

Unit Testing Docker Images

USING GOOGLE'S CONTAINER STRUCTURE TEST FRAMEWORK

Joann

About Me

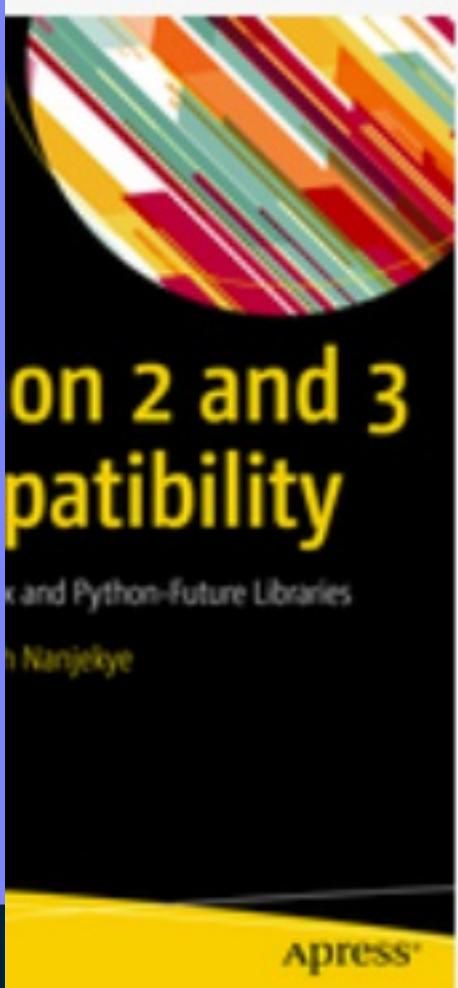
- Joannah N^anje^ky^e
- Software Engineer
- Aeronautical Engineer to be..
- FOSS (Open source) Contributor.



OUTREACHY



Author...



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Python 2 and 3 Compatibility

With Six and Python-Future Library

Authors: **Nanjekye, Joannah**

[Download source code](#)

Coming soon...

Deploying and Managing Python Applications with Kubernetes By
Apress.

Get some of my container talks

Ruby in Containers (EuRuKo 2018) - Best Practices for implementing images.

House Keeping

- We may not have Q and A due to time.
- Please catch up for a chat later.

Agenda

- What are containers.
- How to create them.
- Most importantly how to unit test them.
- A quick tour of the Google Container Structure Test Framework.
- Implement some live tests for a python app container image.

What are containers

- Sand box for our applications.
- Logical package for applications.
- Applications are packaged with their libraries.
- To a developer;
 - Productivity improved
 - Portability
 - Ease of scaling

Why...

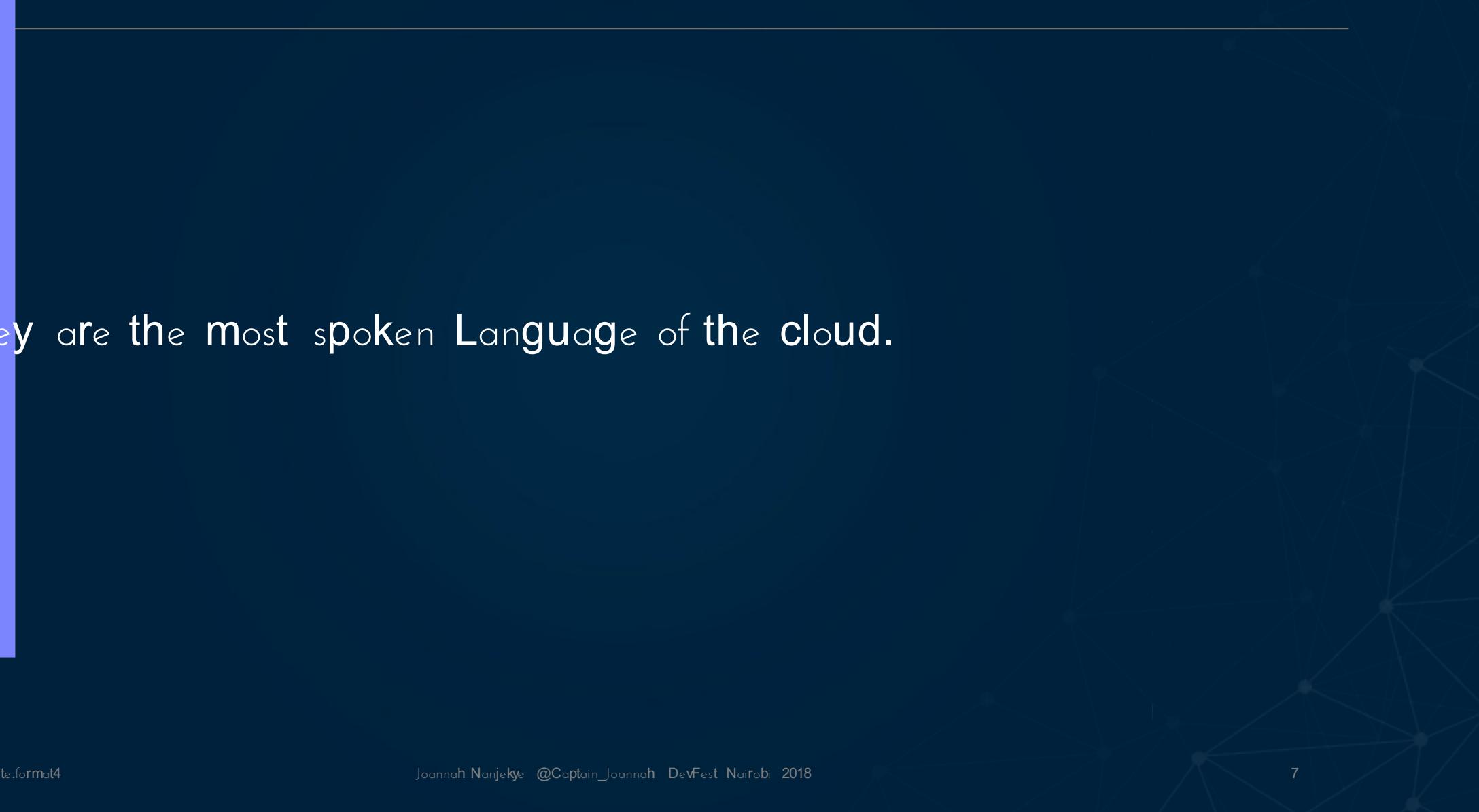


Most importantly...

Containers usher us into using better platforms like kubernetes.



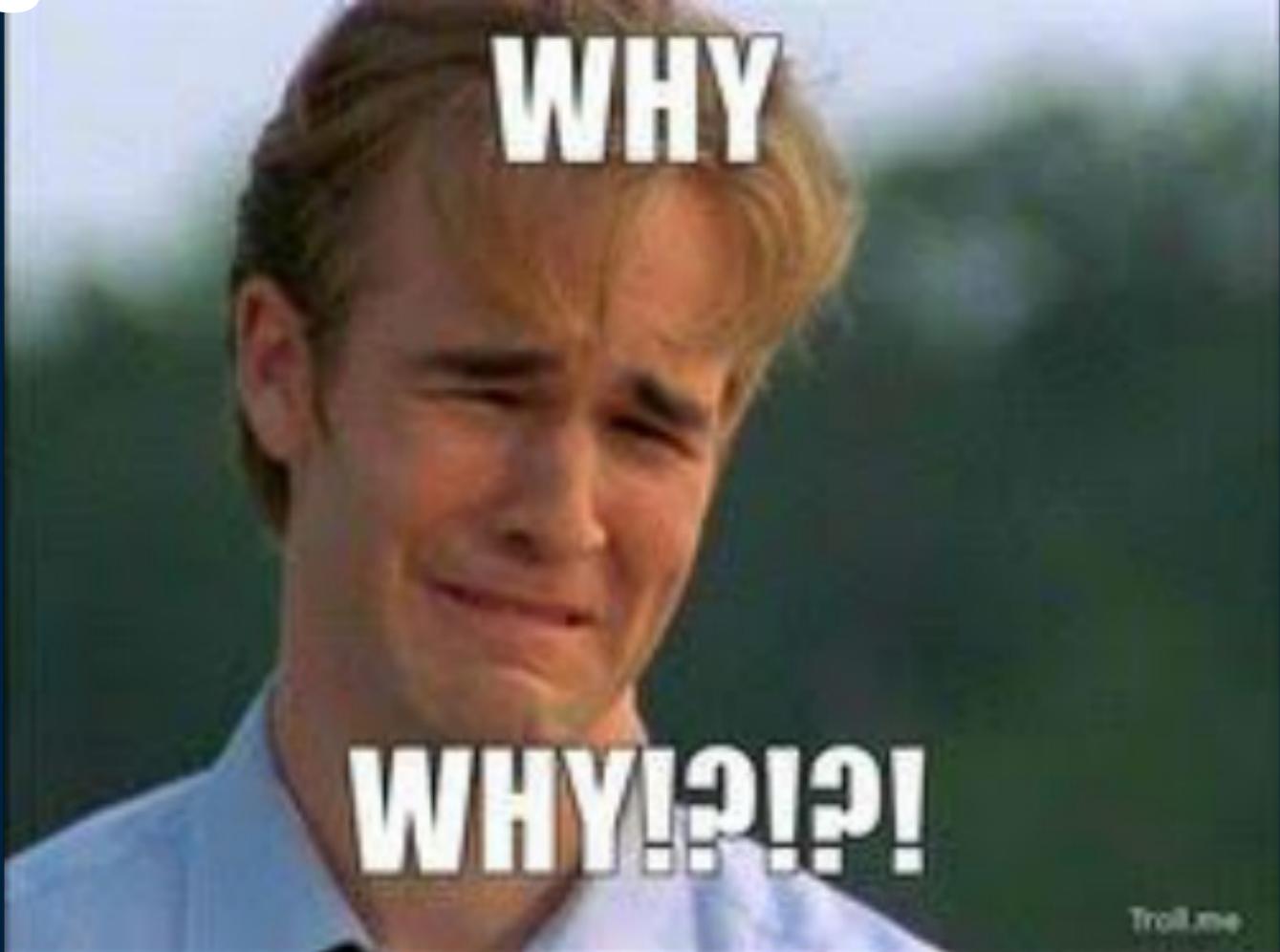
They are the most spoken Language of the cloud.



Containers in a nut shell



Testing Container Images....



- Like Code, Containers also need to be tested before being deployed to Production.



How... stand on the shoulders of others

- The Container Structure Test Framework.
- Released Earlier this year.
- Being used by Google to test all of their team's released containers

Types of tests supported;

- **Command Tests** - Run a command inside your container image and verify the output or error it produces
- **File Existence Tests** - Check existence of a file in a given location in the image's filesystem
- **File Content Tests** - Check contents and metadata of a file in the filesystem
- **A unique Metadata Test** - to verify configuration and metadata of the container itself

Requirements

- The container structure test binary or Docker image.
- An image to test against.
- A .yaml or .json file with tests to run inside the container.

For Example...

```
#app.py  
  
import sysfrom PyQt4 import  
QtGui  
  
app =  
QtGui.QApplication(sys.argv)  
  
window =  
QtGui.QWidget()window.setGeometry(0, 0, 500,  
300)window.setWindowTitle("De  
ploying and Managing Python  
with Kubernetes")  
  
window.show()
```

```
#Dockerfile  
  
FROM python:3.6  
  
MAINTAINER nanjekyejoannah  
"https://github.com/nanjekyejoannah"  
  
COPY ./app  
  
WORKDIR /app  
  
RUN pip3 install -r  
requirements.txt  
  
CMD [ "python", "./app.py" ]
```

#requirements.txt

PyQt5

Command Tests...

CommandTests:

- name: "python package installation"
command: "which"
args: ["python"]
expectedOutput: ["/usr/bin/python"]
- name: "bundler package installation"
command: "which"
args: ["bundler"]
expectedOutput: ["/usr/bin/bundler"]

File Existence Tests

fileExistenceTests:

- name: 'requirements.txt'
path: '/app/requirements.txt'
shouldExist: true
permissions: '-rwxr-xr-x'
- name: 'Code file'
path: '/app/app.py'
shouldExist: true
permissions: '-rwxr-xr-x'

File contents....

fileContentTests:

- name: 'requirements.txt'

- path: '/requirements.txt'

- expectedContents: ["PyQt5"]

Meta-data Tests

```
metadataTest:
```

```
  labels:
```

```
    - key: 'MAINTAINER'
```

```
      value: 'Joannah Nanjekye'
```

```
      workdir: ['/app']
```

```
CMD [ "python", "./app.py" ]
```

Running the tests

```
docker build python_image
```

```
./container-structure-test test --image python_image --config  
test_config.yaml
```

Demo: Task

- Create a Flask App.
- Containerize it.
- Write structure tests for the image.
- Run the tests.

Inspiration

Abby Fuller's Dockercon 2017 talk.

Source Code

https://github.com/nanjekyejoanna/testing_docker_images

References

- <https://opensource.googleblog.com/2018/01/container-structure-tests-unit-tests.html>
- <https://github.com/GoogleContainerTools/container-structure-test>