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

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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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However, it is a trailing metric.

AGENT UTILIZATION

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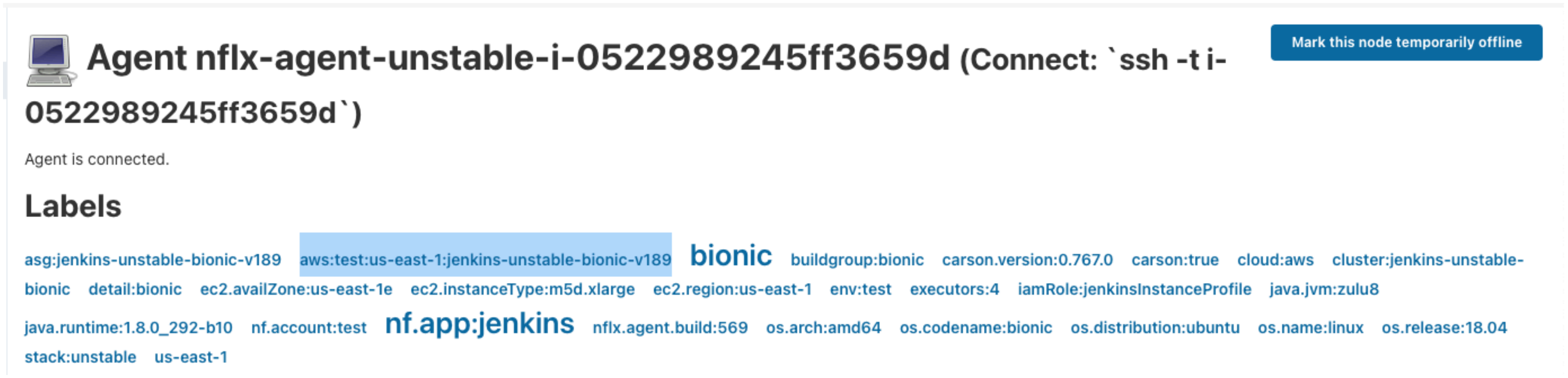
Sum these up by ASG.

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`)

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.

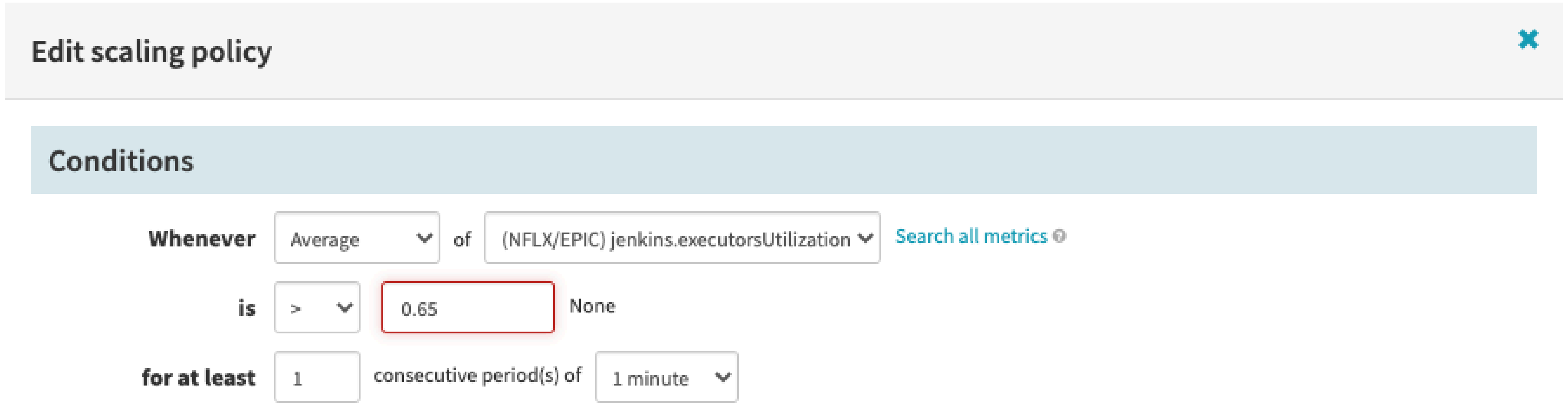
AUTOSCALING

HOW TO AUTOSCALE

AWS offers 2 ways to scale

- Target Tracking
- Step Scaling

WHEN TO SCALE UP



Edit scaling policy

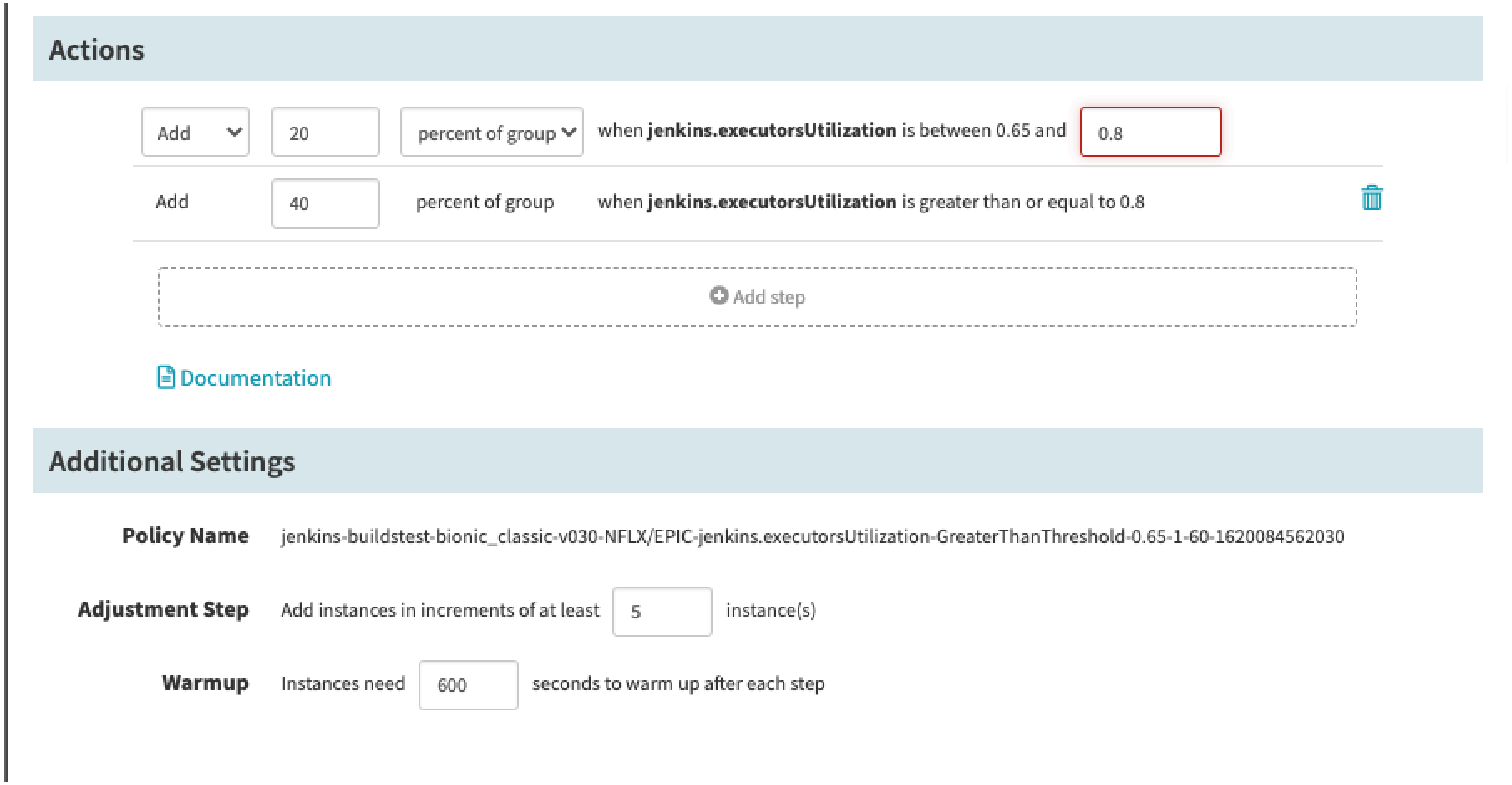
Conditions

Whenever Average of (NFLX/EPIC) jenkins.executorsUtilization

is > 0.65 None

for at least 1 consecutive period(s) of 1 minute

HOW TO SCALE UP



Actions

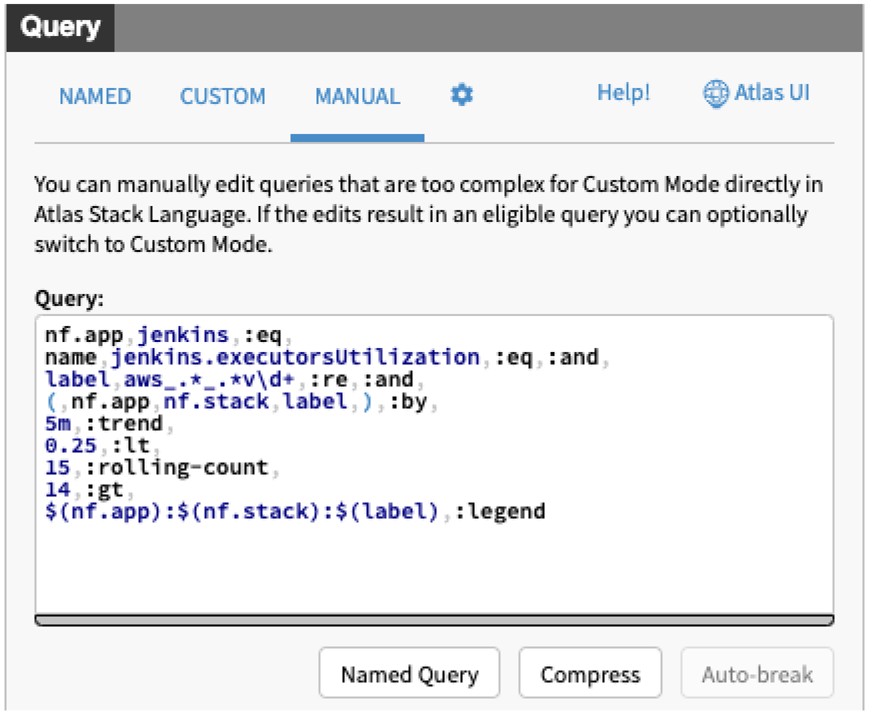
Add 20 percent of group when **jenkins.executorsUtilization** is between 0.65 and 0.8

Add 40 percent of group when **jenkins.executorsUtilization** is greater than or equal to 0.8

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

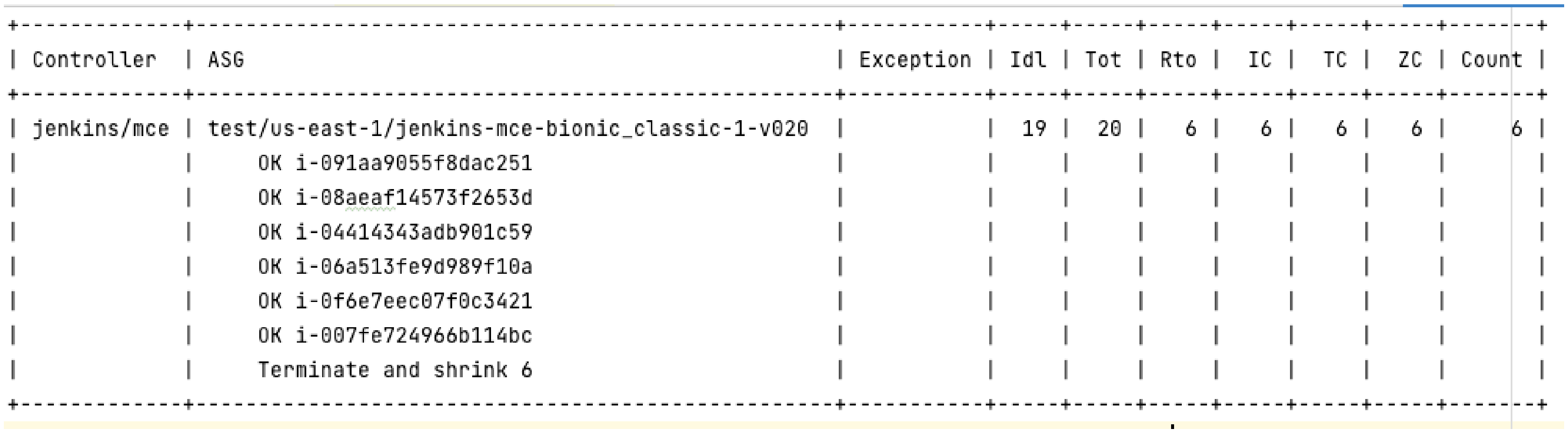


You can manually edit queries that are too complex for Custom Mode directly in Atlas Stack Language. If the edits result in an eligible query you can optionally switch to Custom Mode.

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
```

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

WHAT WE LEARNT

- This improved support experience

WHAT WE LEARNT

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

THANK YOU!

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