

HOW NETFLIX AUTOSCALES CI

Rahul Somasunderam

WHAT DOES CI LOOK LIKE AT NETFLIX

JENKINS @ NETFLIX

- 35 Jenkins controllers
- ~45k job definitions
- ~600k builds per week
- 650-1500 agents
- 1-100 executors per agent

THE SPINNAKER VIEW

- 1 Application
- 35 stacks (Controller Clusters)
- 180 Agent Clusters
- 1+ ASG per cluster
- All workloads on AWS

CLUSTERS AND ASGS

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v<Version>

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- `<Application>-<Stack>-<Detail>-v<Version>`
- `jenkins-unstable-agent-highlander-v123`

HOW TO PLAN FOR CI INFRASTRUCTURE

INFINITE RESOURCES

- Provision capacity based on known maximum load
- Multiply by a safety factor for good measure
- Monitor and change the capacity as load increases

INFINITE PATIENCE

- Plan capacity based on median load
- Builds will sit in queue for long times

INSTANT RESOURCES

- You will get resources as soon as you request for them
- Works well with Containerizable builds
- Not all builds can be containerized
- Does not scale well with large numbers of short-lived builds

AUTOSCALING

- Set up minimum and maximum capacity
- Scale based on some metric

WHAT METRIC TO USE

SYSTEM METRICS

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CPU/Memory/Disk IO/Network throughput

- Natively supported by cloud providers and most metrics solutions

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Scaling Policies are supported by cloud providers

SYSTEM METRICS

Not very useful for CI

QUEUE DEPTH

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Queue Depth seems adequately proportional.

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Queue Depth seems adequately proportional.
However, it is a trailing metric.

AGENT UTILIZATION

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For each agent, find [idle, busy, offline]
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Sum these up by ASG.

Compute utilization as $\frac{busy + offline}{busy + offline + e}$

MEASURING AGENT UTILIZATION

AN AGENT'S ASG

When launching agents, use labels to specify the placement of the agent.



Agent nflx-agent-unstable-i-0522989245ff3659d (Connect: `ssh -t i-0522989245ff3659d`)

Mark this node temporarily offline

Agent is connected.

Labels

asg:jenkins-unstable-bionic-v189 aws:test:us-east-1:jenkins-unstable-bionic-v189 **bionic** buildgroup:bionic carson.version:0.767.0 carson:true cloud:aws cluster:jenkins-unstable-bionic detail:bionic ec2.availZone:us-east-1e ec2.instanceType:m5d.xlarge ec2.region:us-east-1 env:test executors:4 iamRole:jenkinsInstanceProfile java.jvm:zulu8 java.runtime:1.8.0_292-b10 nf.account:test **nf.app:jenkins** nflx.agent.build:569 os.arch:amd64 os.codename:bionic os.distribution:ubuntu os.name:linux os.release:18.04 stack:unstable us-east-1

CAPTURING METRICS

We wrote a custom plugin that plays well with Atlas.
You could write one for whatever your metrics
capturing service is.

AUTOSCALING

HOW TO AUTOSCALE

AWS offers 2 ways to scale

- Target Tracking
- Step Scaling

WHEN TO SCALE UP

Edit scaling policy



Conditions

Whenever of [Search all metrics](#)

is

for at least consecutive period(s) of

HOW TO SCALE UP

Actions

Add ▾	20	percent of group ▾	when jenkins.executorsUtilization is between 0.65 and 0.8	
Add	40	percent of group	when jenkins.executorsUtilization is greater than or equal to 0.8	
<div>⊕ Add step</div>				

 [Documentation](#)

Additional Settings



Policy Name jenkins-buildstest-bionic_classic-v030-NFLX/EPIC-jenkins.executorsUtilization-GreaterThanThreshold-0.65-1-60-1620084562030

Adjustment Step Add instances in increments of at least 5 instance(s)

Warmup Instances need 600 seconds to warm up after each step

WHEN TO SCALE DOWN

Query

[NAMED](#) [CUSTOM](#) [MANUAL](#)  [Help!](#)  Atlas UI

You can manually edit queries that are too complex for Custom Mode directly in Atlas Stack Language. If the edits result in an eligible query you can optionally switch to Custom Mode.

Query:

```
nf.app, jenkins, :eq,  
name, jenkins.executorsUtilization, :eq, :and,  
label, aws_.*.*v\d+, :re, :and,  
(, nf.app, nf.stack, label, ), :by,  
5m, :trend,  
0.25, :lt,  
15, :rolling-count,  
14, :gt,  
$(nf.app):$(nf.stack):$(label), :legend
```

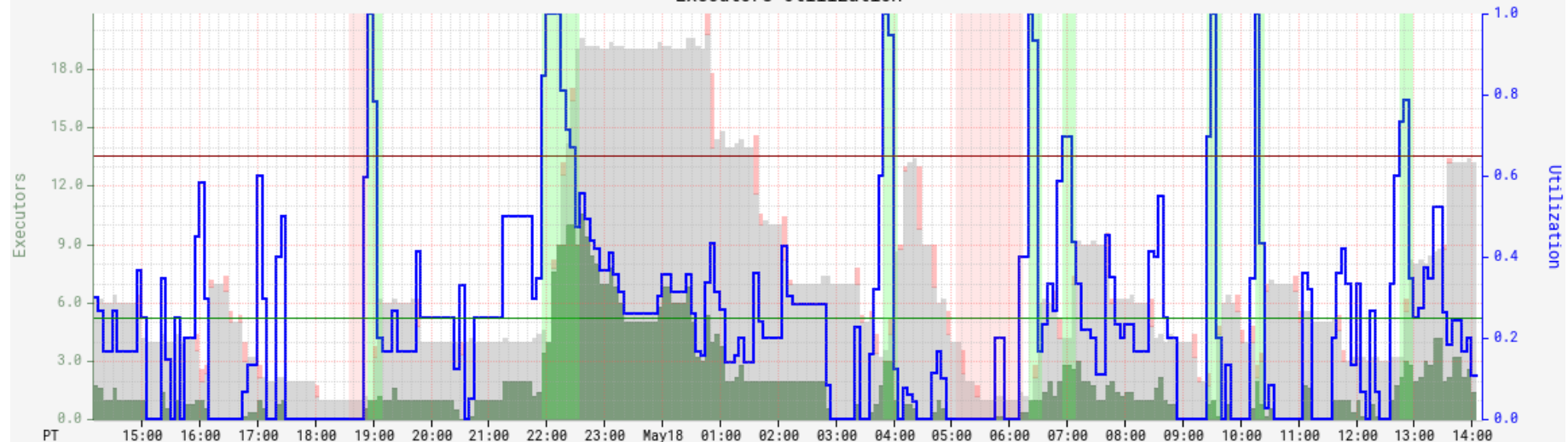
Named Query Compress Auto-break

HOW TO SCALE DOWN

Controller	ASG	Exception	Idl	Tot	Rto	IC	TC	ZC	Count
jenkins/mce	test/us-east-1/jenkins-mce-bionic_classic-1-v020		19	20	6	6	6	6	6
	OK i-091aa9055f8dac251								
	OK i-08aeaf14573f2653d								
	OK i-04414343adb901c59								
	OK i-06a513fe9d989f10a								
	OK i-0f6e7eec07f0c3421								
	OK i-007fe724966b114bc								
	Terminate and shrink 6								

RECAP

Executors Utilization



Axis 0: Executors

busy

Max : 10.600 Min : 0.000
Avg : 1.663 Last : 1.400
Tot : 477.300 Cnt : 287.000

idle

Max : 16.000 Min : 0.000
Avg : 5.206 Last : 11.800
Tot : 1.494k Cnt : 287.000

offline

Max : 3.800 Min : 0.000
Avg : 176.539m Last : 0.000
Tot : 50.667 Cnt : 287.000

Axis 1: Utilization

Utilization

Max : 1.000 Min : 0.000
Avg : 242.190m Last : 107.692m
Tot : 69.509 Cnt : 287.000

Scale Up Threshold

Max : 650.000m Min : 650.000m
Avg : 650.000m Last : 650.000m
Tot : 187.200 Cnt : 288.000

Scale Down Threshold

Max : 250.000m Min : 250.000m
Avg : 250.000m Last : 250.000m
Tot : 72.000 Cnt : 288.000

Scale Up Zone

Max : 1.000 Min : 0.000
Avg : 97.222m Last : 0.000
Tot : 28.000 Cnt : 288.000

Scale Down Zone

Max : 1.000 Min : 0.000
Avg : 62.500m Last : 0.000
Tot : 18.000 Cnt : 288.000

Frame: 1d, End: 2021-05-18T14:15-07:00[US/Pacific], Step: 5m
Fetch: 144ms (L: 120.0, 11.0, 8.0; D: 7.2k, 3.2k, 2.3M)

WHAT WE LEARNT

- This improved support experience

WHAT WE LEARNT

- This improved support experience
- This improved the experience for spiky workloads

THANK YOU!

jobs.netflix.com



How Netflix Autoscales CI

Rahul Somasunderam, cdCon 2021