



Operating Elasticsearch in Kubernetes

microxchg ²⁰¹⁹

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WHO ARE WE?



WE BRING FASHION TO PEOPLE IN 17 COUNTRIES

17 markets

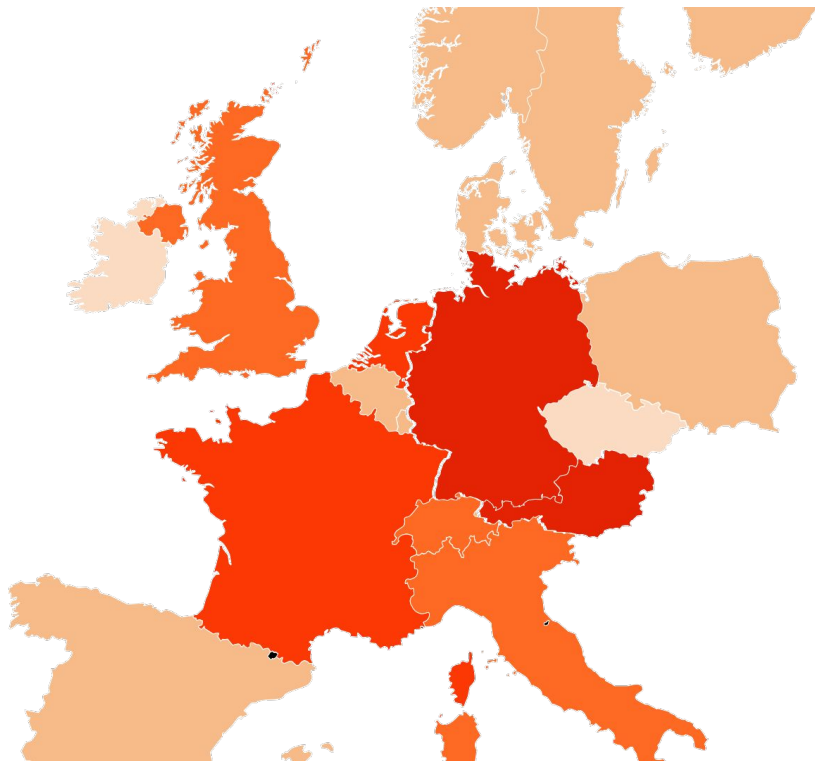
7 fulfillment centers

26 million active customers

5.4 billion € revenue 2018

250 million visits per month

15,000 employees in Europe



ZALANDO AT A GLANCE

~ 5.4 billion EUR
revenue 2018

> 250
million

visits
per
month

> 300.000
product choices

> 15.000
employees in
Europe

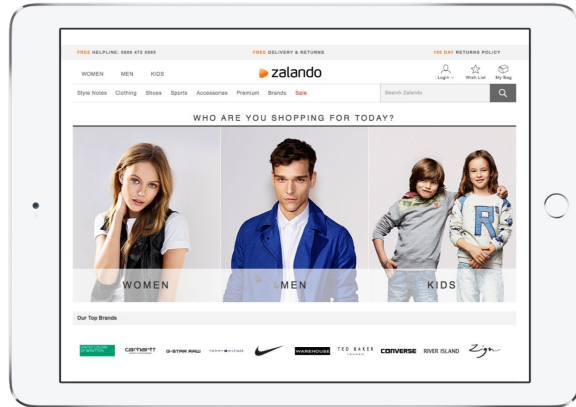
> 79%
of visits via
mobile devices

> 26
million
active customers

~ 2.000
brands

17
countries

ZALANDO TECH



~ 2.000
Employees in Tech

~ 300
Delivery teams

SEARCH @ ZALANDO

300k+
Products
per country

45%
Mobile Traffic

~2000
Brands

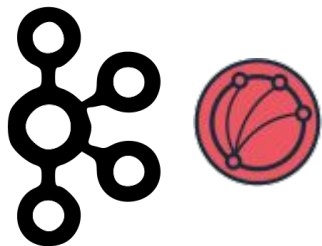
12K
QPS

~700
Categories

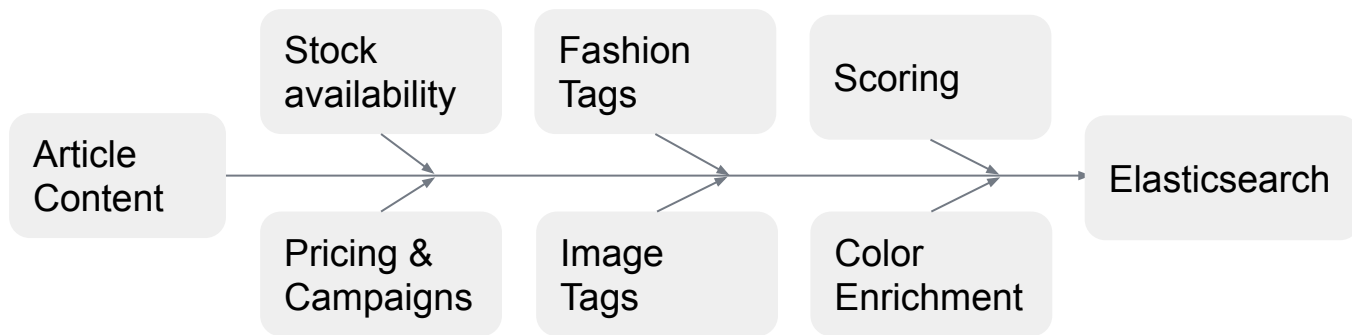
8K
Updates/s



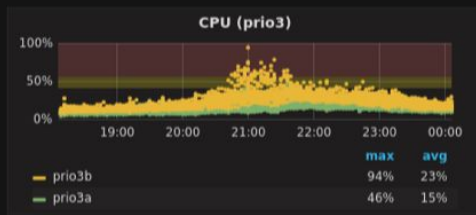
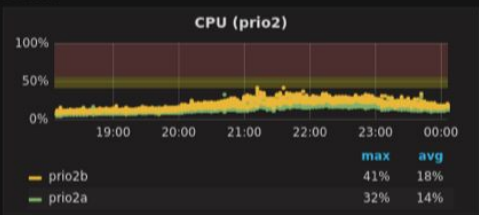
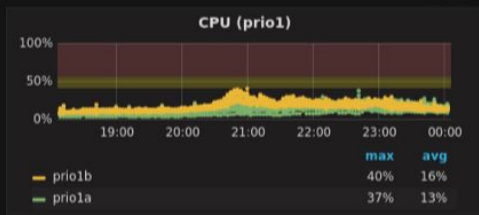
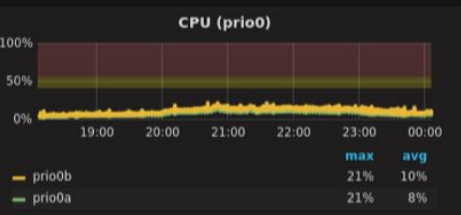
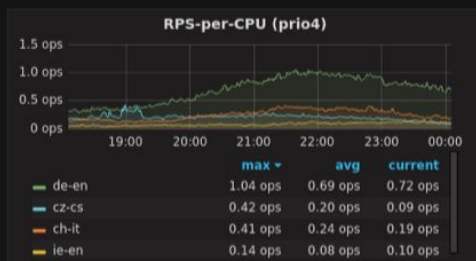
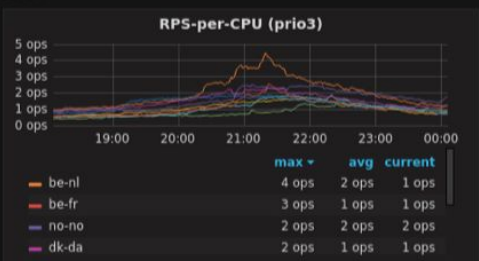
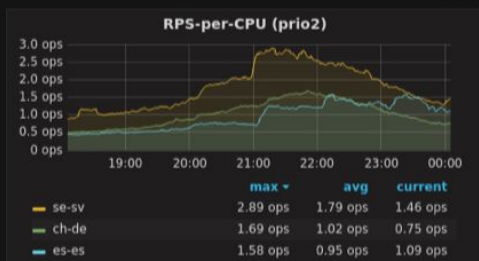
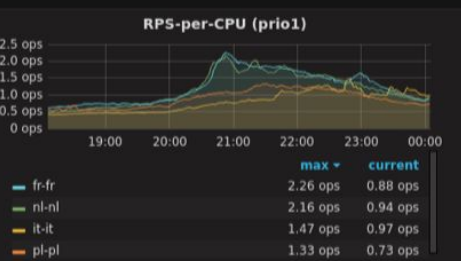
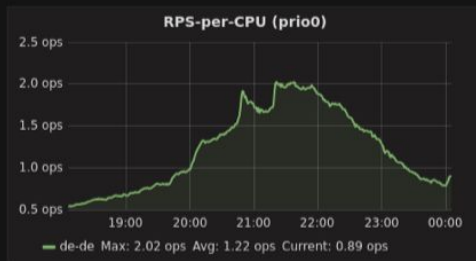
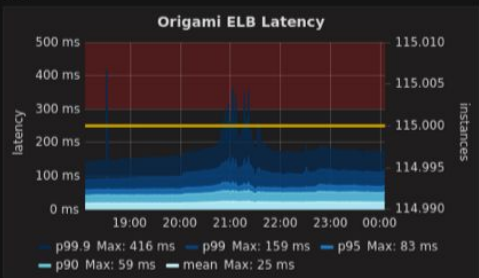
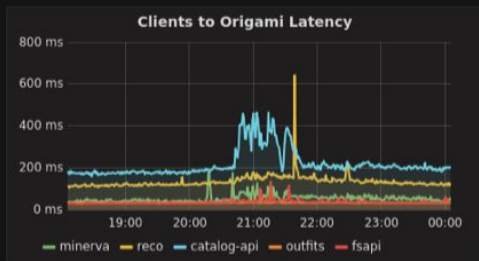
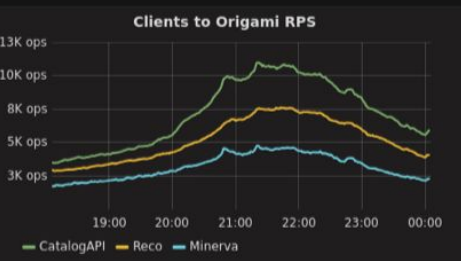
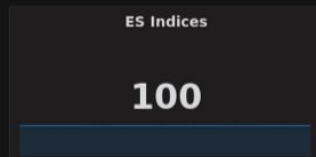
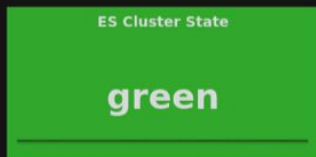
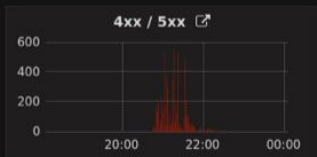
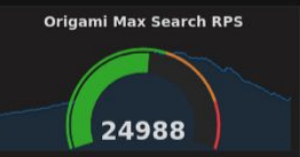
DATA INGESTION



Kafka / Nakadi *



* nakadi.io

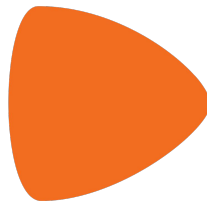


KUBERNETES @ ZALANDO

112
clusters

1.3k
nodes

Since
2016



zalando

Default
Deployment
Target

Node
Autoscaling

From **v1.4**
to **v1.12**

KUBERNETES CLUSTER SETUP



Master



Master



Config



etcd



Worker



docker



CoreOS



EC2
Instances

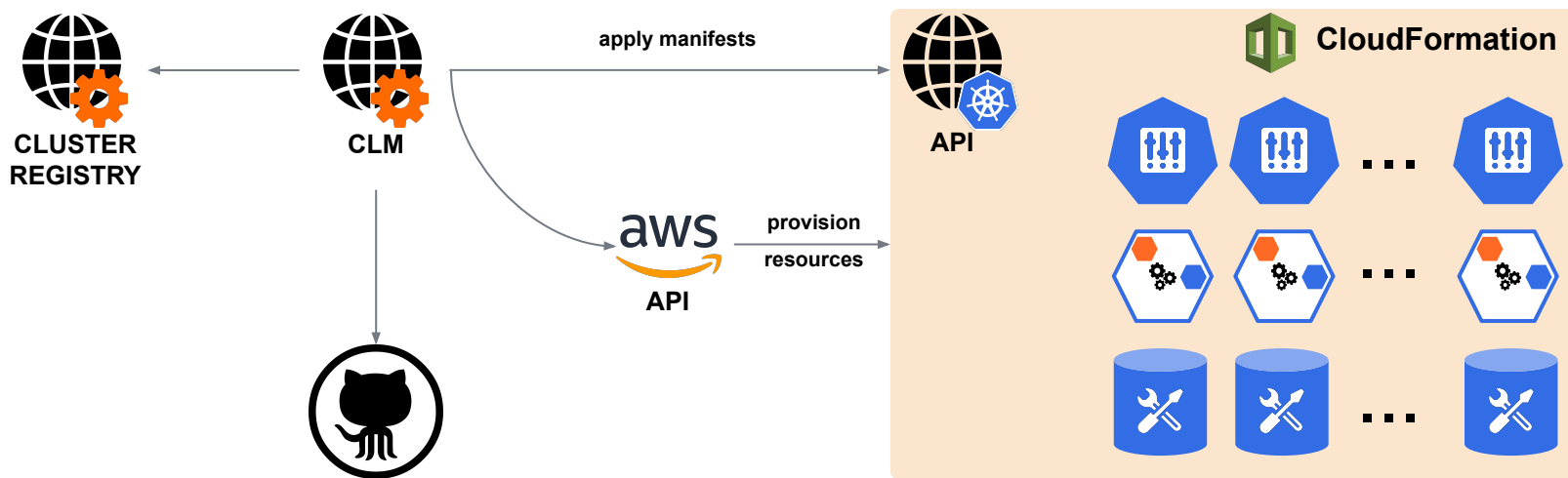


CloudFormation
Stacks

github.com/zalando-incubator/kubernetes-on-aws

CLUSTER PROVISIONING

CLUSTER LIFECYCLE MANAGER (CLM)



github.com/zalando-incubator/cluster-lifecycle-manager

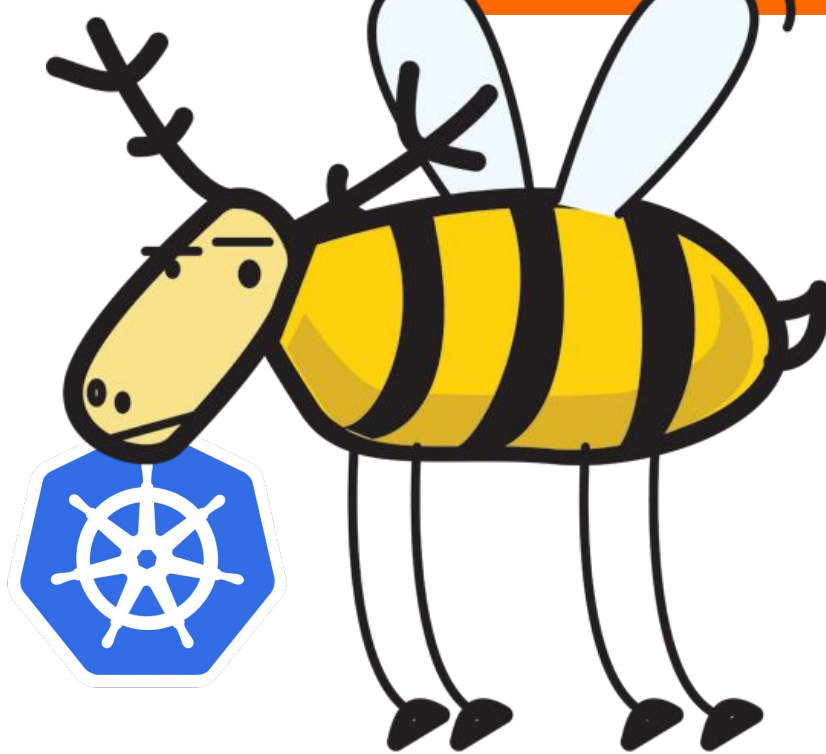
github.com/zalando-incubator/kubernetes-on-aws

CLUSTER UPDATE POLICY (SLA)

SLA	Production clusters	Test clusters
Minimum lifetime of a Pod before it's force terminated during updates	3 days	8 hours
Minimum amount of time after a node is selected for termination before the infrastructure starts force terminating Pods	6 hours	2 hours
Interval between force terminations of Pods on the same node	5 minutes	5 minutes
Minimum lifetime of ready Pods in the same PDB as the one considered for force termination	1 hour	1 hour
Minimum lifetime of non-ready Pods in the same PDB as the one considered for force termination	6 hours	1 hour

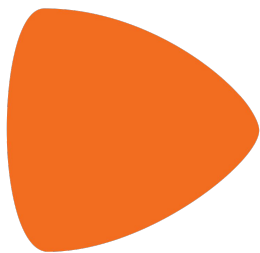
github.com/zalando-incubator/cluster-lifecycle-manager

github.com/zalando-incubator/kubernetes-on-aws



Elasticsearch
2.500 vCPUs
1 TB RAM

Project “ES Operator”



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ES Operator

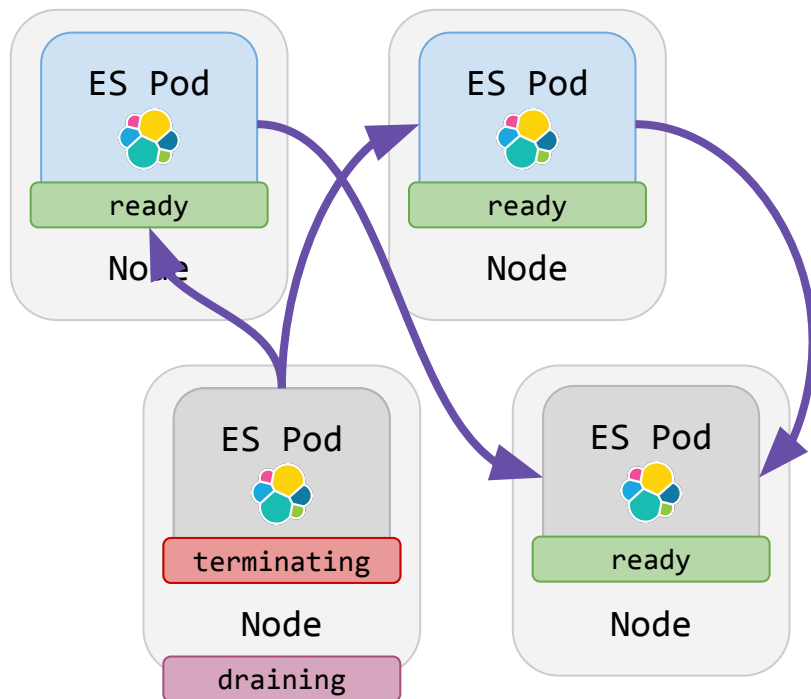
UPDATING ELASTICSEARCH (STATEFULSET)

1) PreStop Hook ([bash script](#))

- Exclude node in ES
- Wait for node to drain (up to 1h)
- Data is moved to existing nodes

2) PostStart Hook ([bash script](#))

- Remove all excludes
- Let ES rebalance from existing nodes

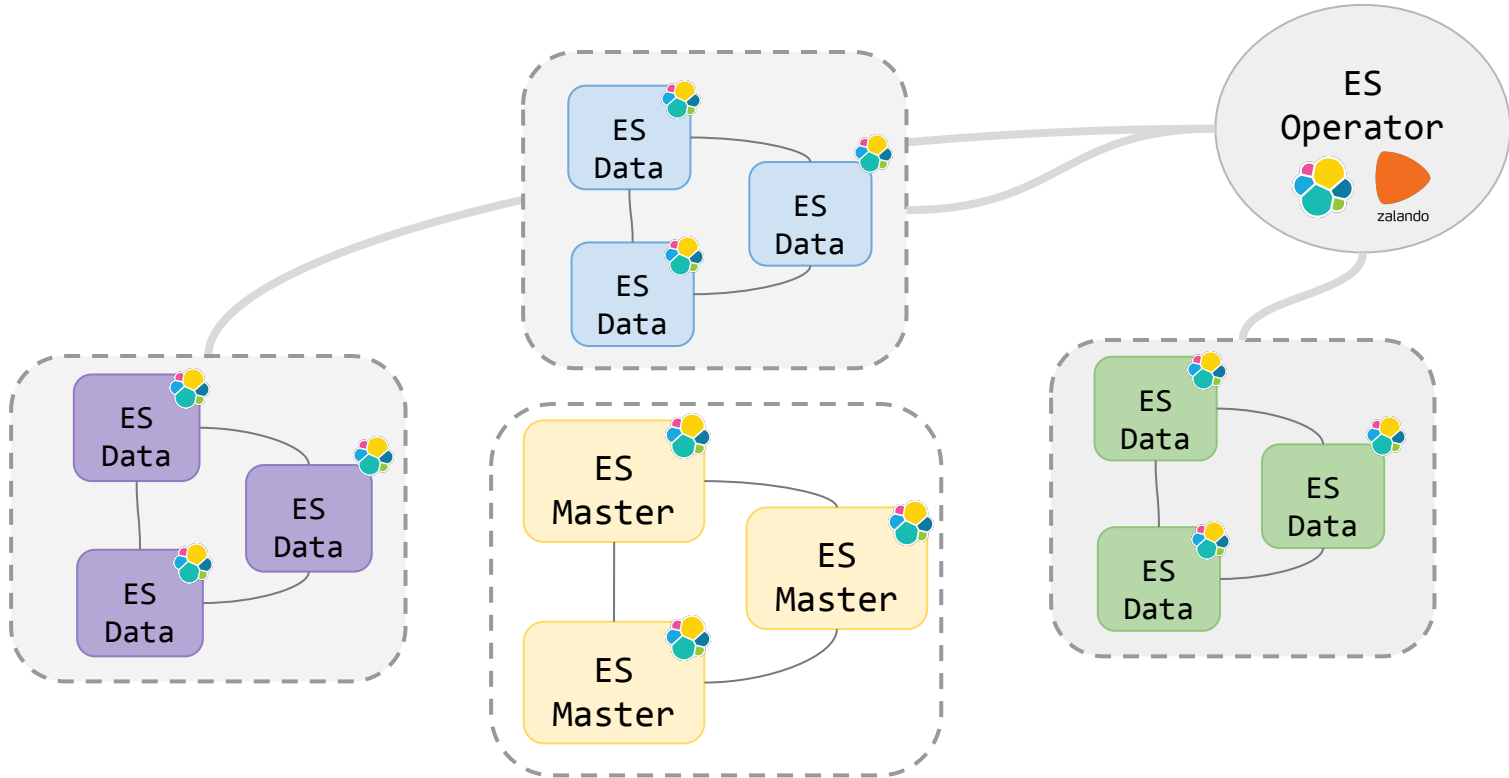


ELASTICSEARCH DATA SETS

```
apiVersion: zalando.org/v1
kind: ElasticsearchDataSet
metadata:
  name: test-cluster
spec:
  scaling:
    {...}
  replicas: 3
  template: # PodTemplate
    {...}
  volumeClaimTemplates:
    {...}
```

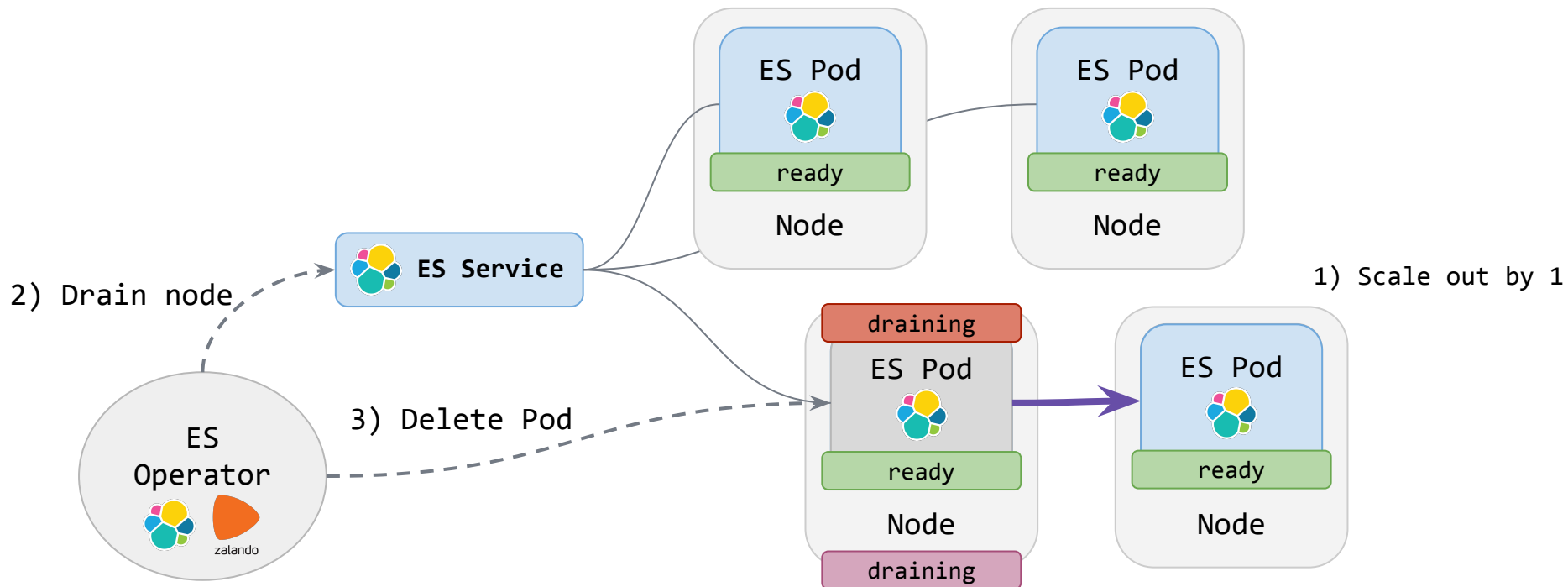
github.com/zalando-incubator/es-operator

ELASTICSEARCH DATA SETS



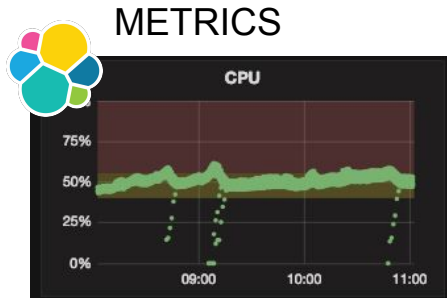
github.com/zalando-incubator/es-operator

UPDATING ELASTICSEARCH (OPERATOR)



github.com/zalando-incubator/es-operator

SCALING UP ELASTICSEARCH (1)

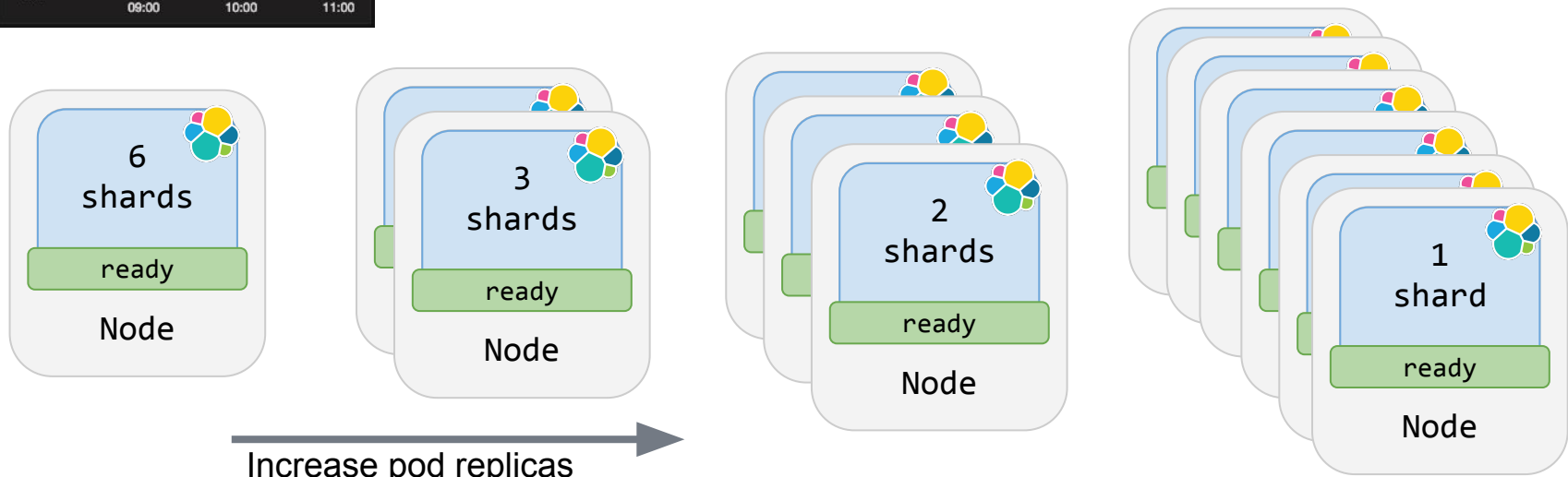


Thresholds

- CPU
- Duration
- Cooldown

Boundaries

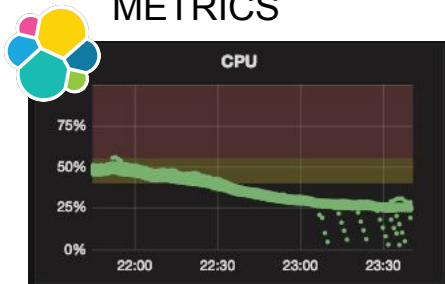
- Max # Pod replicas



SCALING DOWN ELASTICSEARCH

**DON'T OPERATE
WHEN CLUSTER
IS NOT GREEN!**

METRICS

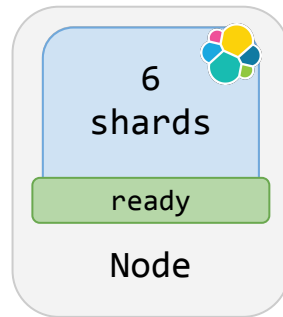
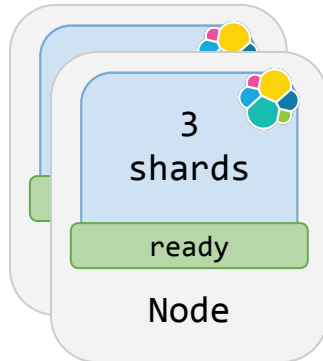
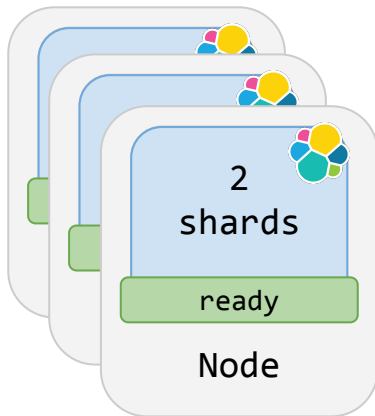
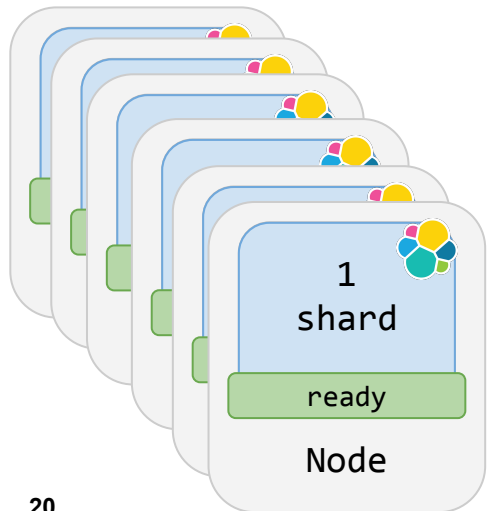


Thresholds

- CPU
- Duration
- Cooldown

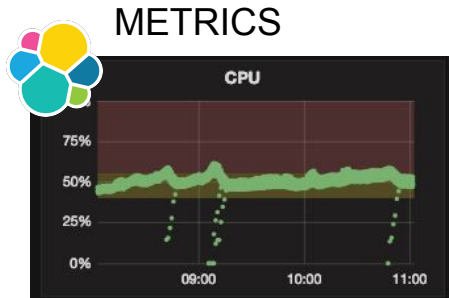
Boundaries

- Min # Replica
- Max # Shards per node
- Max disk usage (%)



Decrease Pod replicas →

SCALING UP ELASTICSEARCH (2)

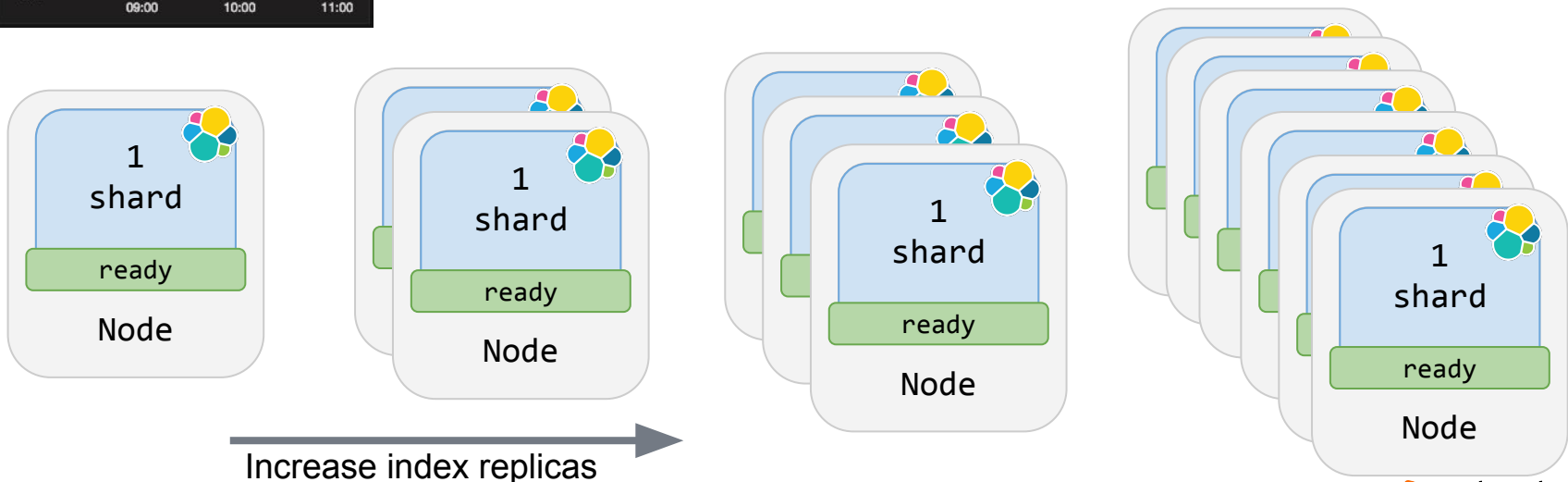


Thresholds

- CPU
- Duration
- Cooldown

Boundaries

- Min # Shards per node



DEMO



OPEN SOURCE

ES Operator

github.com/zalando-incubator/es-operator

Cluster Lifecycle Manager

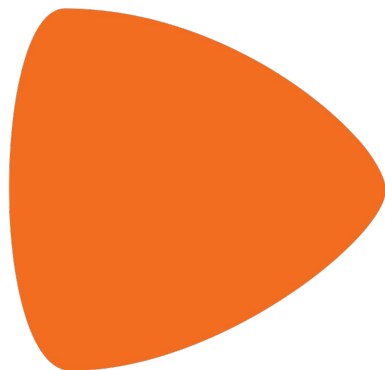
github.com/zalando-incubator/cluster-lifecycle-manager

Kubernetes on AWS

github.com/zalando-incubator/kubernetes-on-aws

microXchg demo

github.com/otrosien/microxchg19-demo



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