

Continuous Delivery for DC/OS with Spinnaker

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Deploying
software is
challenging

Why continuous delivery?

- Decrease risks of deployment
- Decrease cost of deployment
- Decrease delay between feature development and availability

Deployments should be:

- Safe
- Automated
- Flexible



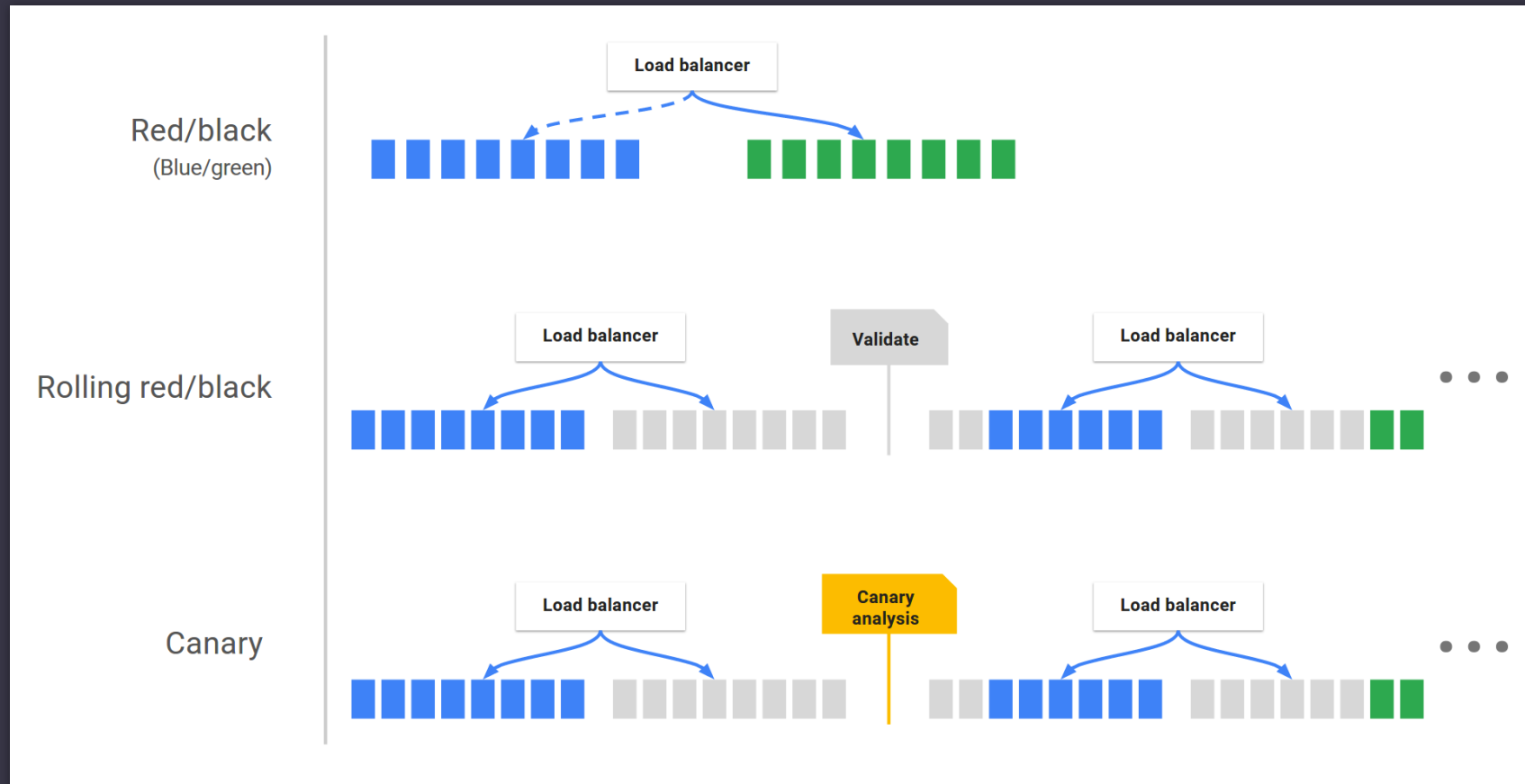
Safety features

- Unit tests
- Sandbox deployments
- Smoke tests
- Zero downtime deployments
- Rolling/canary deployments

Automation

- Automation is an enabler of safety
- Define and test the parts of deployments that aren't often performed
- Deploy smaller changes more frequently

Deployment Strategies



Flexible

- Many teams with similar needs, but some variation
- Engineers naturally want to automate
- Make it easy to share and reuse

How?

Introducing Spinnaker

The open-source, multi-cloud, continuous delivery tool

Continuous Delivery Features

- Pipelines from commit to production
- CI builds
- Image baking
- Deployment strategies
- Validation
- Promotion across environments

Multi-cloud



DC/OS



Microsoft Azure



Multi-cloud

- Spinnaker is multi-cloud but not a pure abstraction

Spinnaker Concepts

Applications, Clusters, Server Groups, and Instances

Applications and Clusters

Application

Clusters

SPINNAKER Search Projects Applications anonymous ▾

mesoscon PIPELINES CLUSTERS TASKS

Clusters Edit multiple Show ☒ Instances ☐ with details Create Server Group

DEMO-ACCOUNT mesoscon 5 ▲ : 100%

US-WEST-1

V000: library/nginx:1.13.2 5 ▲ : 100%

DEMO-ACCOUNT mesoscon-dev 3 ▲ : 100%

US-WEST-1

V000: library/nginx:1.13.2 3 ▲ : 100%

SEARCH

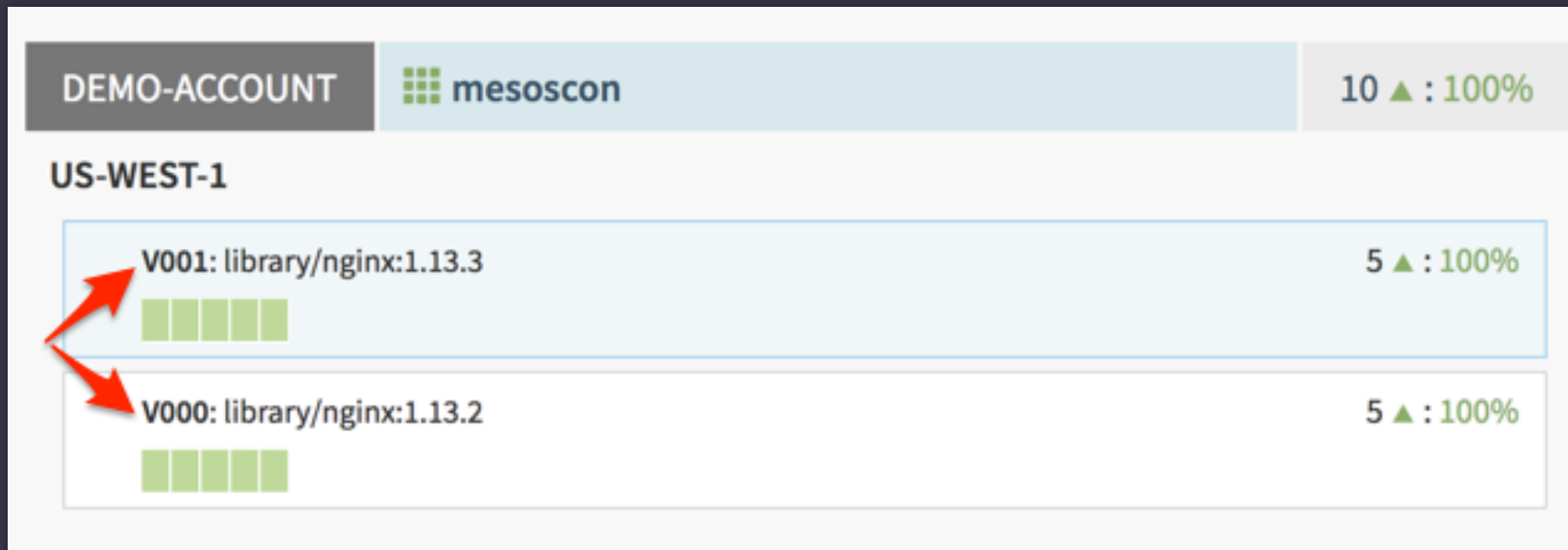
ACCOUNT

REGION

STACK

STATUS

Server Groups and Instances



Marathon applications and tasks

Clusters Edit multiple Show ☒ Instances ☐ with details Create Server Group

DEMO-ACCOUNT mesoscon-dev-mybranch 5 ▲ : 100%

US-WEST-1

V000: library/nginx:1.13.2 5 ▲ : 100%

DEMO-ACCOUNT mesoscon-prod 10 ▲ : 100%

US-WEST-1

V001: library/nginx:1.13.3 5 ▲ : 100%

V000: library/nginx:1.13.2 5 ▲ : 100%

Services > demo-account Running (15 of 15)

Filter

NAME ▲	STATUS ?	CPU	MEM
mesoscon-dev-mybranch-v000	Running (5/5)	2.5	320 MiB
mesoscon-prod-v000	Running (5/5)	2.5	320 MiB
mesoscon-prod-v001	Running (5/5)	2.5	320 MiB

Create New Server Group

Create New Server Group

BASIC SETTINGS

CONTAINER SETTINGS

NETWORK

ENVIRONMENT VARIABLES

LABELS

HEALTH CHECKS

VOLUMES

OPTIONAL

Basic Settings

Account

demo-account

Region

us-west-1

Group

Stack

dev

Detail

example

CPUs

0.5

GPUs

0

Memory (MiB)

512

Disk (MiB)

0

Instances

1

Command

Your server group will be in the cluster:

mesoscon-dev-example (new cluster)

Container Settings

Container Image

Please type your search...

Cancel

Create

Create New Server Group

Create New Server Group

BASIC SETTINGS

CONTAINER SETTINGS

NETWORK

ENVIRONMENT VARIABLES

LABELS

HEALTH CHECKS

VOLUMES

OPTIONAL

Basic Settings

Account

demo-account

Region

us-west-1

Group

Stack

dev

Detail

example

CPU

0.5

GPU

0

Memory (MiB)

512

Disk (MiB)

0

Instances

1

Command

Your server group will be in the cluster:
mesoscon-dev-example

Container Settings

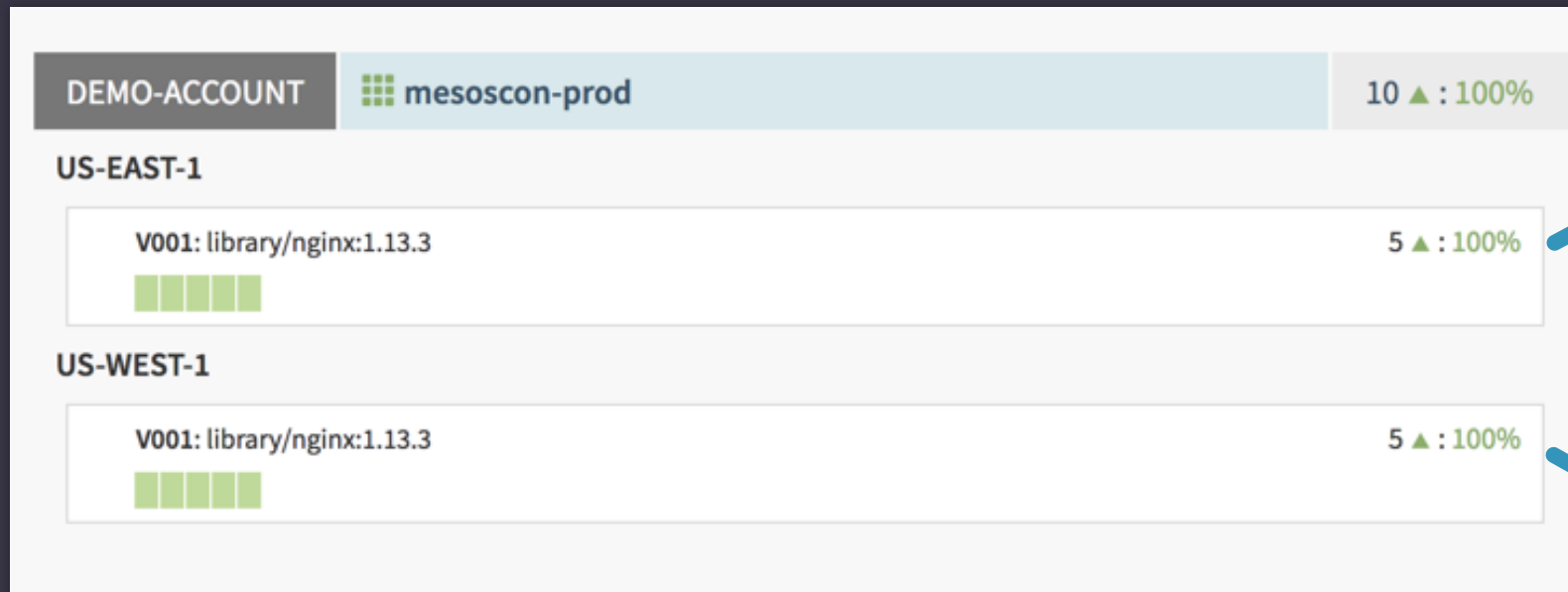
Container Image

Please type your search...

Cancel

Create

Multi-Region Deployments



Pipelines



Triggers



Docker Registry Trigger



Automated Triggers

Type	Docker Registry ↕	Executes the pipeline on an image update	
Registry Name	my-docker-registry	▼	↺
Organization	willgorman	▼	
Image	willgorman/mesoscon-spinnaker-demo	▼	
Tag ?	master-\d+		
Run As User ?	Select Run As User	↕	
<input checked="" type="checkbox"/> Trigger Enabled			

DC/OS Stages Supported

- Pipeline Stages
 - Check preconditions
 - Deploy
 - Destroy Server Group
 - Disable Cluster
 - Find Image from Cluster
 - Jenkins, Manual Judgement, Pipeline, Resize Server Group, Run Job, Scale Down Cluster, Script, Shrink Cluster, Wait
- Server Groups
 - Create
 - Resize
 - Clone
 - Destroy

Deploy





Deploy Configuration

	Account	Cluster	Region	Strategy	Capacity	Actions
↕	DEMO-ACCOUNT	mesoscon-prod	us-east-1	[none]	5	  
↕	DEMO-ACCOUNT	mesoscon-prod	us-west-1	[none]	5	  

 Add server group

Execution Options

If stage fails

- ☒ halt the entire pipeline 
- ☐ halt this branch of the pipeline 
- ☐ halt this branch and fail the pipeline once other branches complete 
- ☐ ignore the failure 

Destroy Server Group

Stage Name

Destroy New Version

 Remove stage

Depends On 

Smoke Test



Select...

Destroy Server Group Configuration

Account

demo-account



Regions

☒ us-east-1

☒ us-west-1



Deselect All

Cluster 



[Toggle for text input](#)

Target

Newest Server Group



Run Job

Execute a Metronome job as a step in a pipeline.

Write JSON or property file output to the Mesos sandbox to create context for later steps

Run Job Configuration

Account	dcos-account		
Region	us-west-1		
General	ID	tests	
	Description	Post-deploy smoke test	
	CPUs	0.01	GPUs 0
	Memory (MiB)	128	Disk (MiB) 0
	Command		
Docker Container	Registry Name	cerner-docker-artifactory	↻
	Organization	No organization	▼
	Image	test	▼
	Tag	awstest	▼
Labels	Attach metadata to services to expose additional information to other services.		
	Key	Value	
	<div>➕ Add Field</div>		
Property File	test-result.json		

Pipeline Expressions

- Spring Expression Language
- Works almost anywhere
- Generate attributes of pipelines at run-time
- Evaluate to test for pipeline branching conditions

The screenshot displays a user interface for a pipeline stage. At the top, a 'Comments' section contains the Spring Expression Language (#{ #stage('Deploy in us-west-2')}). Below this, a dropdown menu is open, showing a list of attributes and their values for the stage. The attributes include:

- ['id']**: 9ce81ed0-6f1a-44f6-82ad-809c47bd6c58-1-Deployinustwest2
- ['type']**: deploy
- ['name']**: Deploy in us-west-2
- ['startTime']**: 1474386589661
- ['endTime']**: 1474386854141
- ['status']**: SUCCEEDED
- ['immutable']**: false
- ['initializationStage']**: false
- ['parentStageId']**: 9ce81ed0-6f1a-44f6-82ad-809c47bd6c58
- ['refId']**: null
- ['requisiteStageRefIds']**: null
- ['syntheticStageOwner']**: STAGE_AFTER
- ['scheduledTime']**: 0
- ['lastModified']**: null
- ['context']['healthCheckType']**: EC2

Pipeline Expressions

Parameters

Name

custom_label

Description

The value of our custom label

Default Value

Show Options

☐

+ Add Parameter

Configure Deployment Cluster

- BASIC SETTINGS
- CONTAINER SETTINGS
- NETWORK
- ENVIRONMENT VARIABLES
- LABELS**
- HEALTH CHECKS
- VOLUMES
- OPTIONAL

Environment Variables

Labels

Attach metadata to services to expose additional information to other services.

Key

Value

CUSTOM_LABEL

`${parameters.custom_label}`

[Expression Docs](#)

+ Add Field

Health Checks

Perform health checks on running tasks to determine if they are operating as expected.

+ Add Health Check

Deployment Safeguards

Execution Windows

☒ Restrict execution to specific time windows

Days of the Week (No days selected implies execution on any day if triggered)

SunMonTueWedThuFriSat

AllNoneWeekdaysWeekend

Time of Day

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	

This stage will only run within the following windows (all times in PDT):

From

07

:

00

to

10

:

00

+ Add an execution window

Execution Windows

Pipelines

+ - Group by Pipeline Show 2 executions per pipeline

wait

Safe Deployment 1

MANUAL START
qcon-2017-workshop/qcon2017:3778f7b2211362d
clin@netflix.com
a few seconds ago
[Details](#)

Status: **SUSPENDED** Duration: 00:05

Deploy (waiting for execution window)
Execution Windows Configuration
Stage execution can only run:
From 07:00 **to** 10:00 **PDT**
On Tue
[Skip remaining window](#)

[Create](#) [Configure](#) [Start Manual Execution](#)


[Configure](#) [Start Manual Execution](#)

[Configure](#) [Start Manual Execution](#)

Traffic Guards

Traffic Guards

Traffic Guards allow you to specify critical clusters that should always have active instances. If a user or process tries to delete, disable, or resize the server group, Spinnaker will verify the operation will not leave the cluster with no active instances, and fail the operation if it would.

Account	Region ?	Stack ?	Detail ?	Matched clusters
dcos-account ▾	us-west-2 ▾	dev		DCOS-ACCOUNT myapp-dev in us-west-2-eng 

 Add Traffic Guard

 Revert

 Save Changes

Chaos Monkey

Chaos Monkey ☒ Enabled

Termination frequency
Mean time between terms days ? Minimum time between terms days ?
Grouping ? ☐ App ☐ Stack ☒ Cluster ☒ Regions are independent ?

Exceptions ?

Account	Region	Stack	Detail	
<input type="text" value="prod"/>	<input type="text" value="us-west-2"/>	<input type="text" value="staging"/>	<input type="text"/>	
<input type="text" value="test"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	

Add Exception

Documentation
Chaos Monkey documentation can be found [here](#).

☒ In sync with server



Spinnaker Patterns for DC/OS

Deployment timeouts



```
"docker": {
  "image": {
    "account": "my-docker-registry",
    "imageId": "index.docker.io/library/nginx:oops",
    "registry": "index.docker.io",
    "repository": "library/nginx",
```



Deploy Configuration

	Account	Cluster	Region	Strategy	Capacity	Actions
↑	DEMO-ACCOUNT	mesoscon	us-west-1	[none]	N/A	✎ 📄 🗑️

➕ Add server group

Execution Options

If stage fails

- ☐ halt the entire pipeline ?
- ☐ halt this branch of the pipeline ?
- ☐ halt this branch and fail the pipeline once other branches complete ?
- ☒ ignore the failure ?

☐ Restrict execution to specific time windows

☒ Override default timeout (1 hour) ?

Fail this stage if it takes longer than hours minutes to complete

☐ Conditional on [Expression](#) ?

Destroy Server Group Configuration

Account

Regions ☒ us-west-1

Cluster [Toggle for list of existing clusters](#)

Target

Execution Options

- If stage fails**
- ☒ halt the entire pipeline [?](#)
 - ☐ halt this branch of the pipeline [?](#)
 - ☐ halt this branch and fail the pipeline once other branches complete [?](#)
 - ☐ ignore the failure [?](#)

☐ **Restrict execution to specific time windows**

☒ **Conditional on Expression** [?](#)

```
${#stage('Deploy in us-west-1')['context']['exception']['exceptionType'].toString()  
== 'TimeoutException'}
```

DEMO-ACCOUNT

Timeout Example

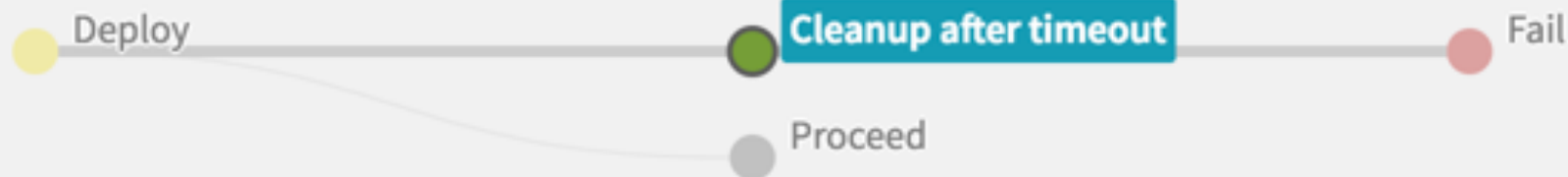
[Configure](#)

[Start Manual Execution](#)

MANUAL START

wg9059
7 minutes ago

[Details](#)



STAGE DETAILS: CLEANUP AFTER TIMEOUT

Duration: 00:21

Step	Started	Duration	Status
Destroy Server Group: mesoscon-v009 (us-west-1)	2017-08-16 23:39:32 EDT	00:21	SUCCEEDED

Incremental Automation

- Problem: Not everything in our release process is completely automated yet

Manual Judgment to Rollback

▼	DEMO-ACCOUNT	Deploy to Dev	Trigger: enabled	⚙️ Configure	▶ Start Manual Execution
No executions found matching the selected filters.					
➤	Manual Judgment		Trigger: enabled	⚙️ Configure	⚙️ Starting Manual Execution...
➤	DEMO-ACCOUNT	Demo	Trigger: enabled	⚙️ Configure	▶ Start Manual Execution

Configuration Change Triggers

- Problem: Spinnaker pipeline configuration isn't the primary source for our application configuration
- Prefer configuration to be stored in version control or generated to reduce duplication across applications

Configuration Change Triggers

Automated Triggers

Type	Git	Executes the pipeline on a git push
Repo Type	github	
Organization or User	foo	
Project	bar	
Branch		

Edit Pipeline JSON

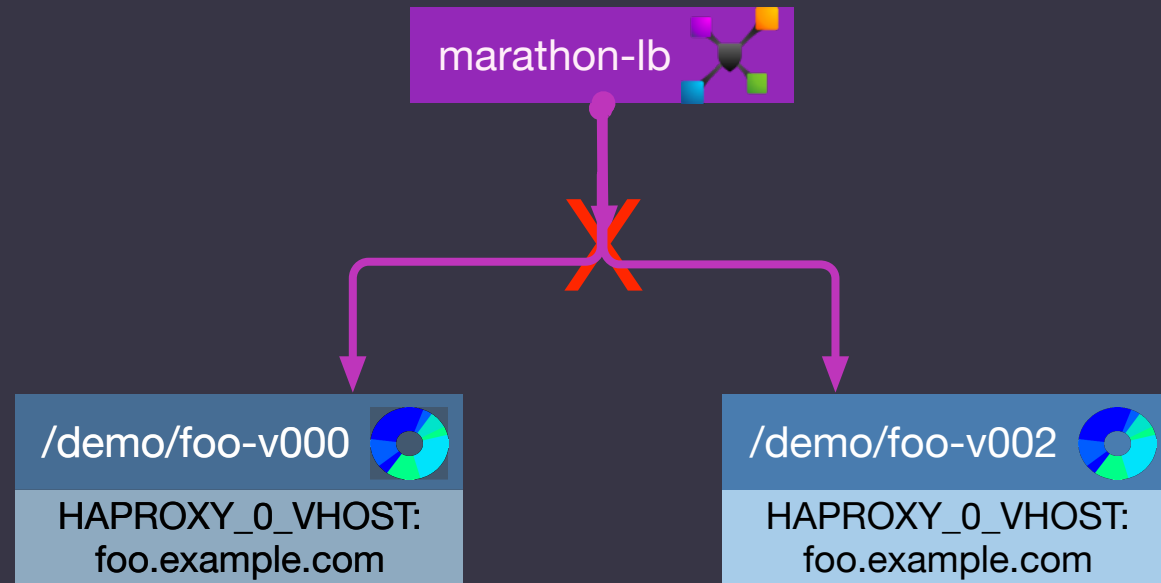
The JSON below represents the pipeline configuration in its persisted state. You can change it here or use this to quickly copy

```
"desiredCapacity": 5,
"disk": 0,
"docker": {
  "forcePullImage": false,
  "image": {
    "imageId": "index.docker.io/willgorman/mesoscon-spinnaker-demo:latest",
    "registry": "index.docker.io",
    "repository": "willgorman/mesoscon-spinnaker-demo",
    "tag": "latest"
  },
  "network": "BRIDGE",
  "parameters": [],
  "privileged": false
},
"dockerVolumes": [],
"env": "${#fromJsonFromUrl('https://raw.githubusercontent.com/foo/bar/master/config.json')}",
"events": [],
"externalVolumes": [],
"fetch": [],
"forceDeployment": false,
```

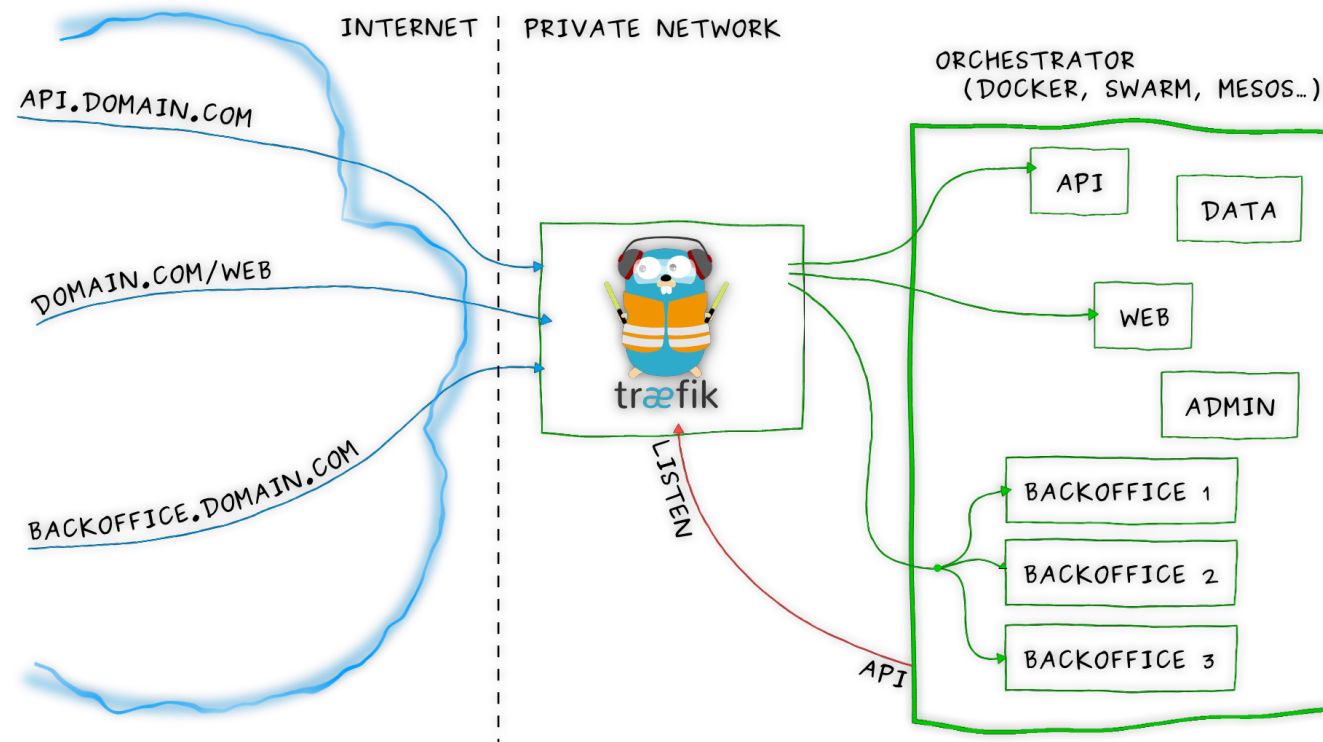
Load Balancer

- Problem: Marathon-LB doesn't support Spinnaker load balancer operations

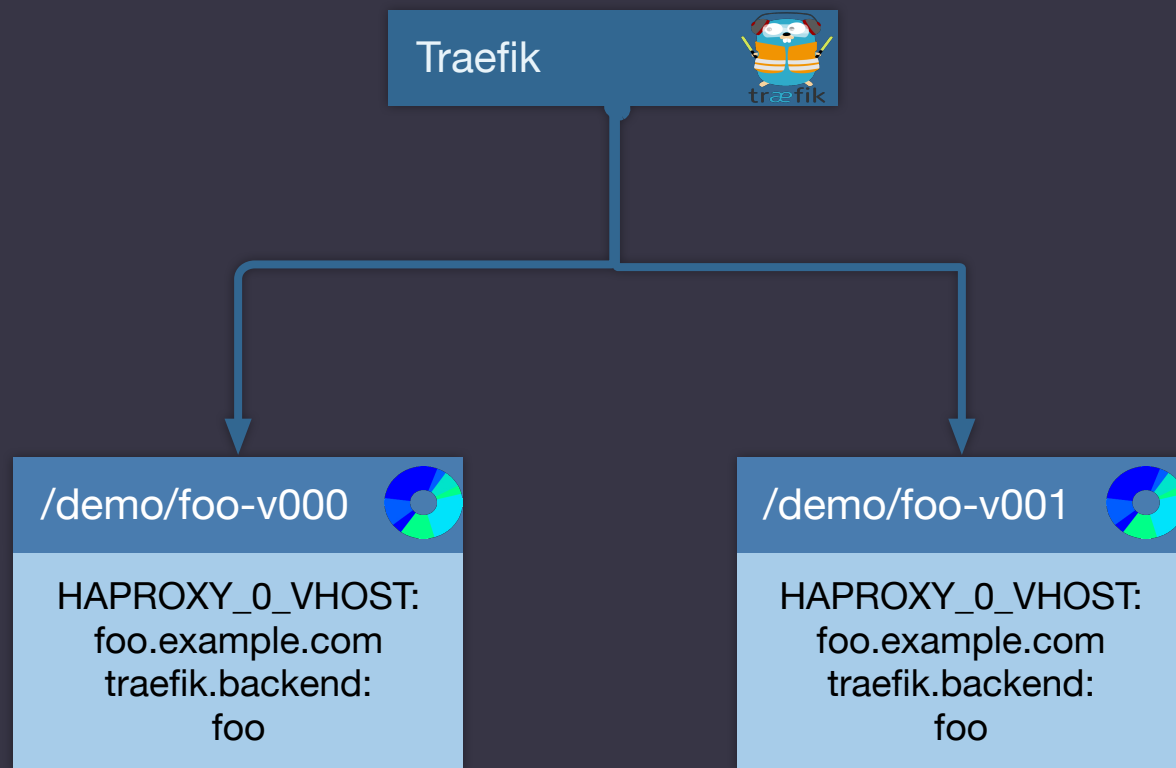
Load Balancer



Traefik



Traefik



Load Balancer

- Problem: Traefik still discovers routing rules through labels, which can't change after an instance is started
 - Solution – DC/OS 1.10 programmable Edge-LB package (beta)

Clusters Edit multiple Show Instances with details Create Server Group

DEMO-ACCOUNT mesoscon-dev 5 ▲ : 100%

US-WEST-1
V022: willgorman/mesoscon-spinnaker-demo:0.12 5 ▲ : 100%

DEMO-ACCOUNT mesoscon-prod 5 ▲ : 100%

US-WEST-1
V065: willgorman/mesoscon-spinnaker-demo:0.12 5 ▲ : 100%

Enterprise and Open Source DC/OS

- Only supports DC/OS Enterprise authentication methods currently
- DC/OS Open Source works with authentication disabled

Thanks!

- <https://www.spinnaker.io/>
- Slack: <https://join.spinnaker.io>
- <http://careers.cerner.com>
- <http://engineering.cerner.com>