

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

- A**W**S has Auto Scaling Groups
- Spinnaker calls them Server Groups
- <Application>-<Stack>-<Detail>-
v<Version>
- jenkins-unstable-agent-highlander-
v123

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**PU**/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 of [Search all metrics](#)


is

for at least consecutive period(s) of



HOW TO SCALE UP

Actions

| | | | | |
|-----------------------|----|------------------|--|---|
| Add | 20 | percent of group | when <code>jenkins.executorsUtilization</code> is between 0.65 and 0.8 | |
| Add | 40 | percent of group | when <code>jenkins.executorsUtilization</code> 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

NAMEDCUSTOMMANUAL

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!

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