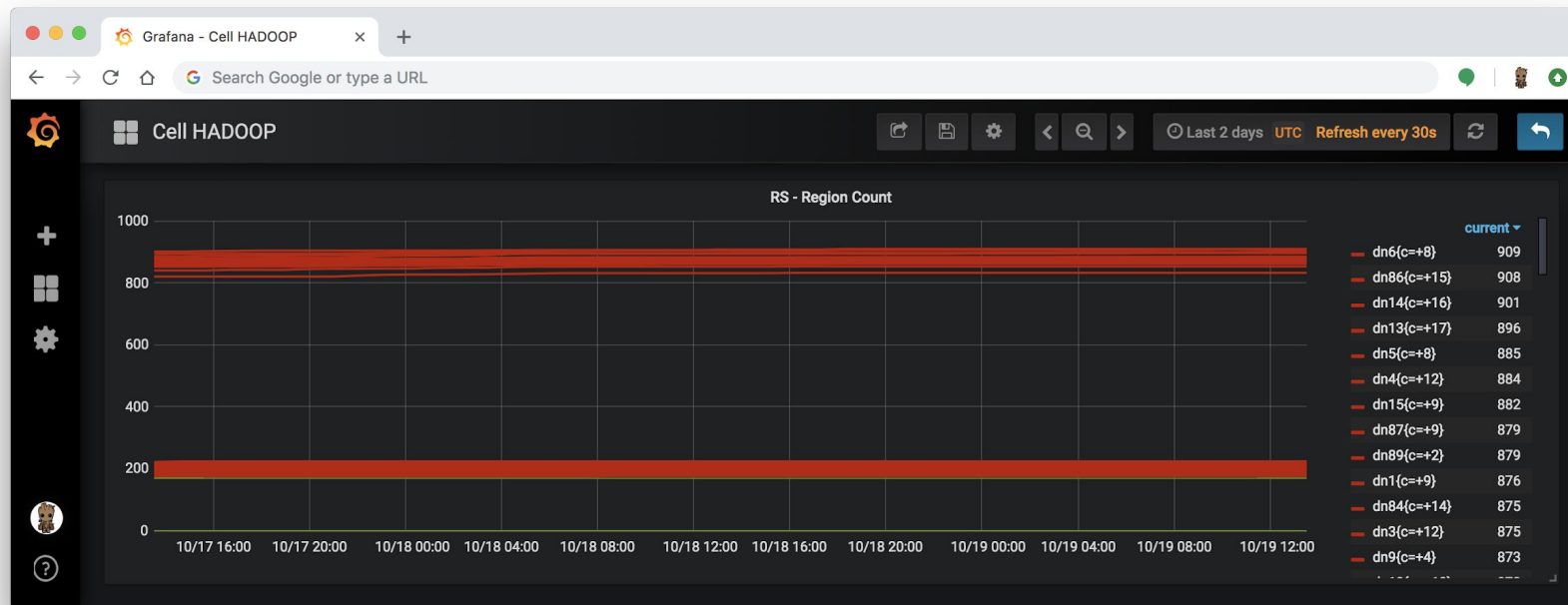
#java #jdk11 #zgc



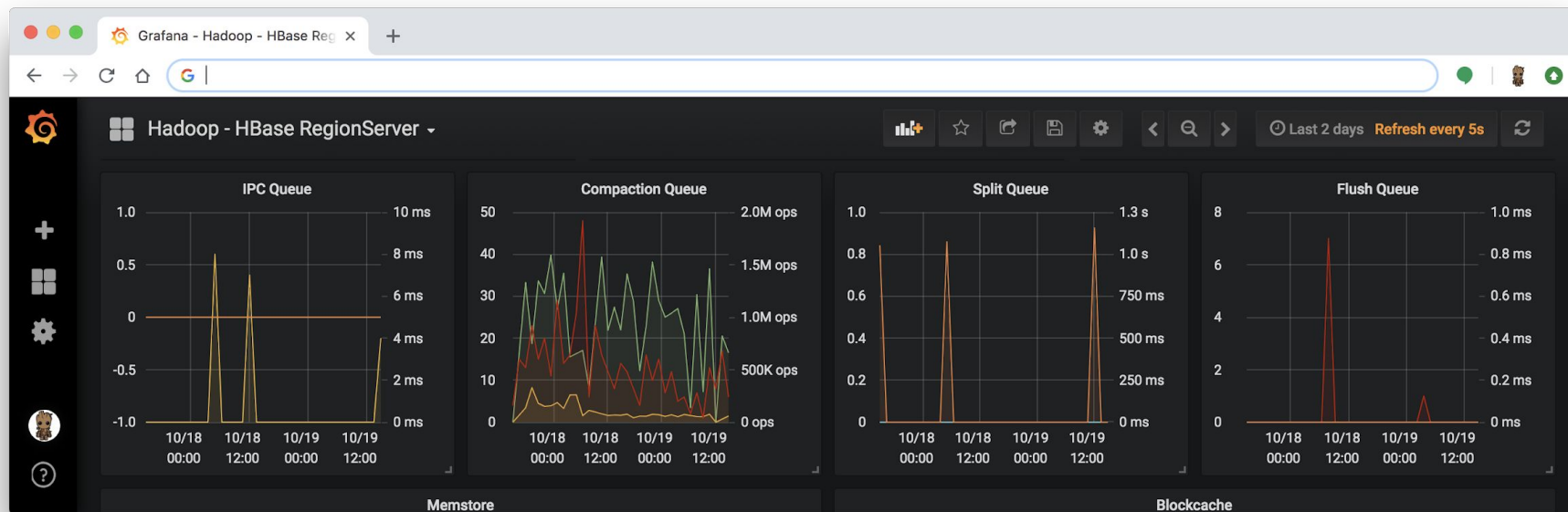
# Monitoring HBase



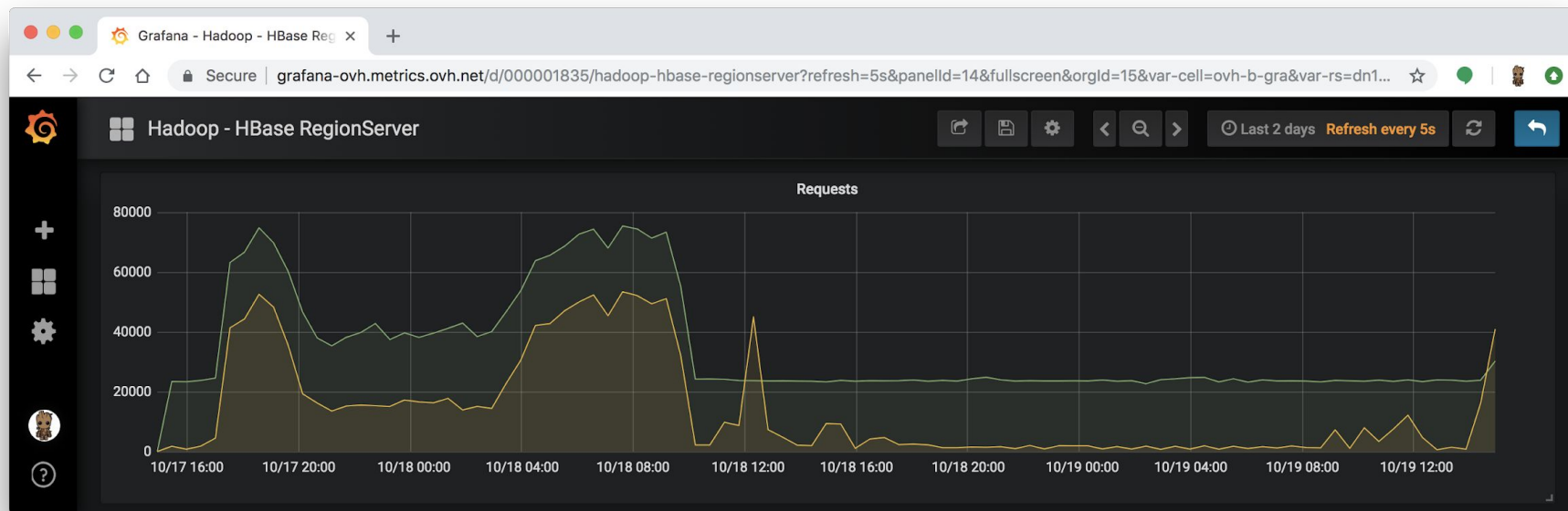
# Number of open regions



# Queues length



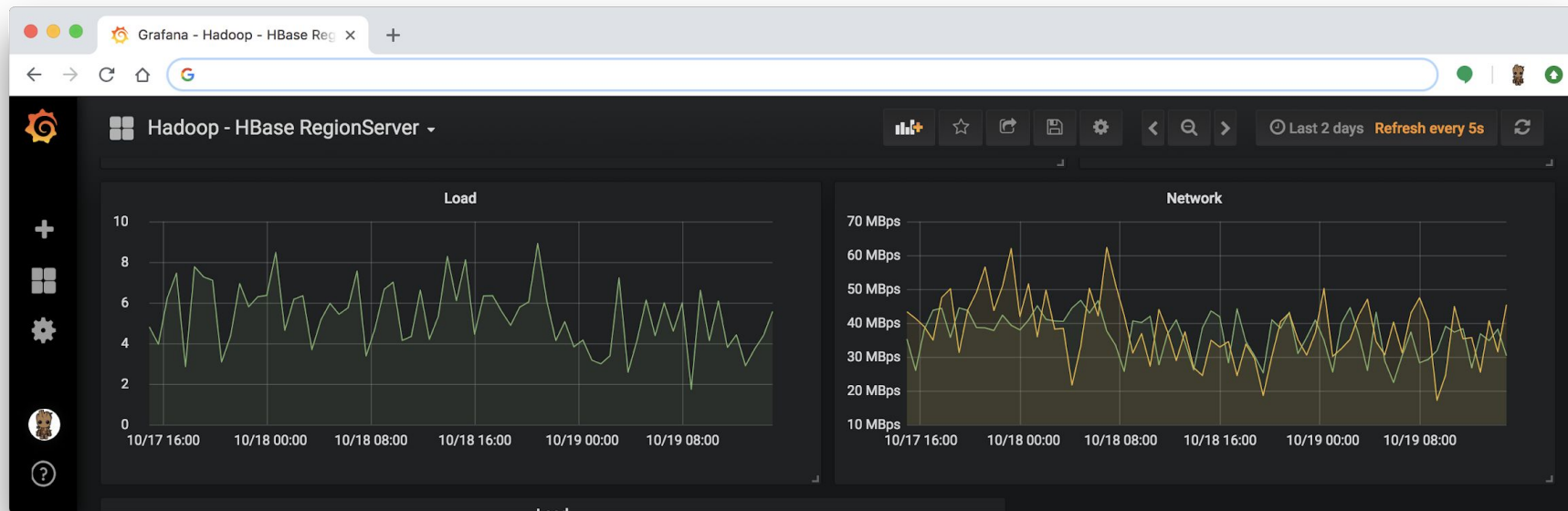
# Number of read and write requests



# Preserve data locality



# Host health

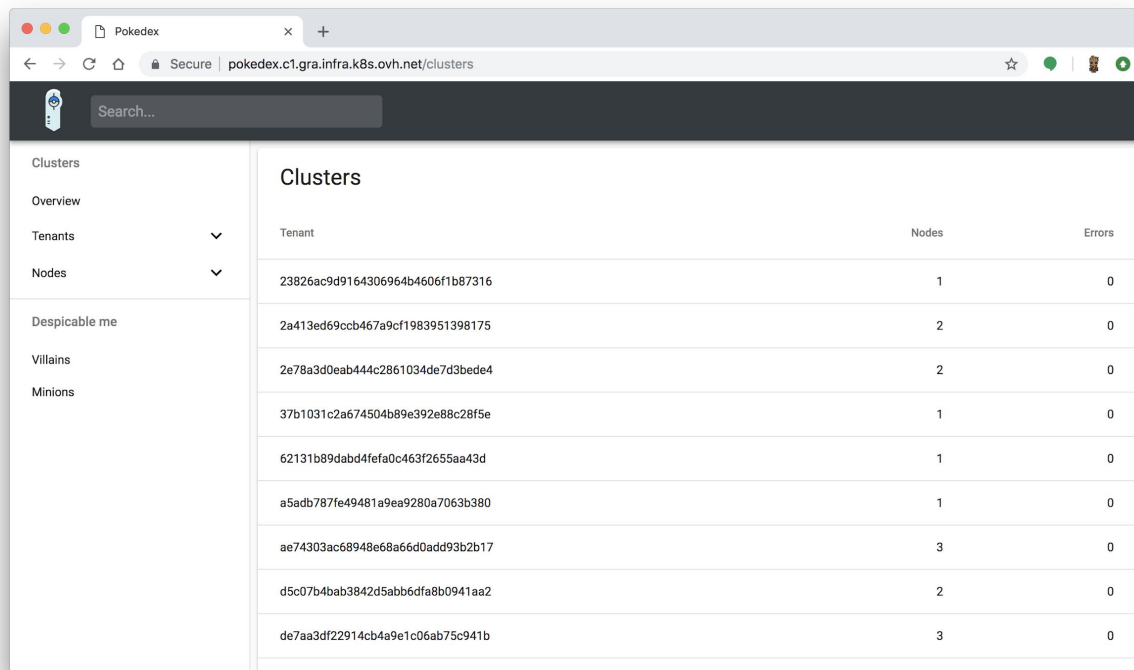


# Pokédex

## Inventory all animals.



# Merging all data sources

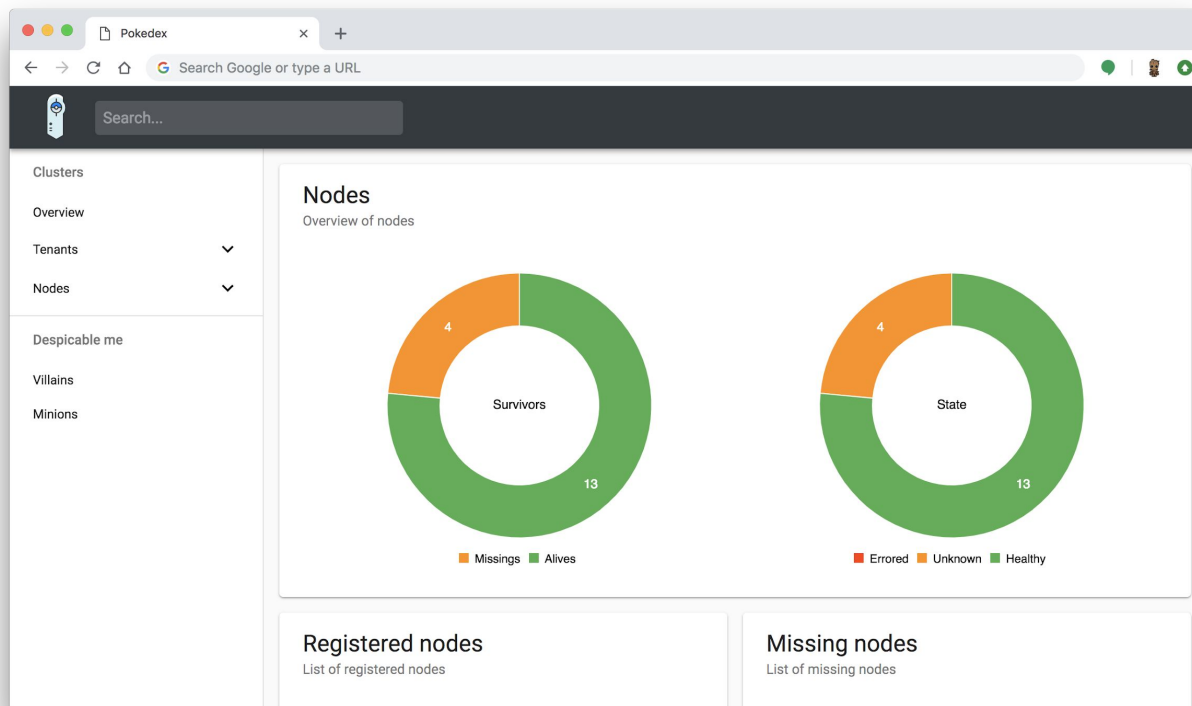


The screenshot shows a web browser window with the address bar displaying "Secure | pokedex.c1.gra.infra.k8s.ovh.net/clusters". The application has a dark header with a search bar. A sidebar on the left contains navigation links: Clusters, Overview, Tenants, Nodes, Despicable me, Villains, and Minions. The main content area is titled "Clusters" and displays a table with three columns: Tenant, Nodes, and Errors. The table lists ten clusters with their respective IDs, node counts, and error counts.

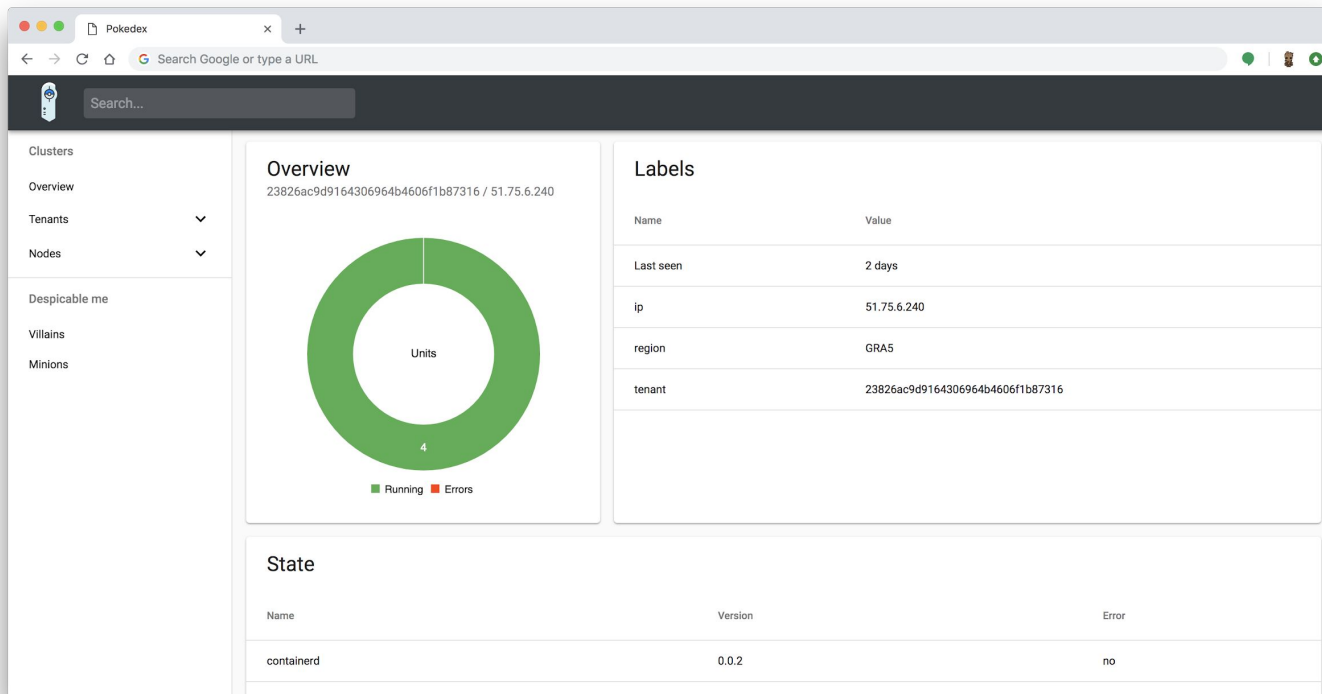
Tenant	Nodes	Errors
23826ac9d9164306964b4606f1b87316	1	0
2a413ed69ccb467a9cf1983951398175	2	0
2e78a3d0eab444c2861034de7d3bede4	2	0
37b1031c2a674504b89e392e88c28f5e	1	0
62131b89dabd4fe40c463f2655aa43d	1	0
a5adb787fe49481a9ea9280a7063b380	1	0
ae74303ac68948e68a66d0add93b2b17	3	0
d5c07b4bab3842d5abb6dfa8b0941aa2	2	0
de7aa3df22914cb4a9e1c06ab75c941b	3	0



# Global visualization



# Correlate information



# Sacha

The best tamer



# An awesome CLI

```
1. metrics@GW_B-GRA: ~/ansible/ansible-hadoop (ssh)
root@nn-1.hadoop.B.GRA:/opt/hbase# ./sacha --help
Sacha - Hadoop management tool

Usage:
  sacha [flags]
  sacha [command]

Available Commands:
  hbase      HBase sub commands
  help       Help about any command

Flags:
  --config string    config file to use
  -h, --help         help for sacha
  -v, --log-level int  Log level (from 1 to 5) (default 4)

Use "sacha [command] --help" for more information about a command.
root@nn-1.hadoop.B.GRA:/opt/hbase# |
```



# Retrieving bare informations

```
1. hbase@nn-1: /opt/hbase (ssh)
hbase@nn-1: /opt/hbase$ ./sacha hbase servers
INFO[0005] dn-85 | dn-85.hadoop.B.GRA.infra.metrics.ovh.net,16020,1536630297124
INFO[0005] dn-117 | dn-117.hadoop.b.gra.infra.metrics.ovh.net,16020,1533841829550
INFO[0005] dn-100 | dn-100.hadoop.B.GRA.infra.metrics.ovh.net,16020,1536630307303
INFO[0005] dn-9 | dn-9.hadoop.b.gra.infra.metrics.ovh.net,16020,1526331102574
INFO[0005] dn-70 | dn-70.hadoop.b.gra.infra.metrics.ovh.net,16020,1532638465829
INFO[0005] dn-115 | dn-115.hadoop.b.gra.infra.metrics.ovh.net,16020,1533841825648
INFO[0005] dn-78 | dn-78.hadoop.b.gra.infra.metrics.ovh.net,16020,1530891364037
INFO[0005] dn-10 | dn-10.hadoop.B.GRA.infra.metrics.ovh.net,16020,1536630281903
INFO[0005] dn-119 | dn-119.hadoop.b.gra.infra.metrics.ovh.net,16020,1535986042437
INFO[0005] dn-91 | dn-91.hadoop.b.gra.infra.metrics.ovh.net,16020,1527788063219
INFO[0005] dn-61 | dn-61.hadoop.b.gra.infra.metrics.ovh.net,16020,1533642514028
INFO[0005] dn-16 | dn-16.hadoop.B.GRA.infra.metrics.ovh.net,16020,1537799642390
INFO[0005] dn-83 | dn-83.hadoop.b.gra.infra.metrics.ovh.net,16020,1532707632810
INFO[0005] dn-96 | dn-96.hadoop.b.gra.infra.metrics.ovh.net,16020,1528715633446
INFO[0005] dn-64 | dn-64.hadoop.b.gra.infra.metrics.ovh.net,16020,1533644687916
INFO[0005] dn-93 | dn-93.hadoop.B.GRA.infra.metrics.ovh.net,16020,1537277470529
INFO[0005] dn-113 | dn-113.hadoop.b.gra.infra.metrics.ovh.net,16020,1533834504553
INFO[0005] dn-28 | dn-28.hadoop.b.gra.infra.metrics.ovh.net,16020,1521767880632
INFO[0005] dn-43 | dn-43.hadoop.B.GRA.infra.metrics.ovh.net,16020,1536747014896
INFO[0005] dn-48 | dn-48.hadoop.b.gra.infra.metrics.ovh.net,16020,1526494308594
INFO[0005] dn-12 | dn-12.hadoop.B.GRA.infra.metrics.ovh.net,16020,1539066910343
INFO[0005] dn-95 | dn-95.hadoop.b.gra.infra.metrics.ovh.net,16020,1530315838140
```



# Create region map

```
1. hbase@nn-1: /opt/hbase (ssh)
hbase@nn-1:/opt/hbase$ ./sacha hbase regions
INFO[0021] dn-10 | cdde4aebd3e9c150624089fb447708e6 | | M\x09\x9E\x9BbD\x09!\* \xC6\x03\x08 | 485
1 | 857968394 | 1.000000
INFO[0021] dn-2 | b46388051bcf3c216711d8e509c3f824 | M\x09\x9E\x9BbD\x09!\* \xC6\x03\x08 | M\x1FG\
xAD!\xA8j\xD7\x9B\x16\x92\xA4 | 4395 | 523983078 | 1.000000
INFO[0021] dn-2 | f3529226e9f21322467a67c00a1e1101 | M\x1FG\xAD!\xA8j\xD7\x9B\x16\x92\xA4 | M\x1
FG\xAD!\xA8j\xD7\x9B\xC1|\x08 | 4140 | 50978108 | 1.000000
INFO[0021] dn-128 | 77d08e6ea1a3302d9c83ed6bd8e8cd1f | M\x1FG\xAD!\xA8j\xD7\x9B\xC1|\x08 | M0e\
xA87=\x9D\xB4\x15\x09\x98\xB9 | 7757 | 975843446 | 1.000000
INFO[0021] dn-10 | 5cf97e64c30c53ff7395344ecd8a00fa | M0e\xA87=\x9D\xB4\x15\x09\x98\xB9 | M1\x1E
\x85\xD0\xF6\xDB@ =B | 4723 | 914385324 | 1.000000
INFO[0021] dn-3 | 2eade822f20dee70fbd728deba94ca7b | M1\x1E\x85\xD0\xF6\xDB@ =B | M1\x1E\x85\xD0
\xF6\xDB@ \xE6\x02N | 3231 | 47080095 | 1.000000
INFO[0021] dn-10 | 0bc668153aab5b827db02285c520481e | M1\x1E\x85\xD0\xF6\xDB@ \xE6\x02N | M;\x9A
\x05\x0F\x0AJ\x15\x0Ek$? | 5014 | 381914734 | 1.000000
INFO[0021] dn-10 | dc37a88543daa6a80300b971743e08e0 | M;\x9A\x05\x0F\x0AJ\x15\x0Ek$? | MAw\xF8\x
DD\xFC\xE0\x9E)\xA\xD8 | 4119 | 300357457 | 1.000000
INFO[0021] dn-2 | 7ba1b7697aefa6282aa462f8f5188dc5 | MAw\xF8\xDD\xFC\xE0\x9E)\xA\xD8 | MQm\xFD | 8
960 | 322459571 | 1.000000
INFO[0021] dn-2 | 4456926a9478ea8aed08921767dba5d7 | MQm\xFD | Mx\xED\xC3\xBC\xA0\xD3-1\xCD\x84\
x11 | 7291 | 741383347 | 1.000000
```



# Move region to another region server

```
1. hbase@nn-1: /opt/hbase (ssh)
hbase@nn-1:/opt/hbase$ ./sacha hbase --regions regions.json move dn-103 dn-103
```

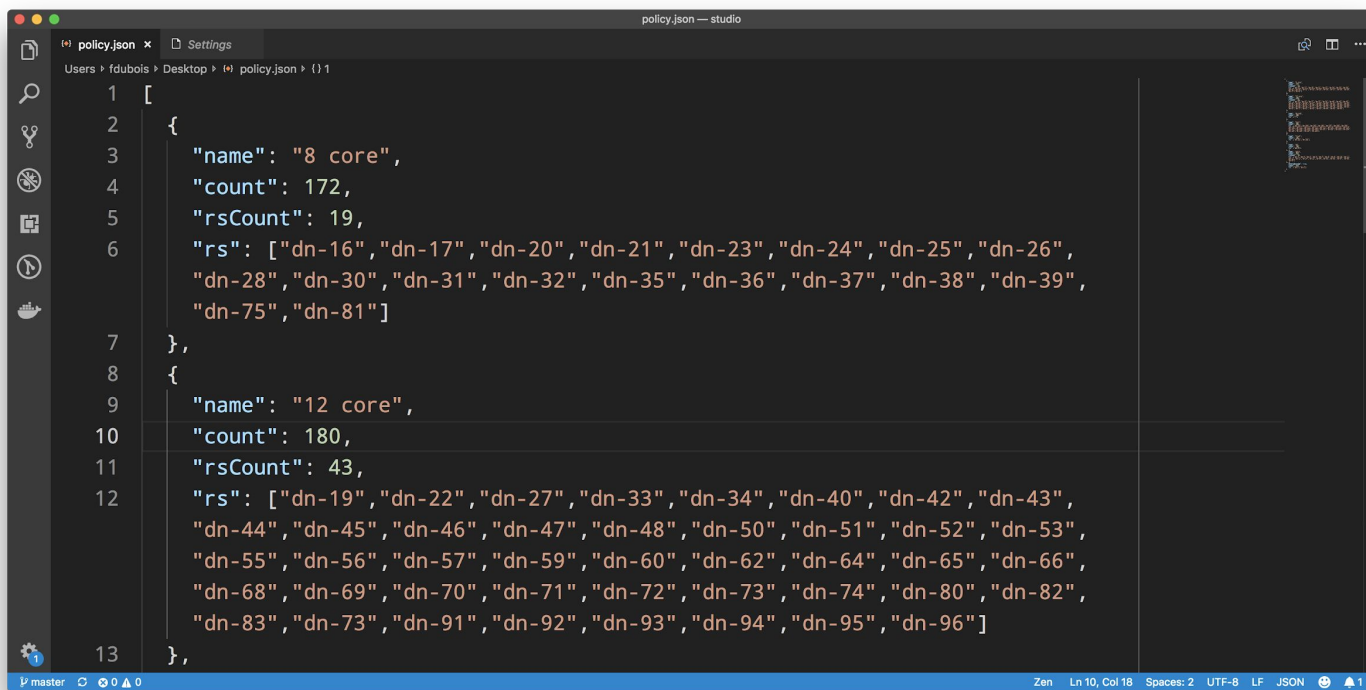


# Drain regions of the region server

```
1. hbase@nn-1: /opt/hbase (ssh)
hbase@nn-1:/opt/hbase$ ./sacha hbase drain --regions regions.json dn-88
```



# Managing multiple hardware profiles



```
1  [
2    {
3      "name": "8 core",
4      "count": 172,
5      "rsCount": 19,
6      "rs": ["dn-16", "dn-17", "dn-20", "dn-21", "dn-23", "dn-24", "dn-25", "dn-26",
7            "dn-28", "dn-30", "dn-31", "dn-32", "dn-35", "dn-36", "dn-37", "dn-38", "dn-39",
8            "dn-75", "dn-81"]
9    },
10   {
11     "name": "12 core",
12     "count": 180,
13     "rsCount": 43,
14     "rs": ["dn-19", "dn-22", "dn-27", "dn-33", "dn-34", "dn-40", "dn-42", "dn-43",
15           "dn-44", "dn-45", "dn-46", "dn-47", "dn-48", "dn-50", "dn-51", "dn-52", "dn-53",
16           "dn-55", "dn-56", "dn-57", "dn-59", "dn-60", "dn-62", "dn-64", "dn-65", "dn-66",
17           "dn-68", "dn-69", "dn-70", "dn-71", "dn-72", "dn-73", "dn-74", "dn-80", "dn-82",
18           "dn-83", "dn-73", "dn-91", "dn-92", "dn-93", "dn-94", "dn-95", "dn-96"]
19   },
20 ]
```



# Balance the cluster

```
1. hbase@nn-1: /opt/hbase (ssh)
hbase@nn-1:/opt/hbase$ ./sacha hbase b|balance --policy policy.json --regions regions.json
```



# Conclusion

That's all folks!

