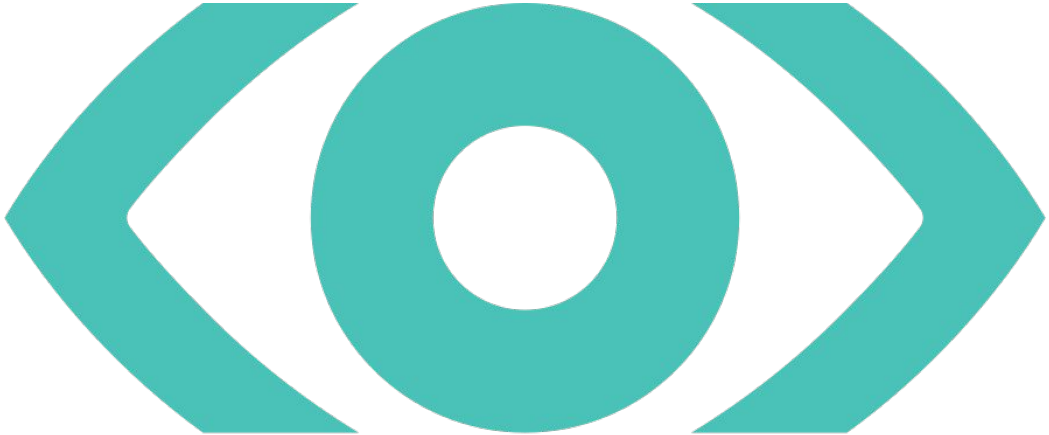
Meltwater
Outside Insight

Zero downtime Kubernetes cluster upgrades

Simone Sciarrati

dezmodue



Meltwater

@meltwatereng

Mission

"We enable teams to accelerate without thinking too much about the infrastructure, allowing a rapid path from ideation to prototype to providing business value."

Meltwater

Nodes
149
Namespaces
77
Running Pods
2102
Deployments
561
Statefulsets
21
Services LoadBalancer
93
Jobs
182
Daemonsets
6
Services ClusterIP
394
Services NodePort
41
Cronjobs
50
Services ExternalName
6
HPA
21

@dezmodue

What could possibly….

- AWS limits
- CNI plugin, CNI plugin, CNI plugin….
- Kops
- Cross account IAM
- Network connectivity / DNS
- Much more...
- … and Kubernetes

kubernetes / kubernetes

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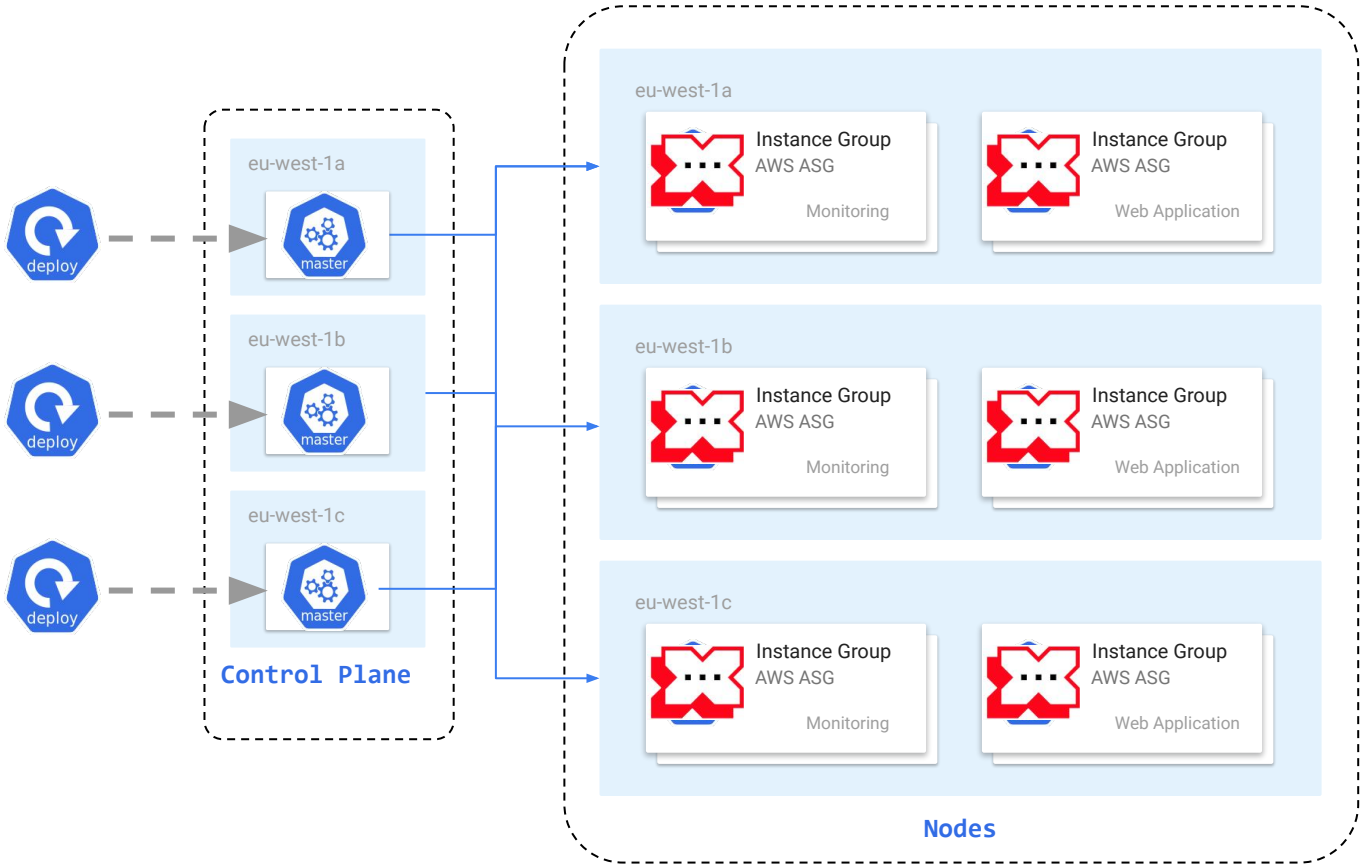
kubelet fails to heartbeat with API server with stuck TCP connections #48638

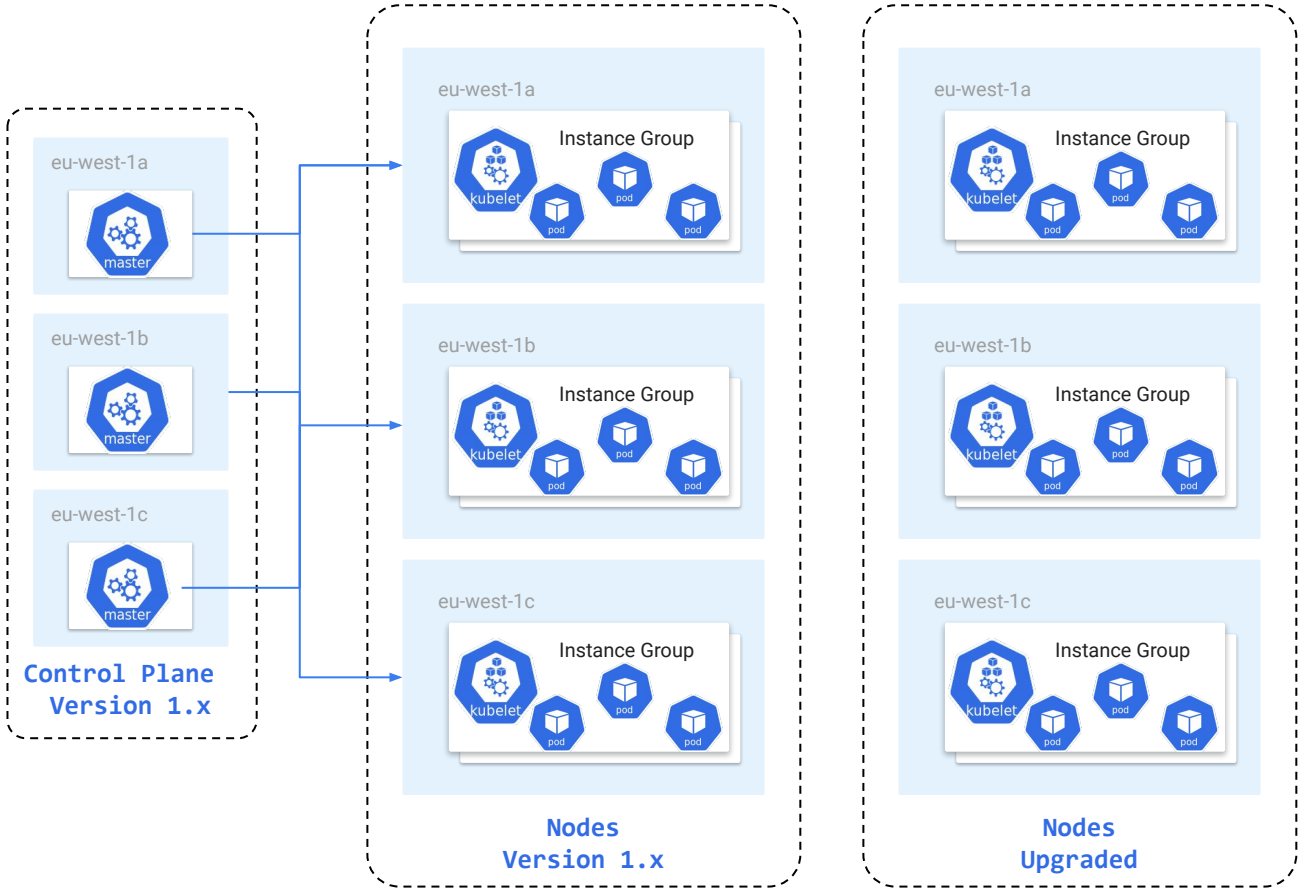
Closed **derekwaynecarr** opened this issue on 7 Jul 2017 · 33 comments

derekwaynecarr commented on 7 Jul 2017 • edited Member

Is this a BUG REPORT or FEATURE REQUEST?:
/kind bug

What happened:
operator is running an HA master setup with a LB in front. kubelet attempts to update node status, but `tryUpdateNodeStatus` wedges. based on the goroutine dump, the wedge happens when it attempts to GET the latest state of the node from the master. operator observed 15 minute intervals between attempts to update node status when kubelet could not contact master. assume this is when the LB ultimately closes the connection. the impact is that node controller then marked node as lost, and workload was evicted.

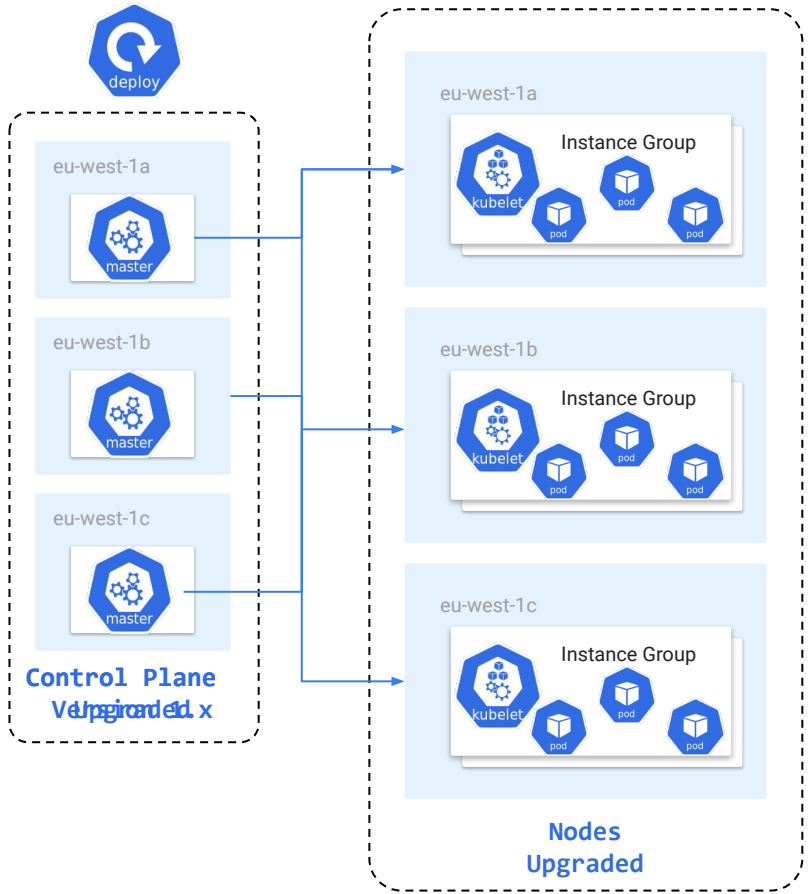

deploy
deploy
deploy
eu-west-1a
master
eu-west-1b
master
eu-west-1c
master
Control Plane
eu-west-1a
Instance Group
AWS ASG
Monitoring
Instance Group
AWS ASG
Web Application
eu-west-1b
Instance Group
AWS ASG
Monitoring
Instance Group
AWS ASG
Web Application
eu-west-1c
Instance Group
AWS ASG
Monitoring
Instance Group
AWS ASG
Web Application
Nodes



`kubectl cordon node`

`kubectl drain node`

PodDisruptionBudget
Lifecycle Hooks
help minimising the impact of draining


deploy
eu-west-1a
master
eu-west-1b
master
eu-west-1c
master
Control Plane
Upgraded
eu-west-1a
Instance Group
kubelet
pod
pod
pod
eu-west-1b
Instance Group
kubelet
pod
pod
pod
eu-west-1c
Instance Group
kubelet
pod
pod
pod
Nodes
Upgraded

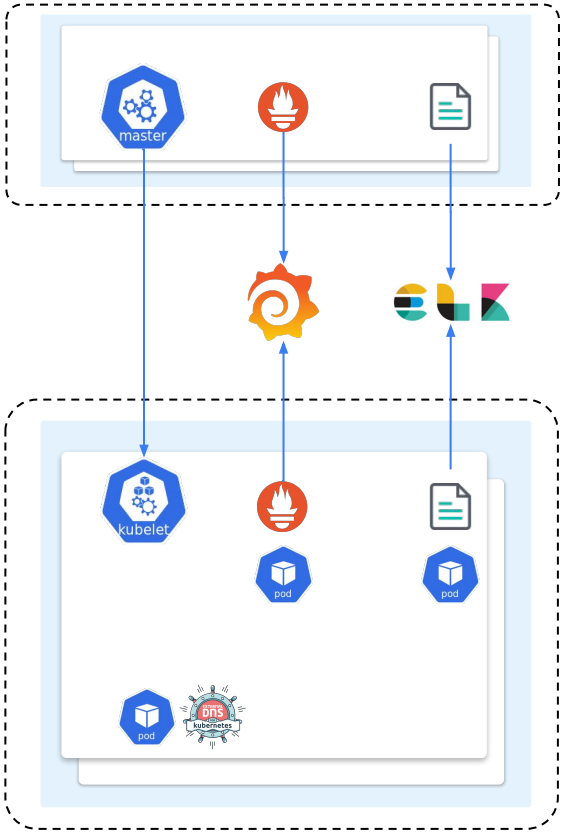
Definition of “working”

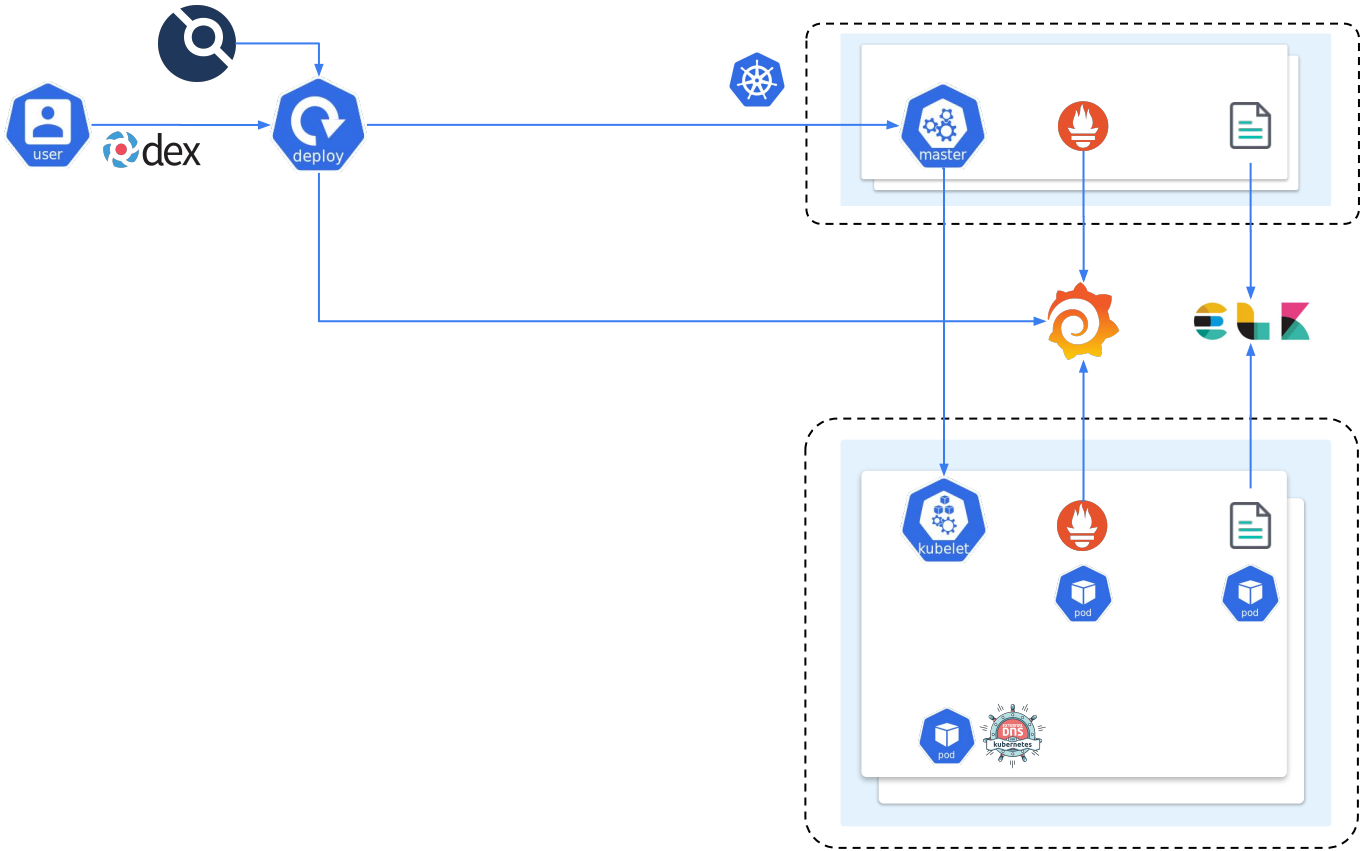
- Kubernetes API and components
- Dex
- Deployments
- Ingress/Services
- StatefulSets
- External-DNS
- CNI
- Metrics
- Logging
- etc

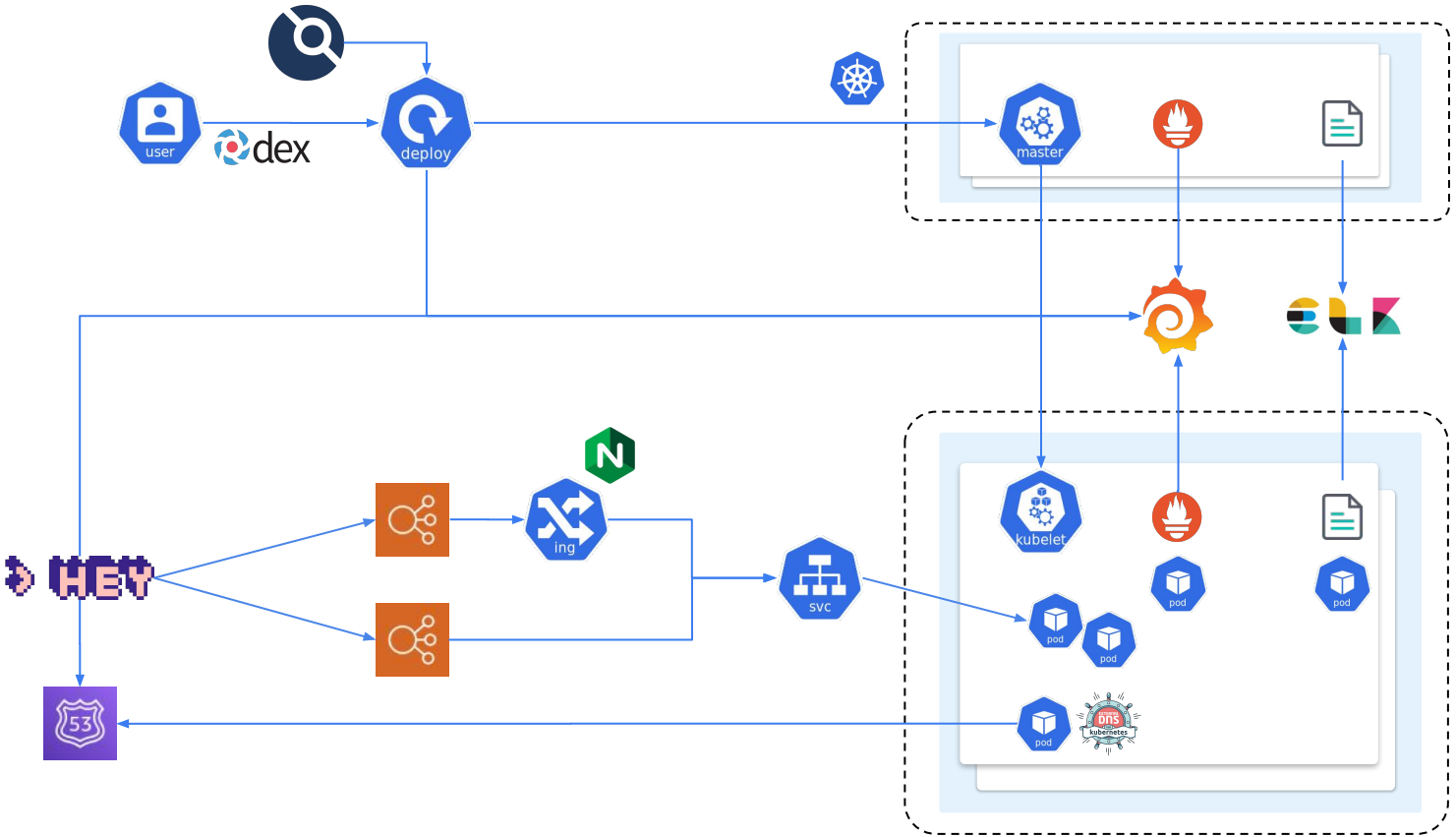
Pre-flight checks:

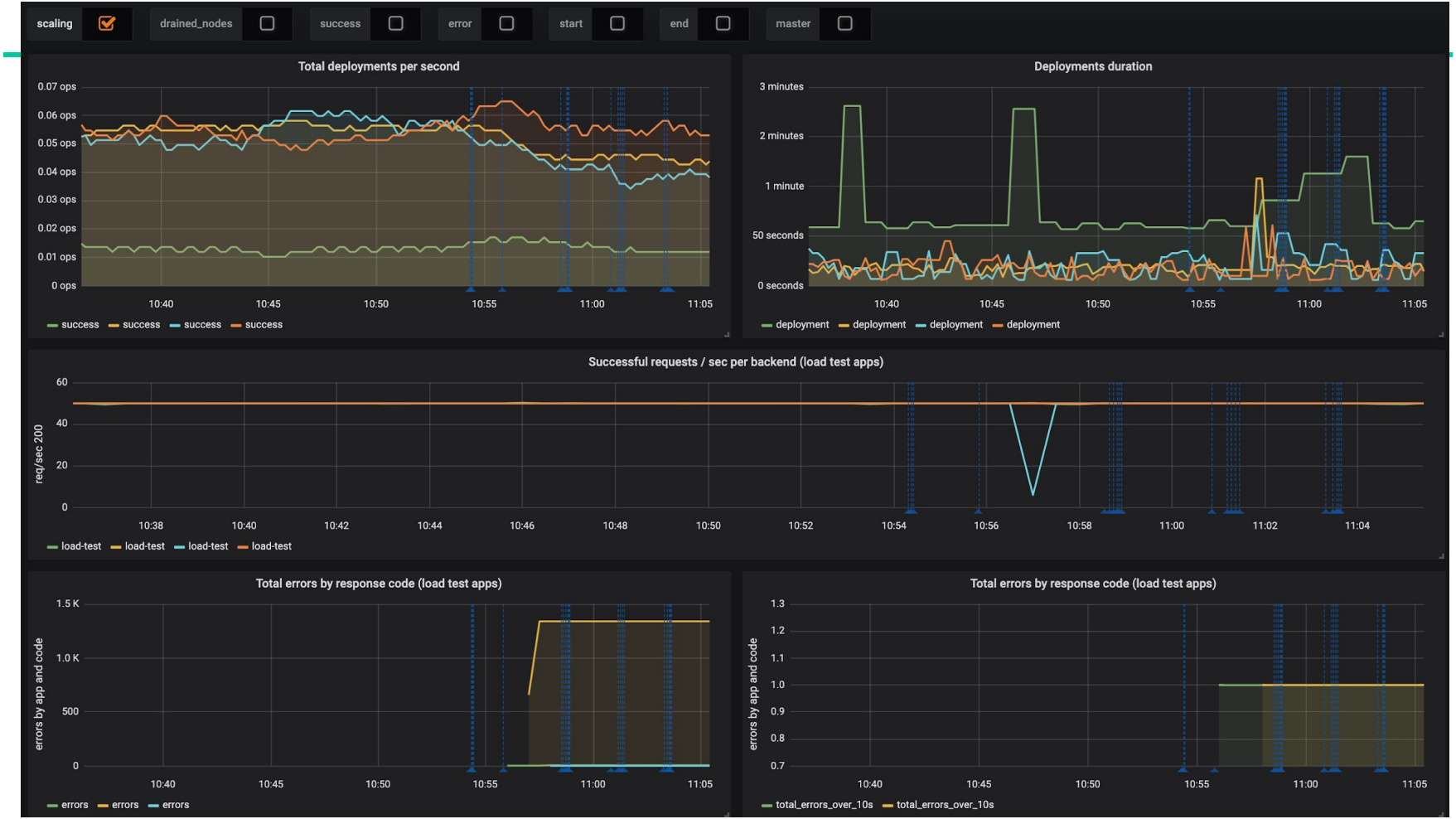
- **Kops**: changes since last release, default flags after upgrade, breaking changes etc
- **Kubernetes**: API deprecations, changes to the components behaviour etc
- **AWS**: limits (monitored via a prometheus exporter and aws trusted advisor)
- **Components**: Changes or upgrades (*-dns, kube-proxy, CA, CNI plugin, etc)
- Identify changes in behaviour or deprecations that need to be communicated to the users

Validate the new configuration on a small scale


master
kubelet
pod
pod
pod
dns
kubernetes


user
dex
deploy
master
kubelet
pod
pod
pod
dns
kubernetes


user
dex
deploy
master
ing
svc
kubelet
pod
pod
pod
pod
pod
53
dns
kubernetes


scaling
drained_nodes
success
error
start
end
master
Total deployments per second
0.07 ops
0.06 ops
0.05 ops
0.04 ops
0.03 ops
0.02 ops
0.01 ops
0 ops
10:40
10:45
10:50
10:55
11:00
11:05
success
success
success
success
Deployments duration
3 minutes
2 minutes
1 minute
50 seconds
0 seconds
10:40
10:45
10:50
10:55
11:00
11:05
deployment
deployment
deployment
deployment
Successful requests / sec per backend (load test apps)
req/sec 200
60
40
20
0
10:38
10:40
10:42
10:44
10:46
10:48
10:50
10:52
10:54
10:56
10:58
11:00
11:02
11:04
load-test
load-test
load-test
load-test
Total errors by response code (load test apps)
errors by app and code
1.5 K
1.0 K
500
0
10:40
10:45
10:50
10:55
11:00
11:05
errors
errors
errors
Total errors by response code (load test apps)
errors by app and code
1.3
1.2
1.1
1.0
0.9
0.8
0.7
10:40
10:45
10:50
10:55
11:00
11:05
total_errors_over_10s
total_errors_over_10s

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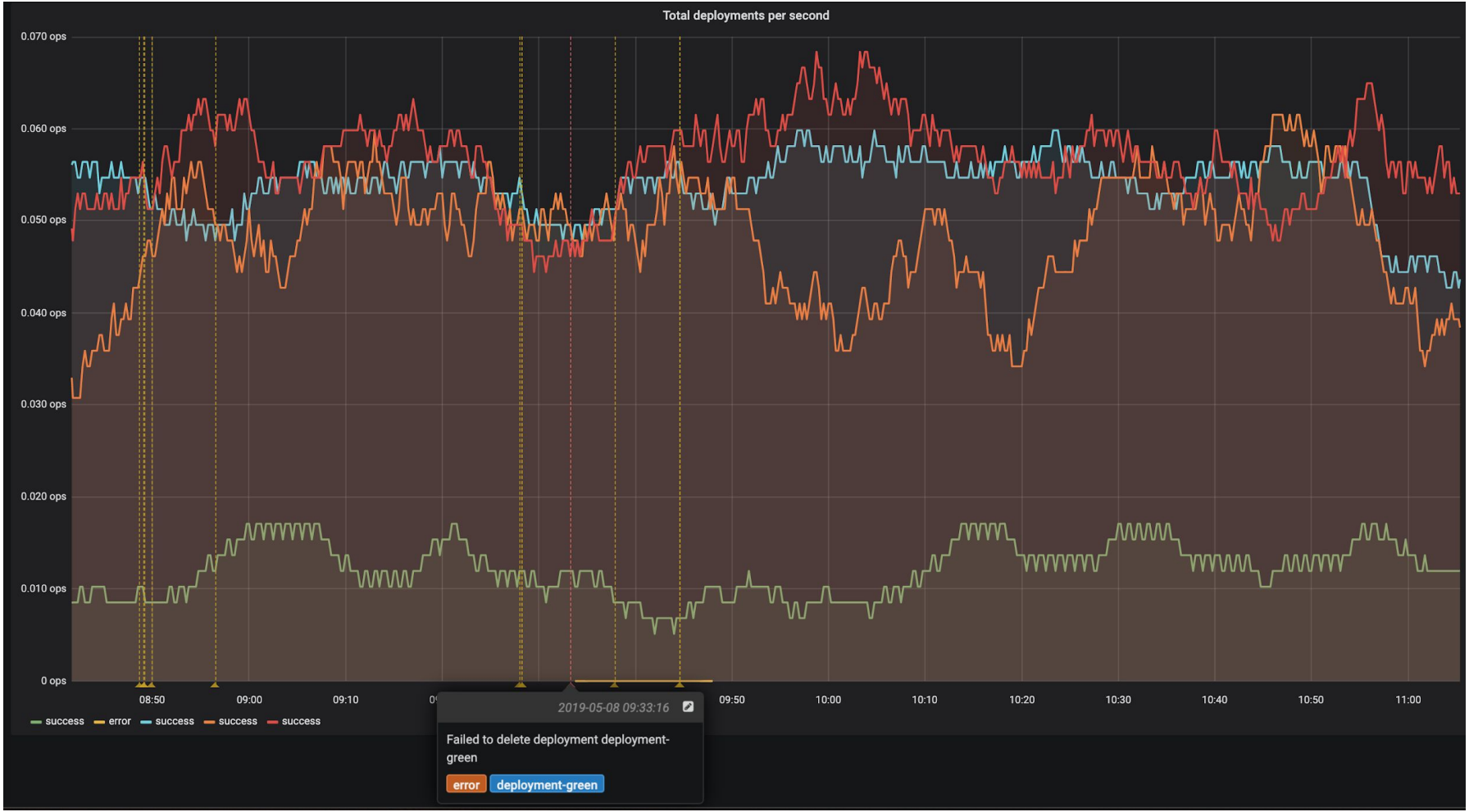
Total deployments per second
0.070 ops
0.060 ops
0.050 ops
0.040 ops
0.030 ops
0.020 ops
0.010 ops
0 ops
08:50
09:00
09:10
09:50
10:00
10:10
10:20
10:30
10:40
10:50
11:00
success
error
success
success
success
2019-05-08 09:33:16
Failed to delete deployment deployment-green
error
deployment-green

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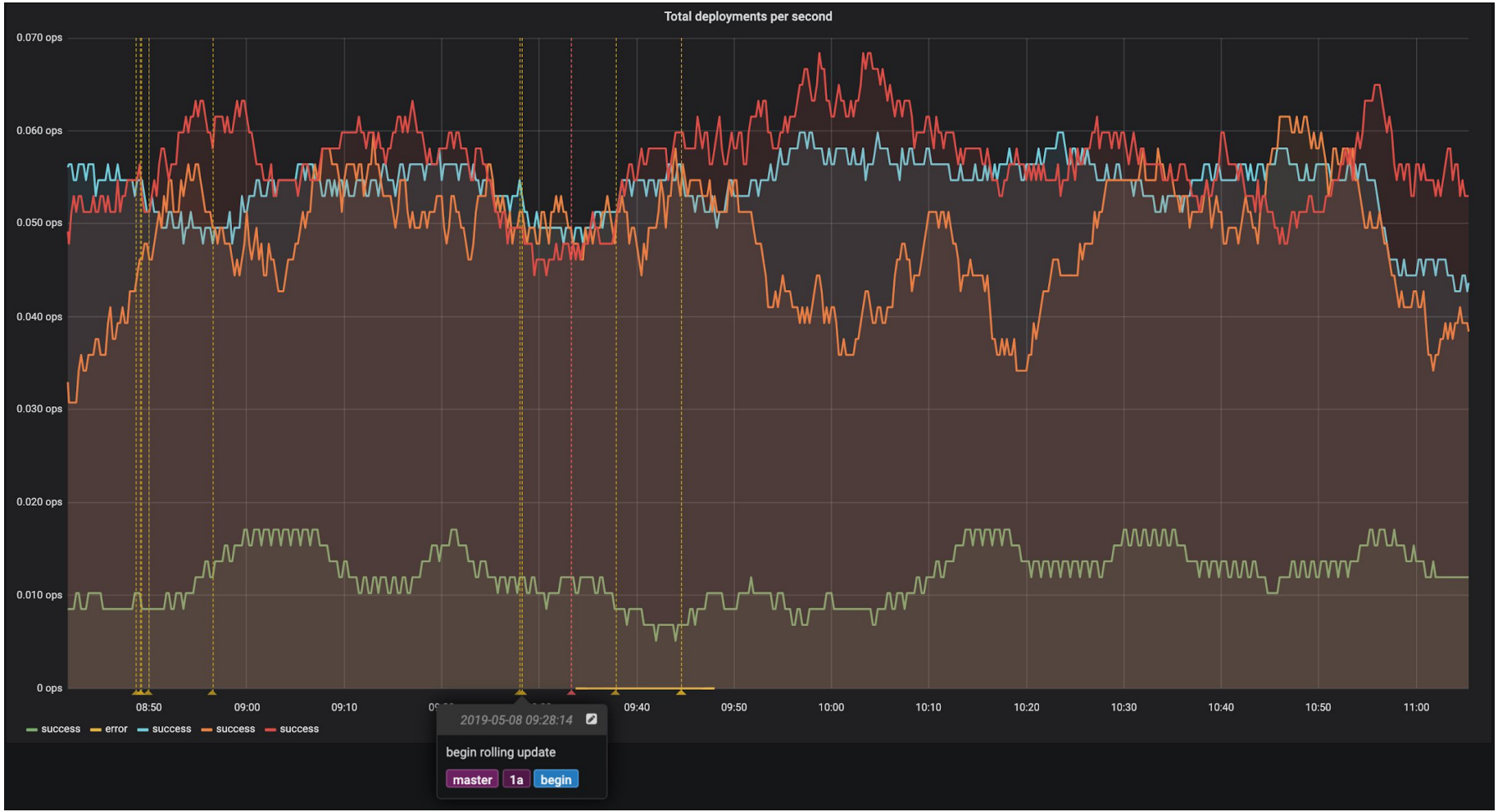
Total deployments per second
0.070 ops
0.060 ops
0.050 ops
0.040 ops
0.030 ops
0.020 ops
0.010 ops
0 ops
08:50
09:00
09:10
09:40
09:50
10:00
10:10
10:20
10:30
10:40
10:50
11:00
success
error
success
success
success
2019-05-08 09:28:14
begin rolling update
master
1a
begin

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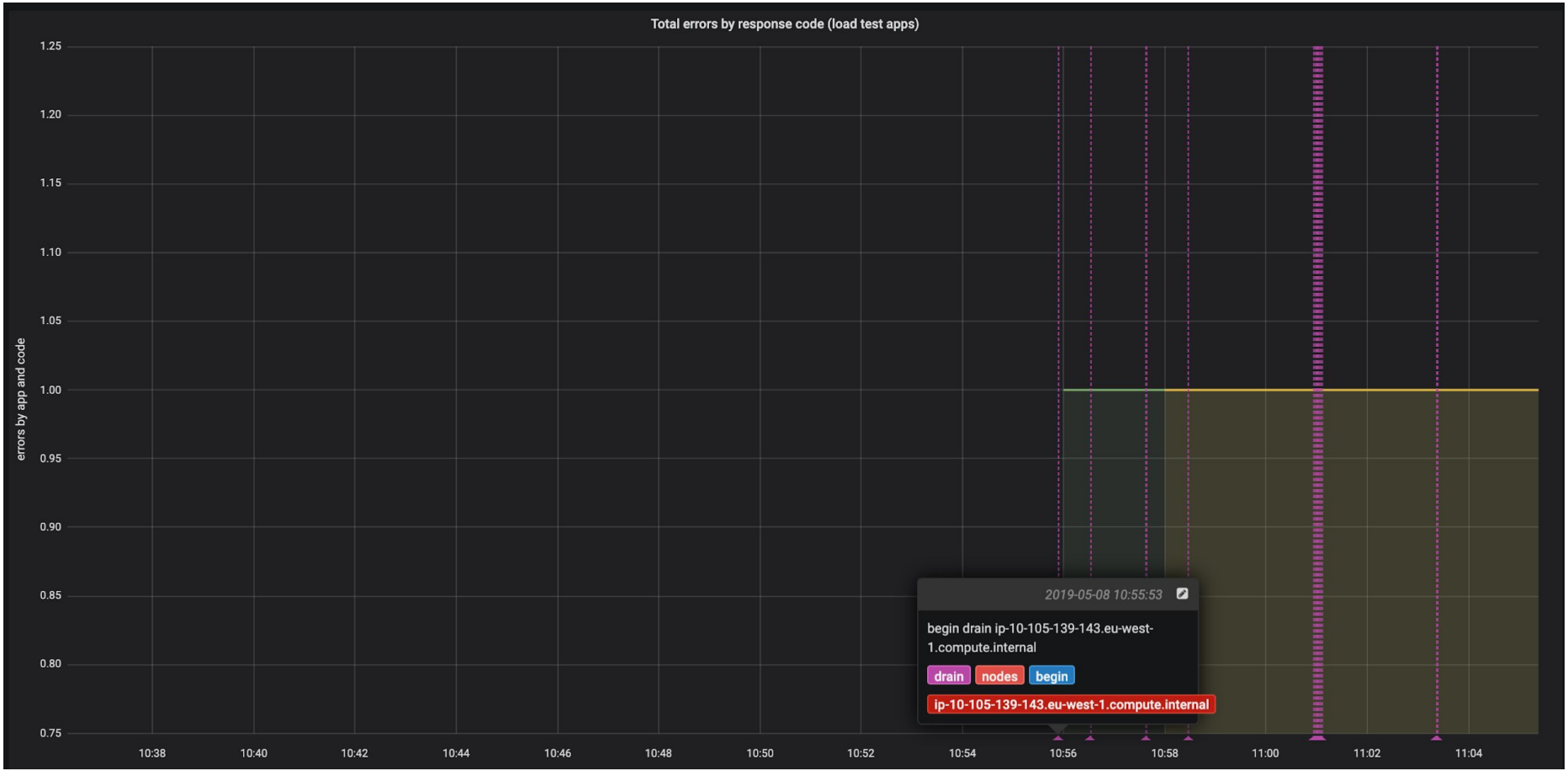
Total errors by response code (load test apps)
errors by app and code
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
10:38
10:40
10:42
10:44
10:46
10:48
10:50
10:52
10:54
10:56
10:58
11:00
11:02
11:04
2019-05-08 10:55:53
begin drain ip-10-105-139-143.eu-west-1.compute.internal
drain
nodes
begin
ip-10-105-139-143.eu-west-1.compute.internal

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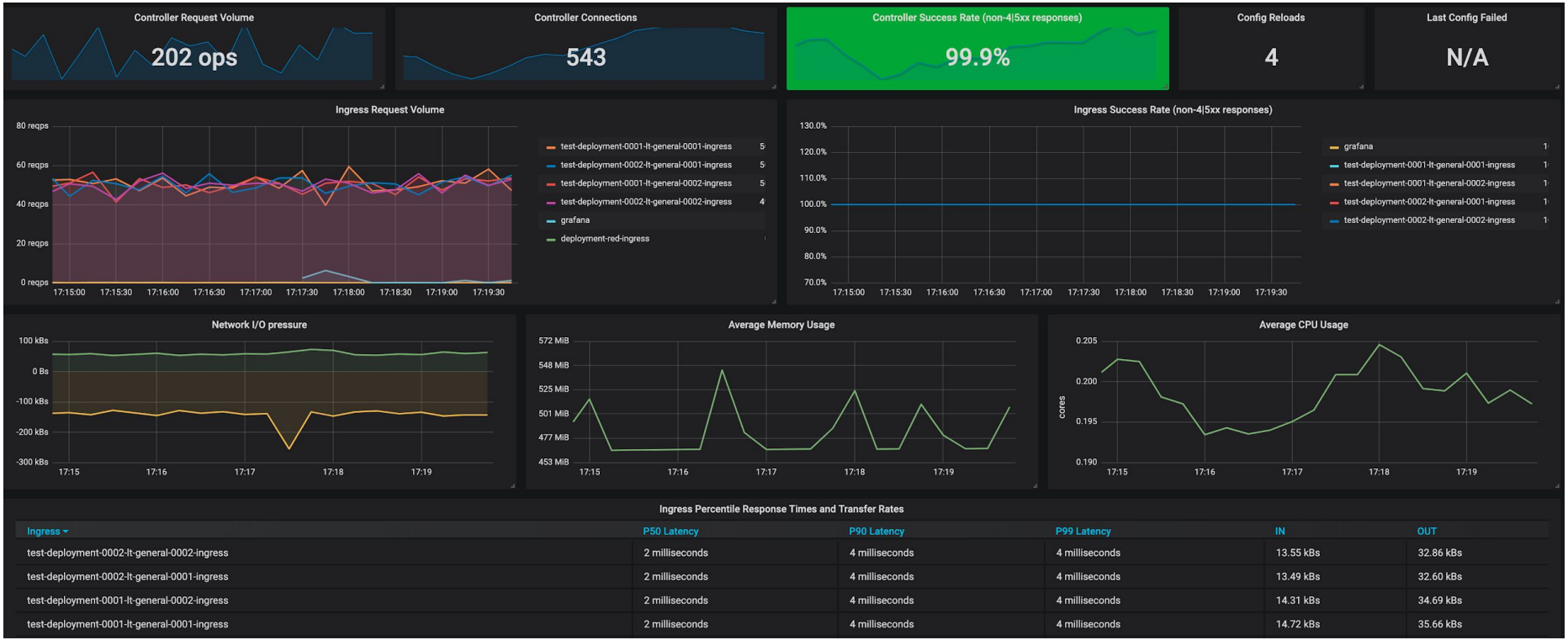

Ingress Percentile Response Times and Transfer Rates

Ingress	P50 Latency	P90 Latency	P99 Latency	IN	OUT
test-deployment-0002-lt-general-0002-ingress	2 milliseconds	4 milliseconds	4 milliseconds	13.55 kBs	32.86 kBs
test-deployment-0002-lt-general-0001-ingress	2 milliseconds	4 milliseconds	4 milliseconds	13.49 kBs	32.60 kBs
test-deployment-0001-lt-general-0002-ingress	2 milliseconds	4 milliseconds	4 milliseconds	14.31 kBs	34.69 kBs
test-deployment-0001-lt-general-0001-ingress	2 milliseconds	4 milliseconds	4 milliseconds	14.72 kBs	35.66 kBs

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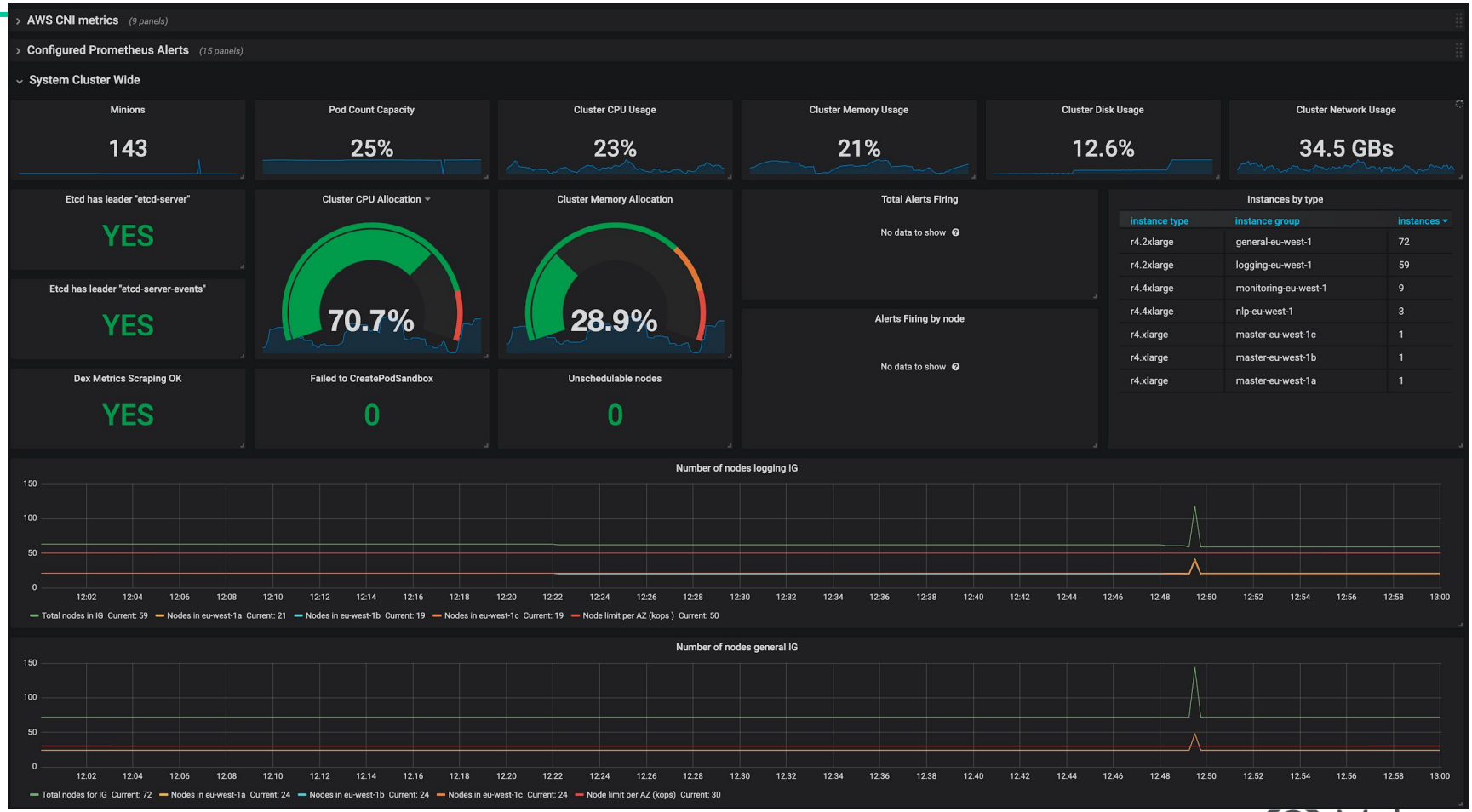
AWS CNI metrics (9 panels)
Configured Prometheus Alerts (15 panels)
System Cluster Wide
Minions
143
Pod Count Capacity
25%
Cluster CPU Usage
23%
Cluster Memory Usage
21%
Cluster Disk Usage
12.6%
Cluster Network Usage
34.5 GBs
Etcd has leader "etcd-server"
YES
Etcd has leader "etcd-server-events"
YES
Cluster CPU Allocation
70.7%
Cluster Memory Allocation
28.9%
Total Alerts Firing
No data to show
Alerts Firing by node
No data to show
Instances by type
instance type
instance group
instances
r4.2xlarge general-eu-west-1 72
r4.2xlarge logging-eu-west-1 59
r4.4xlarge monitoring-eu-west-1 9
r4.4xlarge nlp-eu-west-1 3
r4.xlarge master-eu-west-1c 1
r4.xlarge master-eu-west-1b 1
r4.xlarge master-eu-west-1a 1
Dex Metrics Scraping OK
YES
Failed to CreatePodSandbox
0
Unschedulable nodes
0
Number of nodes logging IG
150
100
50
0
12:02 12:04 12:06 12:08 12:10 12:12 12:14 12:16 12:18 12:20 12:22 12:24 12:26 12:28 12:30 12:32 12:34 12:36 12:38 12:40 12:42 12:44 12:46 12:48 12:50 12:52 12:54 12:56 12:58 13:00
Total nodes in IG Current: 59
Nodes in eu-west-1a Current: 21
Nodes in eu-west-1b Current: 19
Nodes in eu-west-1c Current: 19
Node limit per AZ (kops) Current: 50
Number of nodes general IG
150
100
50
0
12:02 12:04 12:06 12:08 12:10 12:12 12:14 12:16 12:18 12:20 12:22 12:24 12:26 12:28 12:30 12:32 12:34 12:36 12:38 12:40 12:42 12:44 12:46 12:48 12:50 12:52 12:54 12:56 12:58 13:00
Total nodes for IG Current: 72
Nodes in eu-west-1a Current: 24
Nodes in eu-west-1b Current: 24
Nodes in eu-west-1c Current: 24
Node limit per AZ (kops) Current: 30

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