Scale search powered apps with Elasticsearch, k8s and go

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shopify

2016

Was a major year for me

Joined Shopify

Had a son

2017

Joined the search infrastructure team

You searched for: ***cap***

We found 27 results

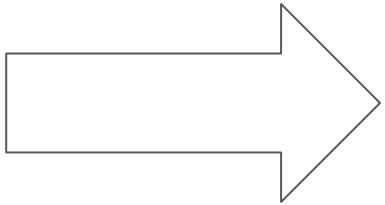
Search again

cap →

Applications moving from various cloud provider and data centers to Google Cloud

HEROKU

amazon web services™



Growing number of Elasticsearch clusters

Search operator

Based on Elasticsearch, Kubernetes, Golang and Docker

Elasticsearch basics

- Cluster
- Node
- Index
- Replicas

Kubernetes basics

- Pod
- Deployment
- Statefulset
- Service
- Configmap
- Custom Resource Definition

Good practices are not always in place

Simple configuration

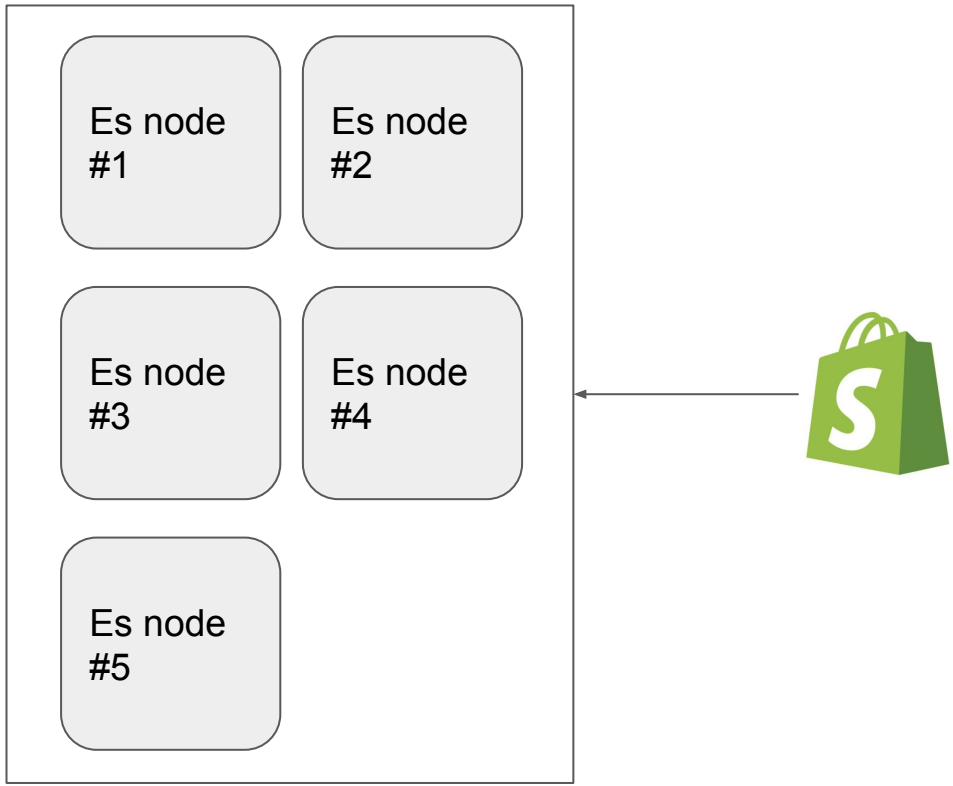
Simple configuration: elasticsearch.yml

```
apiVersion: stable.shopify.io/v1
kind: Elasticsearch
metadata:
 name: app
spec:
 elastic-search-version: 6
 zones:
   - us-east1-b
   - us-east1-c
   - us-east1-d
 node-specs:
   - replicas: 3
     cpu-limit: "1"
     mem-limit: 2G
     data-volume-size: 10Gi
 snapshot:
   bucket-name: shopify-app-prod-es-snapshots
```

Good practices are ~~not~~ always in place

Running Es with k8s

Elasticsearch cluster

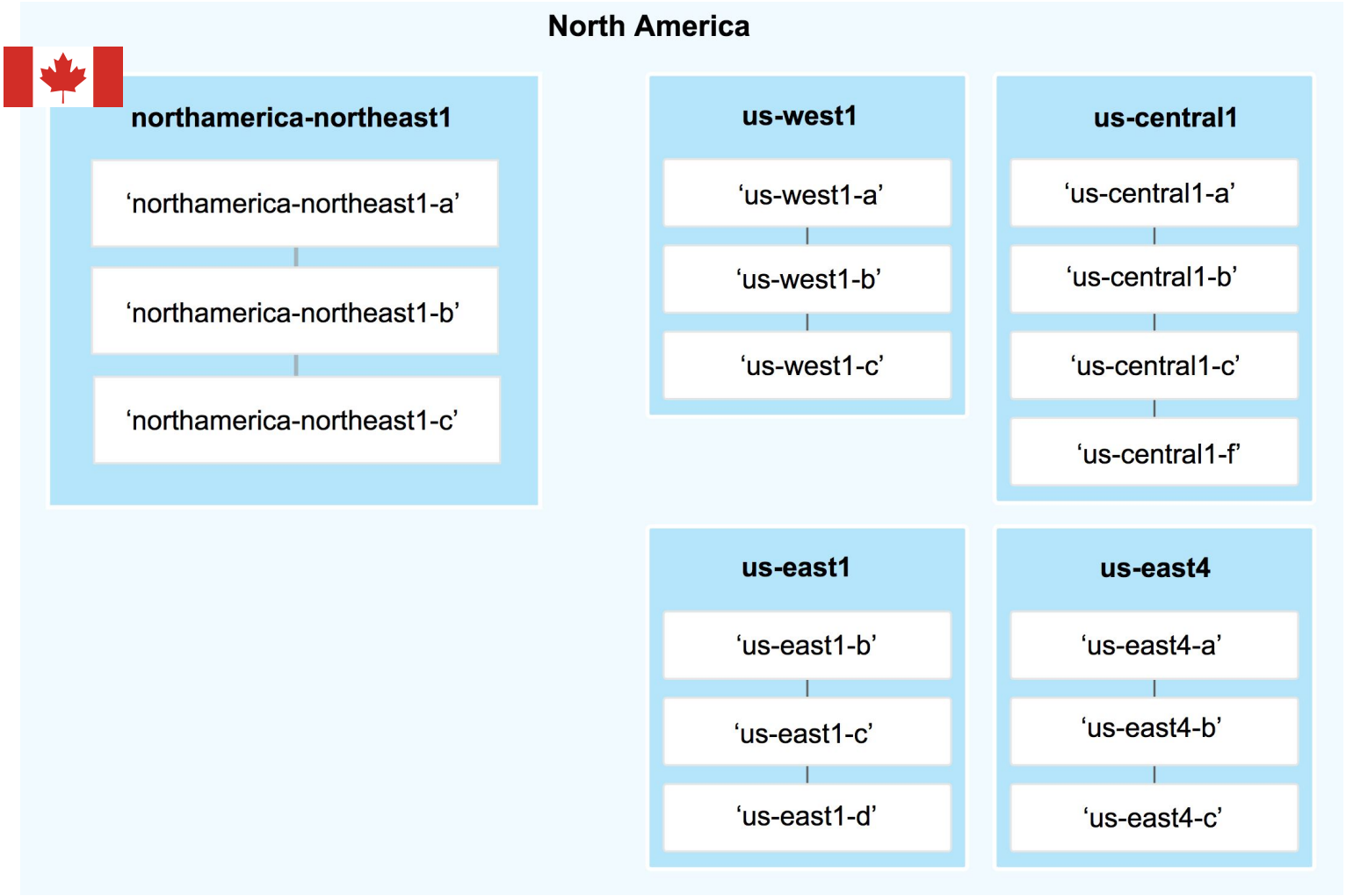


Elasticsearch Kubernetes components

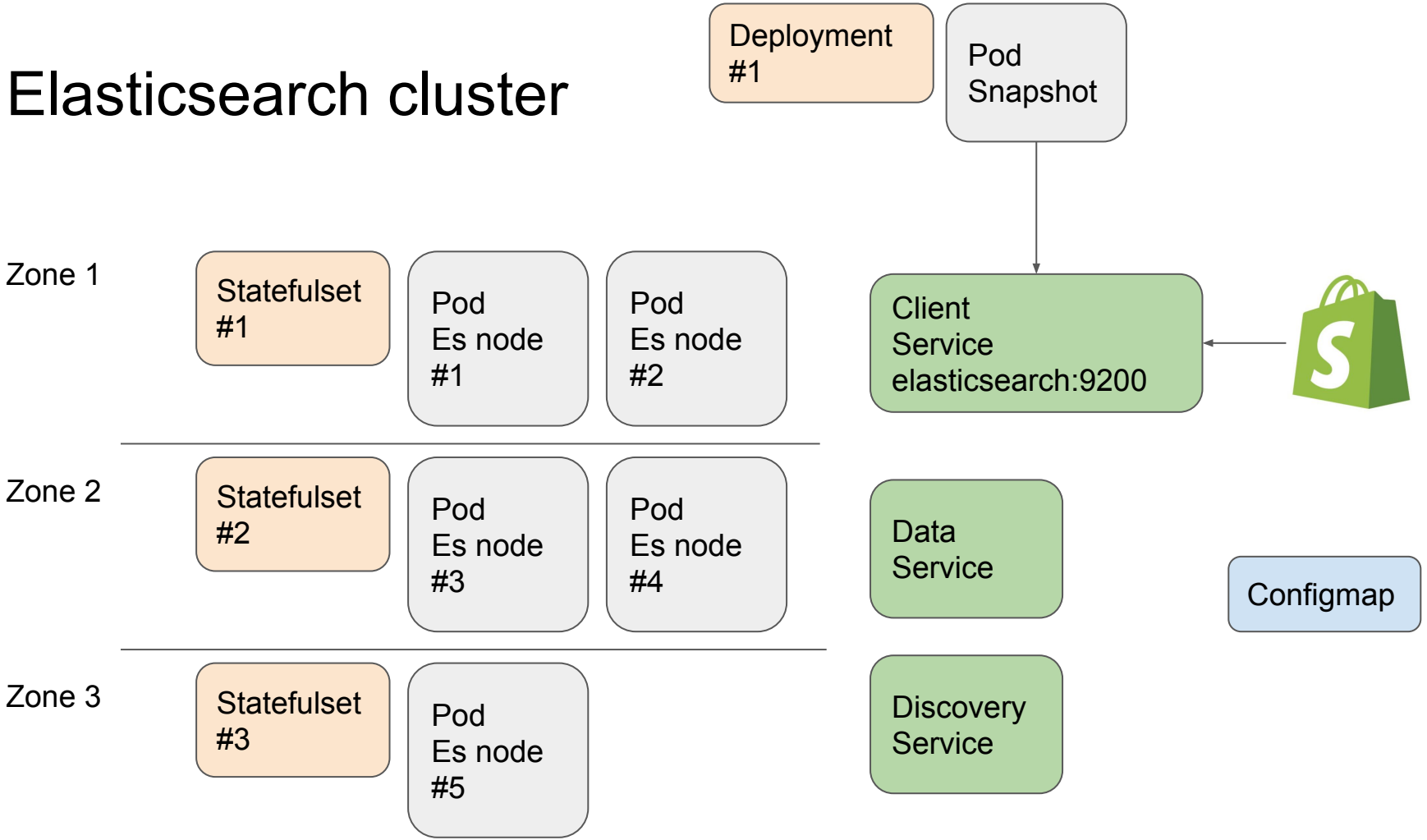
- Statefulset
  - Elasticsearch nodes
- Deployment
  - Snapshot pod with crontab and cli
- Configmap
  - Shared Elasticsearch and logging configuration
- Service
  - Client Endpoint: elasticsearch:9200
  - Discovery
  - Data

Multi-zone data resiliency

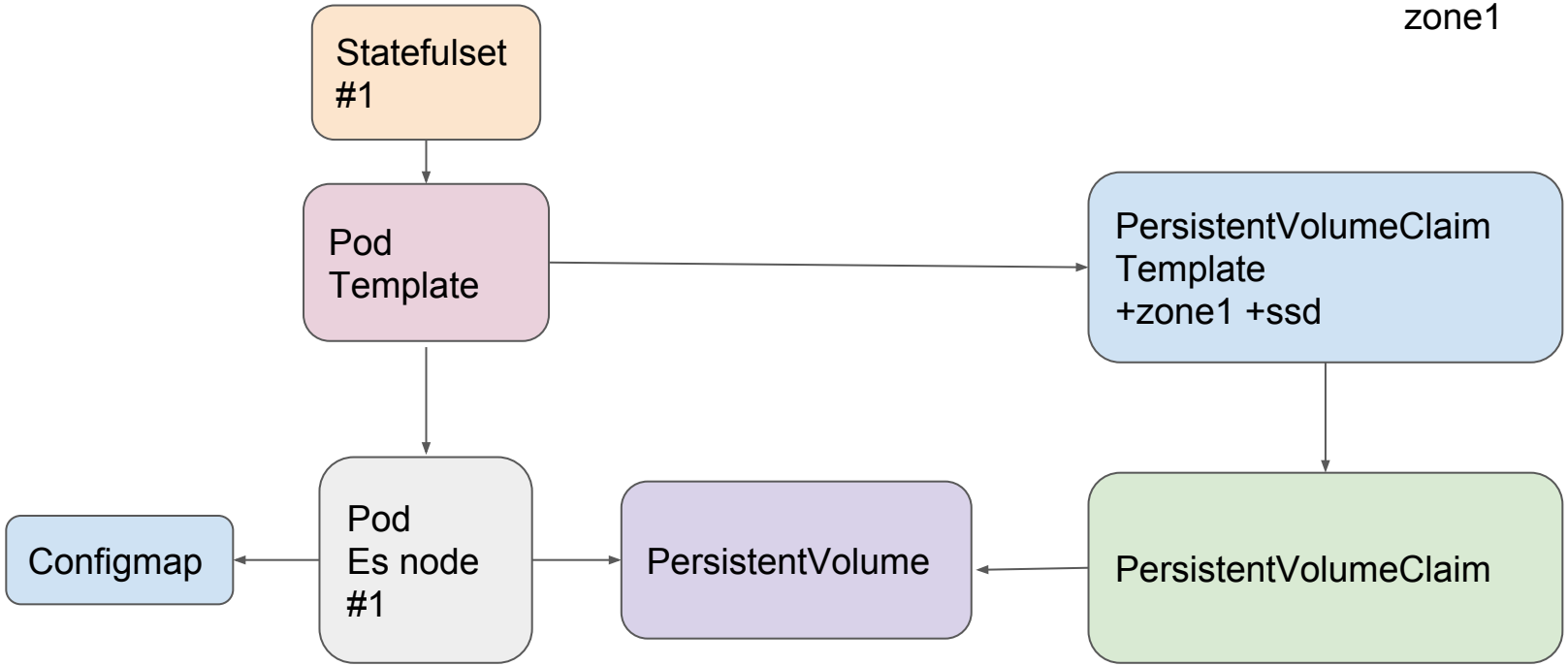
- Regions and Zones
- One Statefulset per zone
  - Persistent volume claim
- Allocation awareness setting


North America
northamerica-northeast1
‘northamerica-northeast1-a’
‘northamerica-northeast1-b’
‘northamerica-northeast1-c’
us-west1
‘us-west1-a’
‘us-west1-b’
‘us-west1-c’
us-central1
‘us-central1-a’
‘us-central1-b’
‘us-central1-c’
‘us-central1-f’
us-east1
‘us-east1-b’
‘us-east1-c’
‘us-east1-d’
us-east4
‘us-east4-a’
‘us-east4-b’
‘us-east4-c’

Elasticsearch cluster



Elasticsearch node



```
$ kubectl get all
NAME                                          DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
deploy/app--elasticsearch-snapshot-cronjob   1         1         1            1           3m

NAME                                             DESIRED   CURRENT   AGE
statefulsets/app--elasticsearch-data-us-east1-b   1         1         3m
statefulsets/app--elasticsearch-data-us-east1-c   1         1         3m
statefulsets/app--elasticsearch-data-us-east1-d   1         1         3m

NAME                                                 READY     STATUS    RESTARTS   AGE
po/app--elasticsearch-data-us-east1-b-0              1/1       Running   0          3m
po/app--elasticsearch-data-us-east1-c-0              1/1       Running   0          3m
po/app--elasticsearch-data-us-east1-d-0              1/1       Running   0          3m
po/app--elasticsearch-snapshot-cronjob-7d699dd658-f7p8w   1/1       Running   0          3m

NAME                                TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)    AGE
svc/app--elasticsearch              ClusterIP   10.187.243.214   <none>        9200/TCP   3m
svc/app--elasticsearch-data         ClusterIP   10.187.255.181   <none>        9300/TCP   3m
svc/app--elasticsearch-discovery    ClusterIP   10.187.242.125   <none>        9300/TCP   3m
```

Elasticsearch operations are manual

Automate operations

Rolling update

- When Statefulset or Configmap change:
  - For each node from the previous configuration:
    - Wait for ready/green cluster
    - Stop allocation
    - Restart pod
    - Start allocation
- Downtime on master restart, no native way around
  - Elastic notification of maintenance email > This work will have minimum impact on your usage of the cluster. This change will involve a grow and shrink action on the cluster which you may notice and it may cause a reelection of the master node.

Scaling

- When configured replicas not the same as current n of nodes:
  - While replicas != n of nodes
    - Wait for the cluster to be ready and green
    - Increment or decrement one by one
- Minimum master nodes
  - Split brain on scale up
  - Master lost on scale down

Elasticsearch operations are ~~manual~~ automated

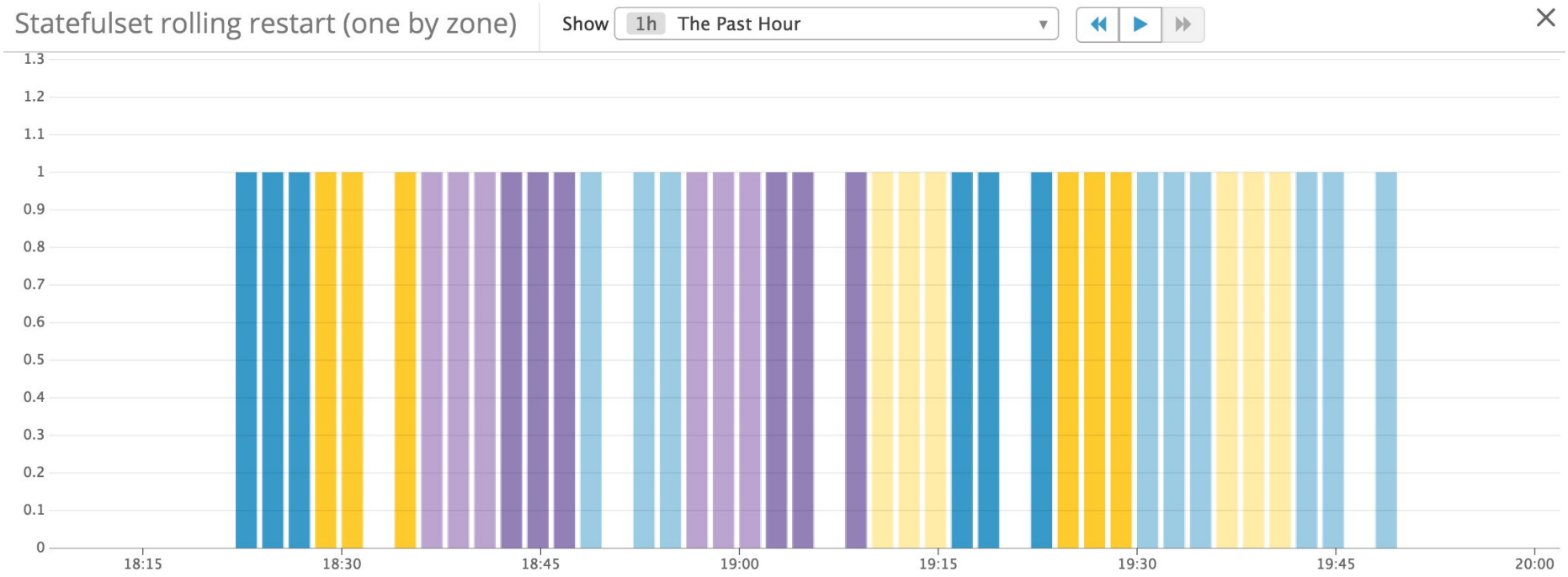
Snapshots for everyone

Snapshots

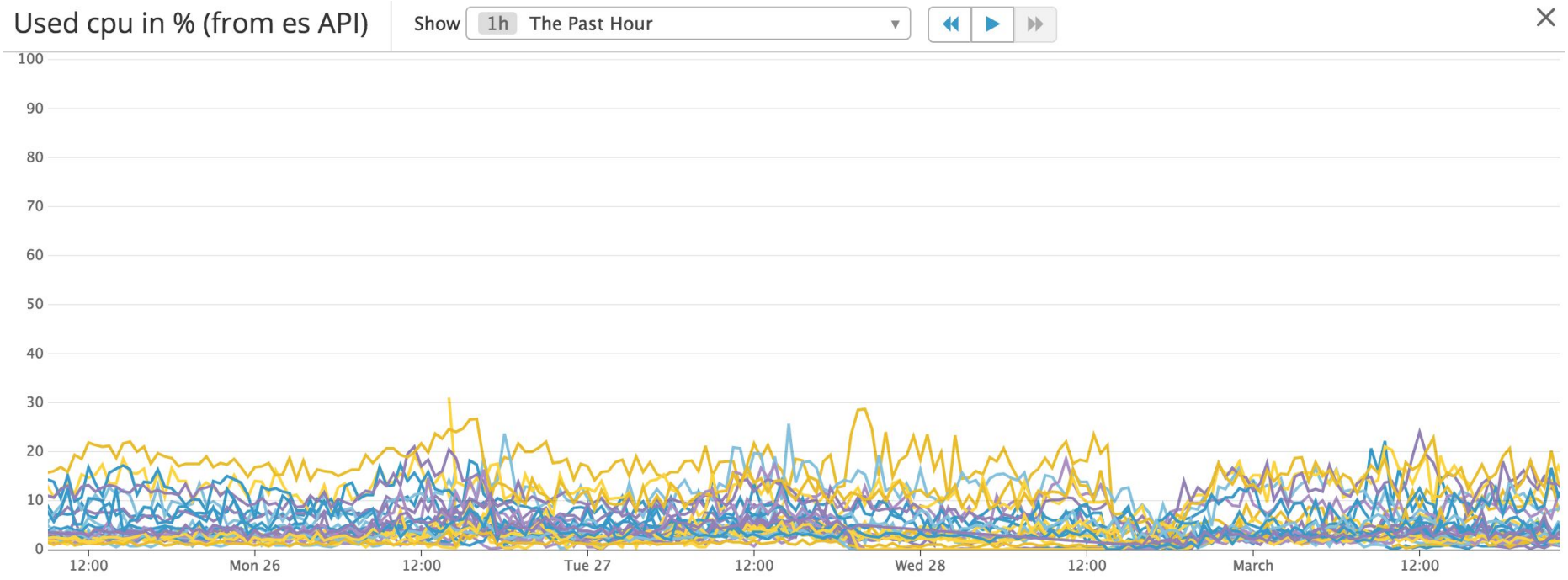
- Bucket
- Crontab
- CLI
- Purge

The big picture

Search operator: Datadog and Bugsnag



Elasticsearch: Datadog, Splunk and Kibana



2018

One year later

- Managed Elasticsearch clusters: XX+
- Kubernetes pods: XXX+

- Clusters are up to date
- Many automated operations
- Good practices in place

Demo

- Create
- Update
- Scale
- Delete

Conclusion

2017
Scaled search infra with k8s

2018
Search infra as a product (internally)

Thanks!

https://github.com/maxboisvert/waq2018

shopify