

HOW NETFLIX AUTOSCALES CI

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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

- **AWS** has Auto Scaling Groups
- Spinnaker calls them Server Groups
- `<Application>-<Stack>-<Detail>-v<Version>`
- `jenkins-unstable-agent-highlander-`



HOW TO PLAN FOR CI INFRASTRUCTURE



INFINITE RESOURCES

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



INFINITE PATIENCE

- **P**lan 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
- **W**orks well with Containerizable builds
- Not all builds can be containerized
- **D**oes 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

C**P**U/Memory/**D**isk I**O**/Network throughput

- Natively supported by cloud providers and most metrics solutions

Scaling **P**olicies are supported by cloud providers



SYSTEM METRICS

Not very useful for CI



QUEUE DEPTH

Queue **D**epth seems adequately proportional.
However, it is a trailing metric.



AGENT UTILIZATION

For each agent, find [idle, busy, offline] executors.

Sum these up by ASG.

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



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

A**W**S offers 2 ways to scale

- **T**arget **T**racking
- Step Scaling




WHEN TO SCALE UP


Edit scaling policy 


Conditions

Whenever


Average 

of

(NFLX/EPIC) jenkins.executorsUtilization 

[Search all metrics](#) 

is

> 


0.65

None

for at least

1


consecutive period(s) of

1 minute 



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)



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

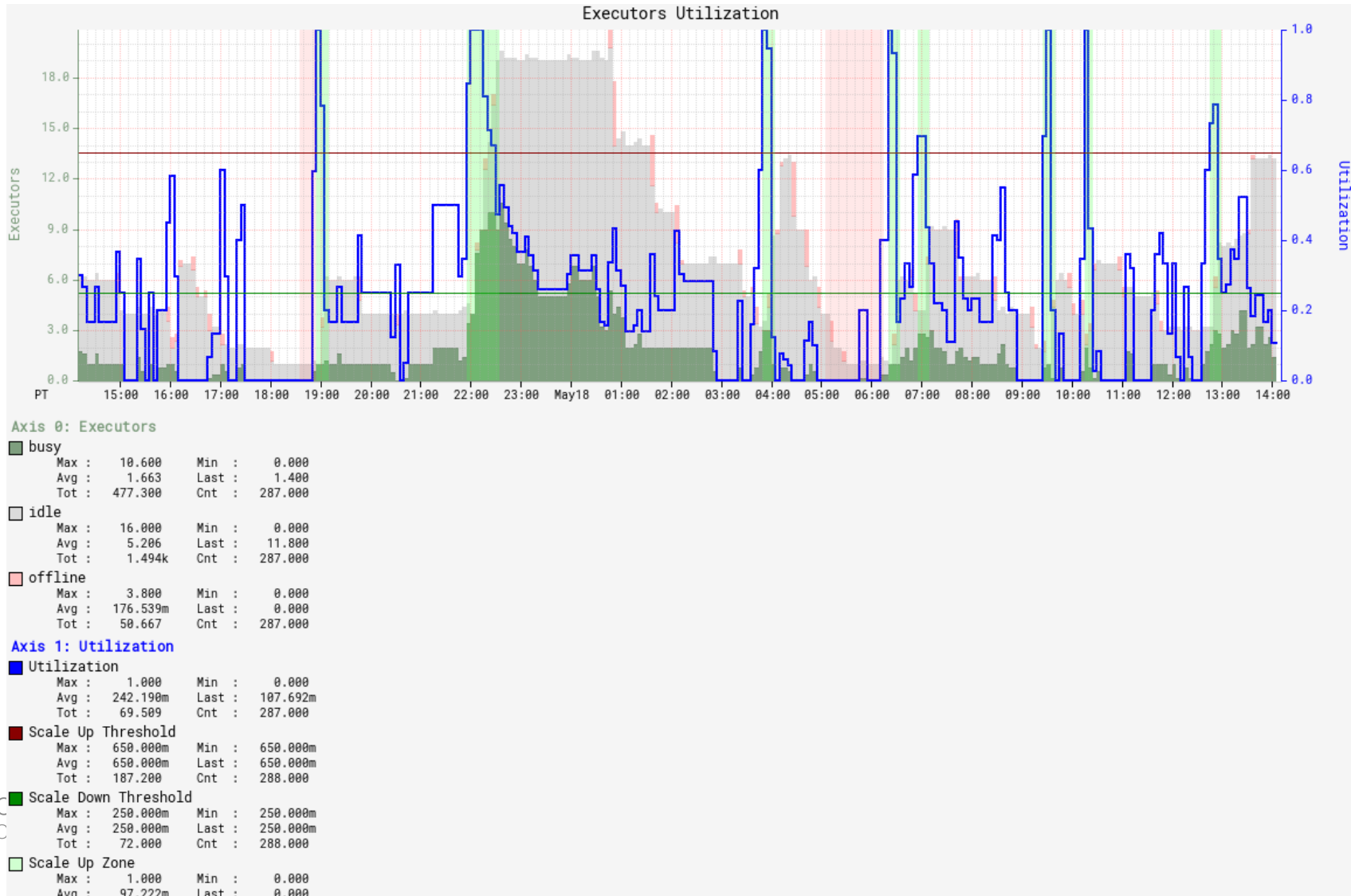


HOW TO SCALE DOWN

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



WHAT WE LEARNT

- **T**his improved support experience
- **T**his improved the experience for spiky workloads



THANK YOU!

jobs.netflix.com

