Declarative Cluster Testing with KUTTL

Ken Sipe

KubeCon | CloudNativeCon
North America 2020
Virtual

Schnook

Actor

Henhouse Henery (1949)

Who Framed Roger Rabbit (1988)
Space Jam (1996)

KFC, Oscar Mayer and GEICO

@FoghornRoost

Foghorn Leghorn (he / him / rooster / schnook)

Rooster

Henhouse Henery (1949)

Who Framed Roger Rabbit (1988)
Space Jam (1996)

KFC, Oscar Mayer and GEICO

@FoghornRoost

Ken Sipe (he / him / boy / dog / rooster)

Distributed Application Engineer
And Orchestration Conductor

Apache Mesos, Kubernetes, KUDO, KUTTL

Developer: Java, Go, Python, Scala, Groovy, C, C++, C#

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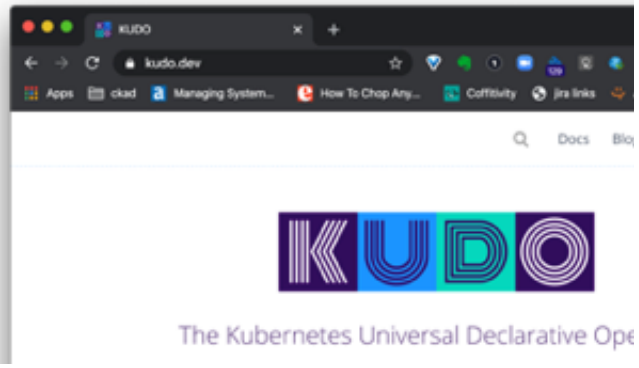
What is KUTTL

KUbernetes Test TooL (kuttl)

KUTTL Origins

Kubernetes Universal **Declarative** Operator (KUDO)

Declarative Testing



What is KUTTL

~~Unit~~

Integration

e2e

End-to-End Tests

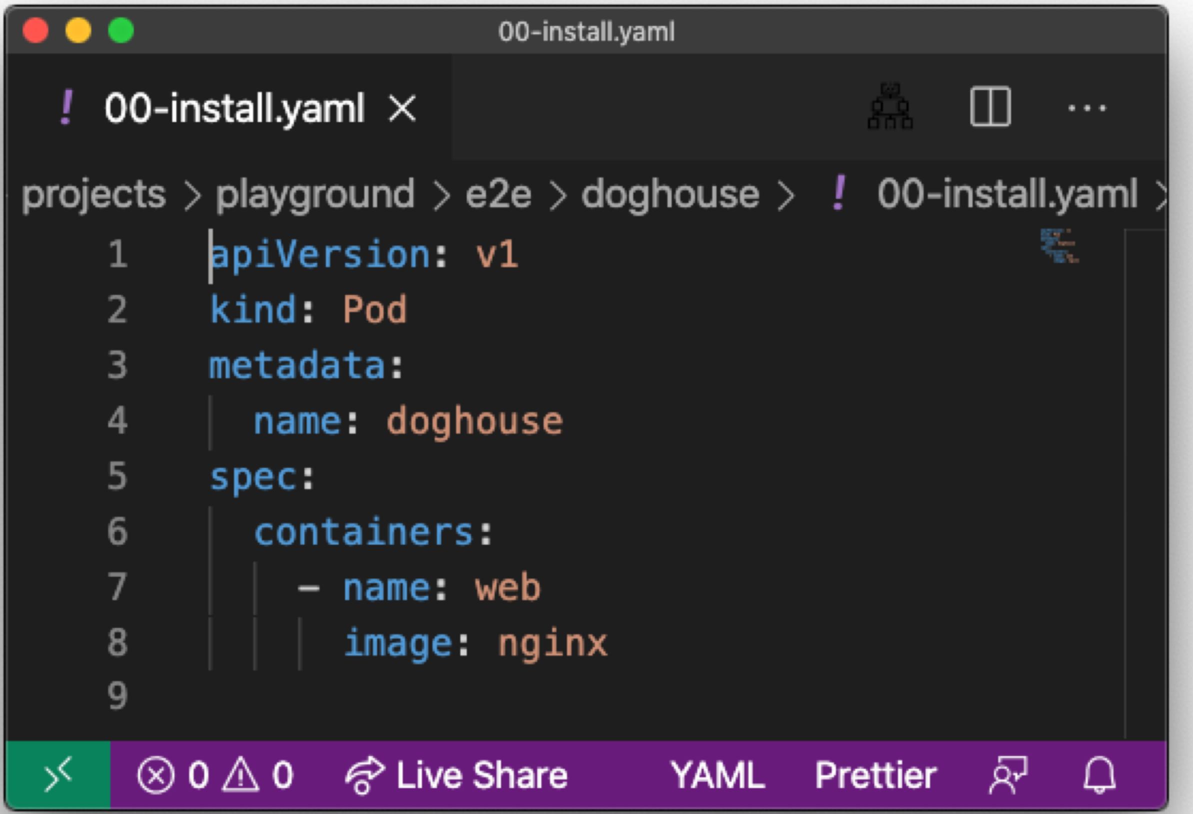
- Tests the full stack (front to back to front round trip)
- Not necessarily developers
- Variety of Clusters
- Various Versions of Clusters
- Test in The Client ENV

- Provides a Working Example of Expectations (from user perspective)

Declarative Testing

What does that mean?

Test Setup

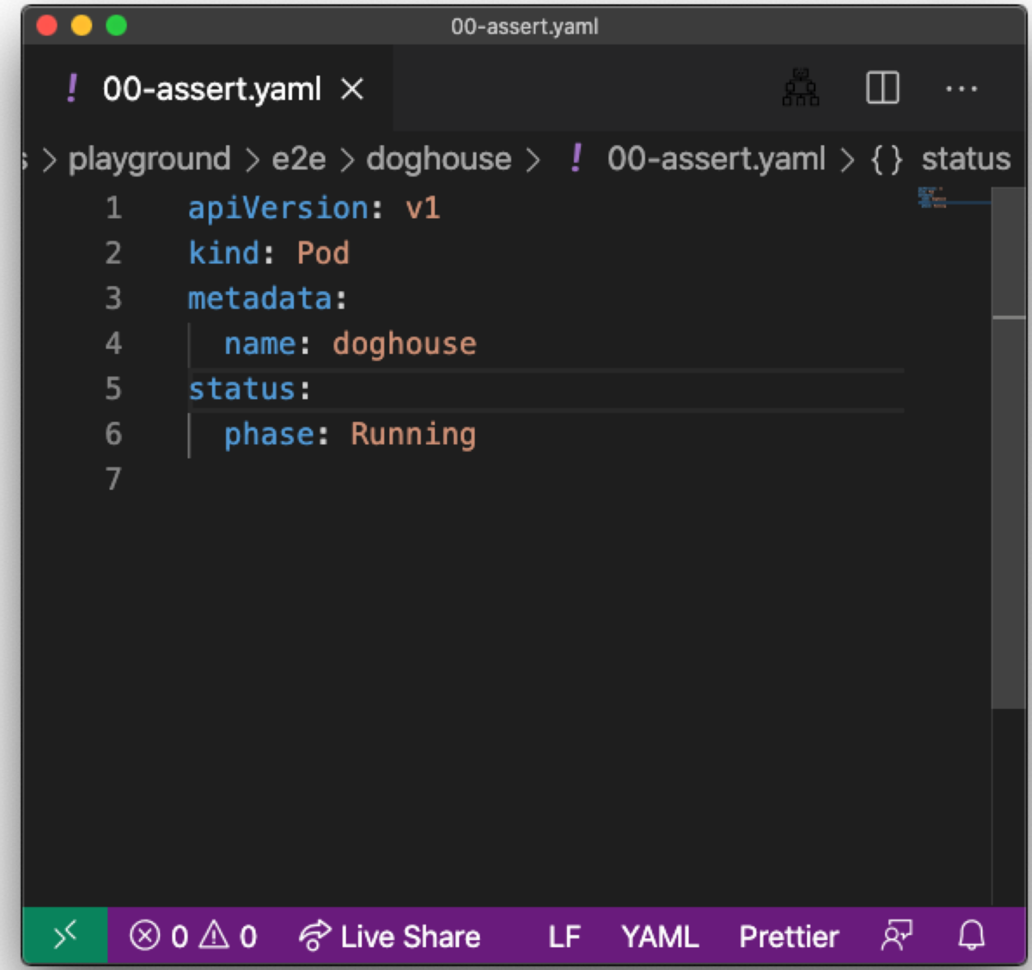

00-install.yaml
projects > playground > e2e > doghouse > 00-install.yaml
0 0 Live Share YAML Prettier

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: doghouse
spec:
  containers:
    - name: web
      image: nginx
```

Declarative Testing

What does that mean?

Assert!

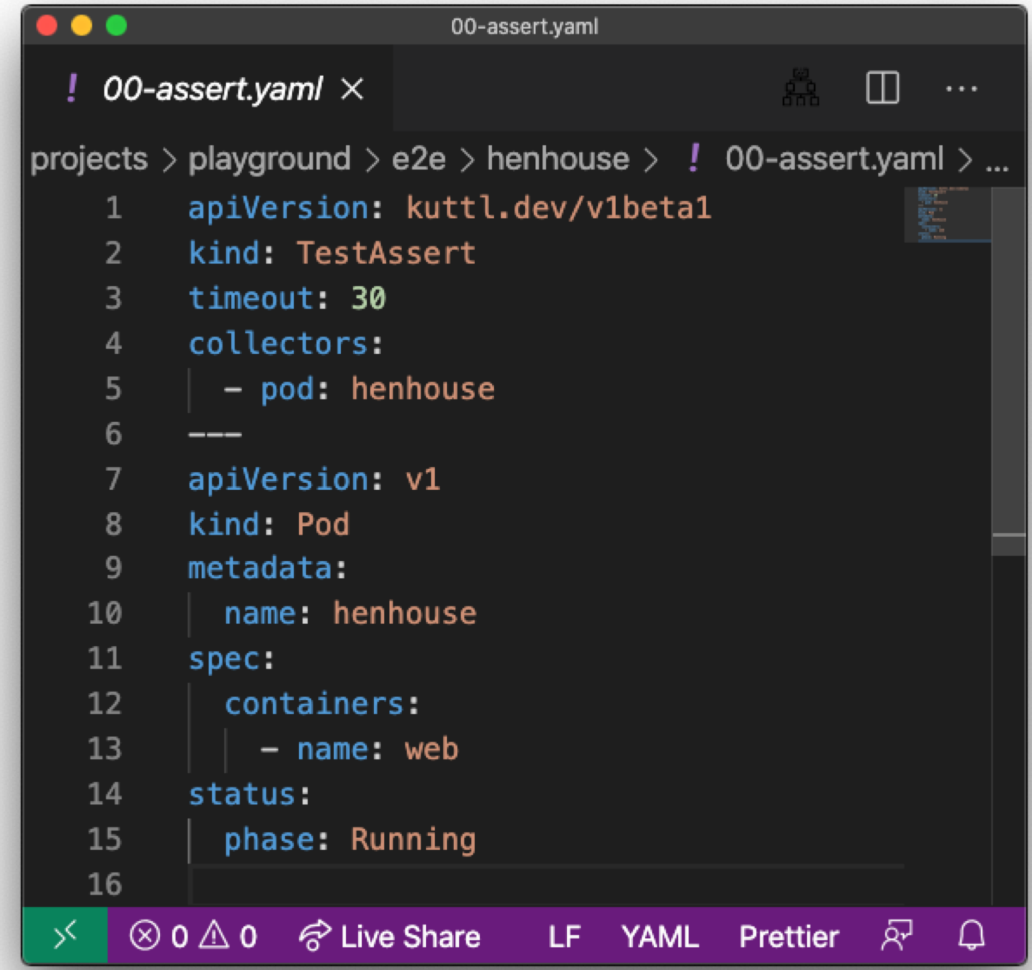


```yaml
apiVersion: v1
kind: Pod
metadata:
  name: doghouse
status:
  phase: Running
```

Declarative Testing

What does that mean?

Assert!


00-assert.yaml
projects > playground > e2e > henhouse > 00-assert.yaml > ...
0 0 Live Share LF YAML Prettier

```yaml
apiVersion: kuttl.dev/v1beta1
kind: TestAssert
timeout: 30
collectors:
  - pod: henhouse
---
apiVersion: v1
kind: Pod
metadata:
  name: henhouse
spec:
  containers:
    - name: web
status:
  phase: Running
```

WELL, I DO DECLARE

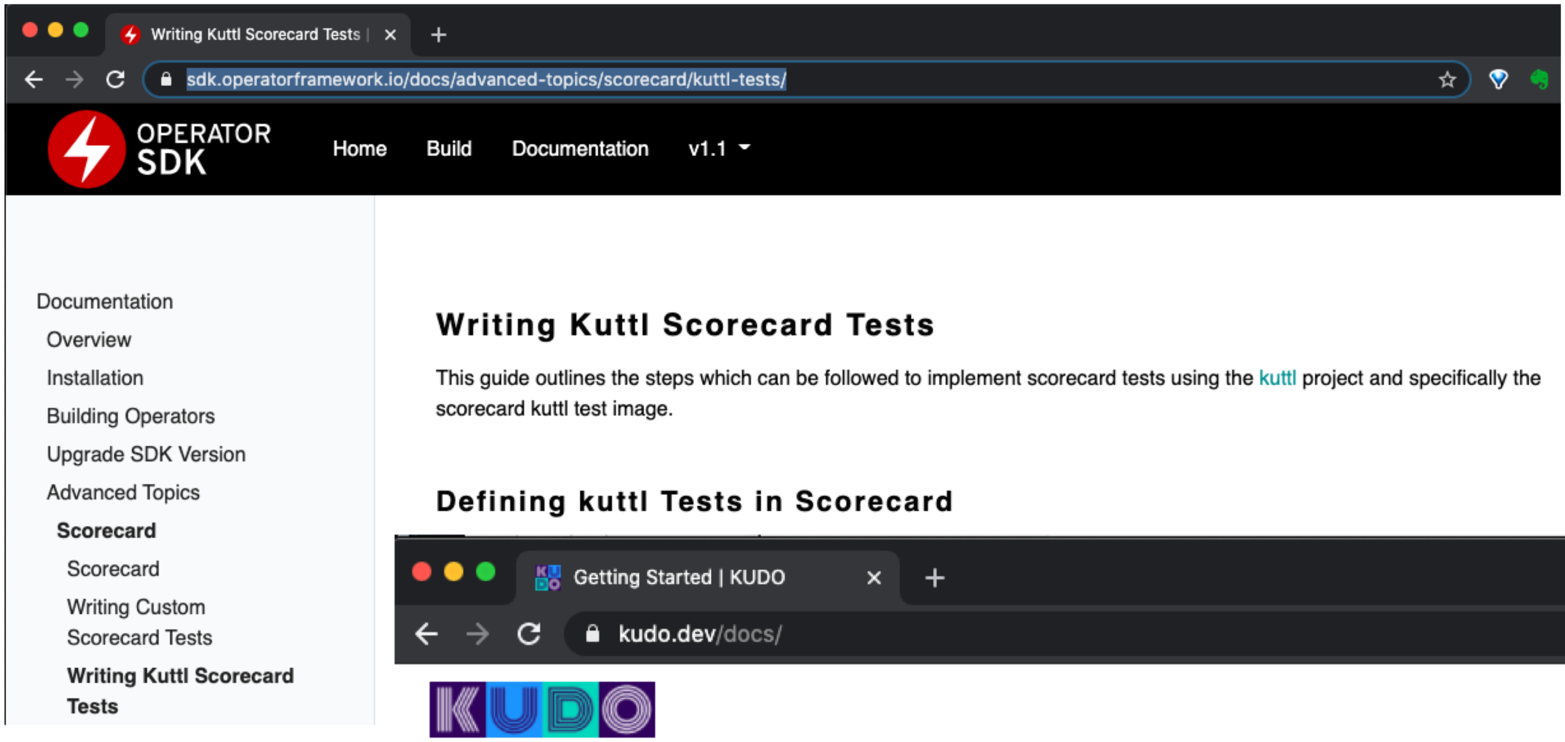
Who Needs a KUTTL?

Testing harness to **declarative** test:

- operators
- KUDO
- helm charts

- any other Kubernetes applications or controllers.

Testing Operators



Writing Kuttl Scorecard Tests |

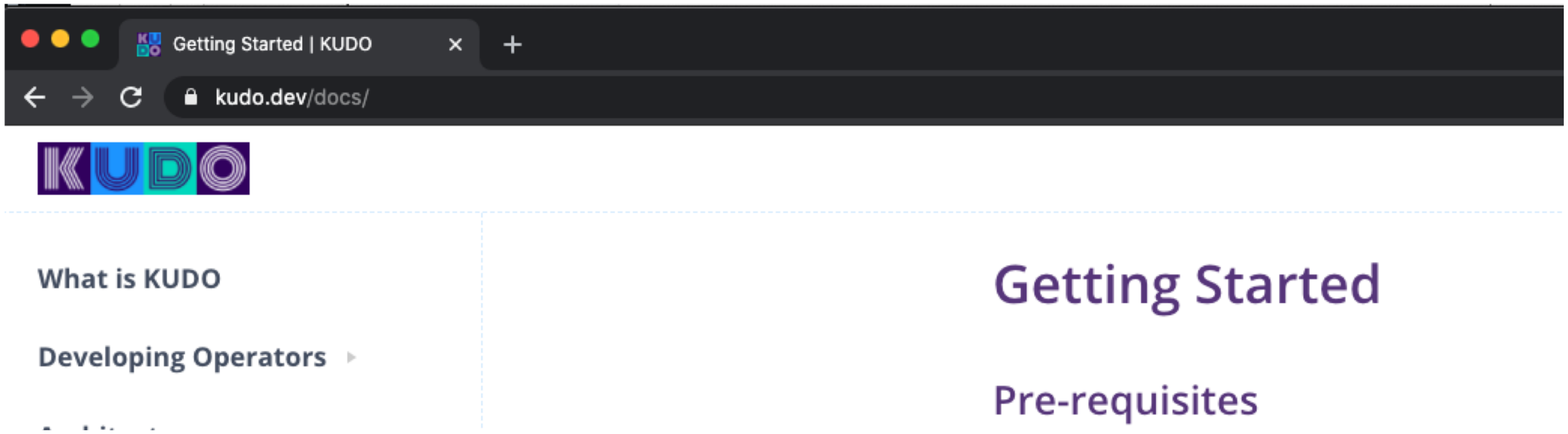
sdk.operatorframework.io/docs/advanced-topics/scorecard/kuttl-tests/

Documentation
- Overview
- Installation
- Building Operators
- Upgrade SDK Version
- Advanced Topics
  - **Scorecard**
    - Scorecard
    - Writing Custom Scorecard Tests
    - **Writing Kuttl Scorecard Tests**

Writing Kuttl Scorecard Tests

This guide outlines the steps which can be followed to implement scorecard tests using the kuttl project and specifically the scorecard kuttl test image.

Defining kuttl Tests in Scorecard



Getting Started | KUDO

kudo.dev/docs/

What is KUDO

Developing Operators

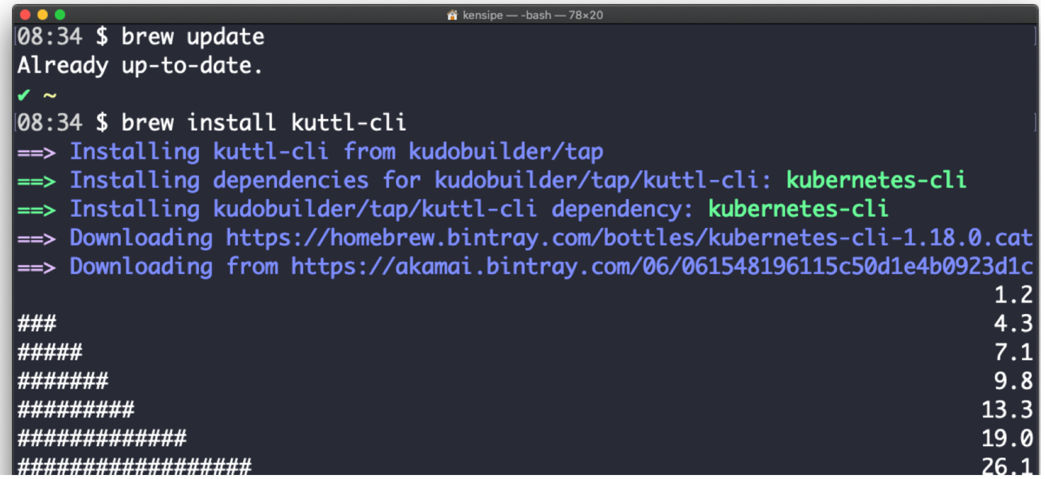
Getting Started

Pre-requisites

How Do I Start KUTTLing?

```
brew install kuttl-cli

kubectl krew install kuttl*
```

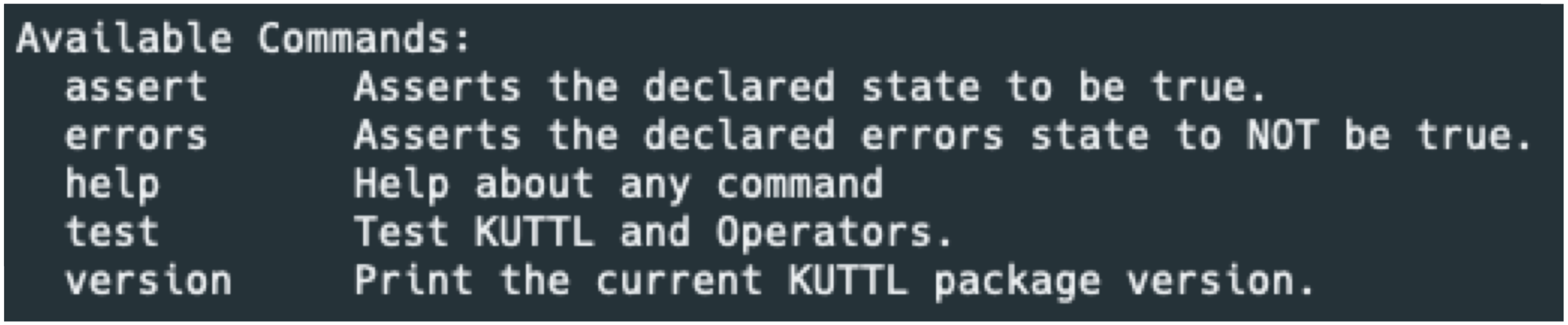


```
08:34 $ brew update
Already up-to-date.
✔ ~
08:34 $ brew install kuttl-cli
==> Installing kuttl-cli from kudobuilder/tap
==> Installing dependencies for kudobuilder/tap/kuttl-cli: kubernetes-cli
==> Installing kudobuilder/tap/kuttl-cli dependency: kubernetes-cli
==> Downloading https://homebrew.bintray.com/bottles/kubernetes-cli-1.18.0.cat
==> Downloading from https://akamai.bintray.com/06/061548196115c50d1e4b0923d1c
                                                                           1.2
###                                                                        4.3
#####                                                                      7.1
#######                                                                    9.8
#########                                                                 13.3
#############                                                             19.0
##################                                                        26.1
```

KUTTL Basics

KUTTL CLI

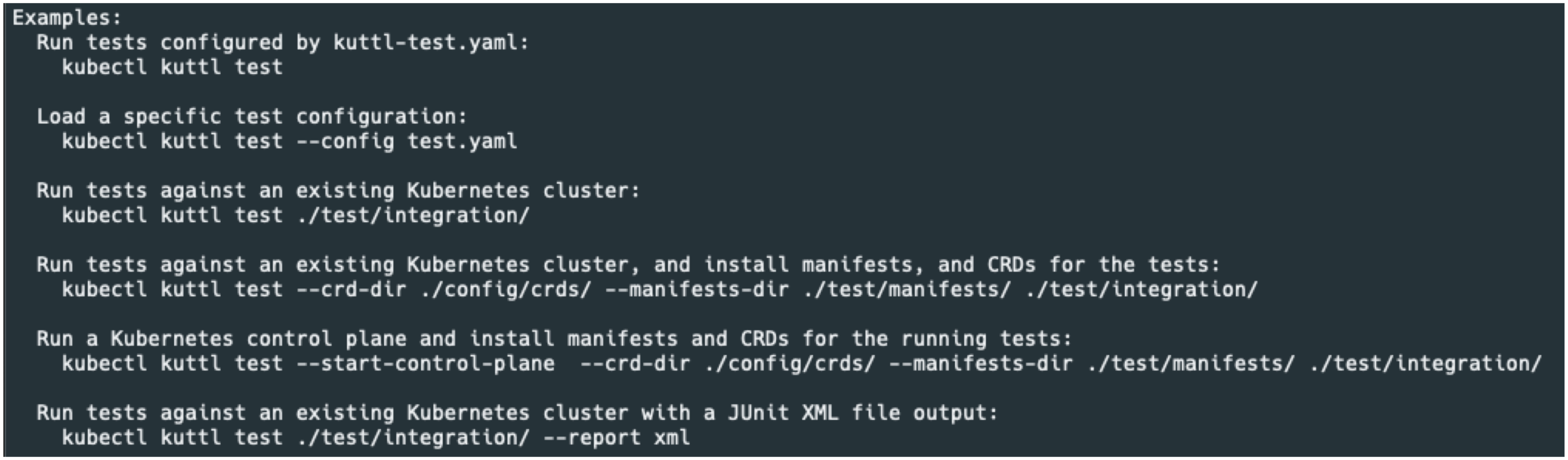
```
k kuttl --help
```



```
Available Commands:
  assert      Asserts the declared state to be true.
  errors      Asserts the declared errors state to NOT be true.
  help        Help about any command
  test        Test KUTTL and Operators.
  version     Print the current KUTTL package version.
```

KUTTL CLI

```
kubectl kuttl test ./test/
```



```
Examples:
  Run tests configured by kuttl-test.yaml:
    kubectl kuttl test

  Load a specific test configuration:
    kubectl kuttl test --config test.yaml

  Run tests against an existing Kubernetes cluster:
    kubectl kuttl test ./test/integration/

  Run tests against an existing Kubernetes cluster, and install manifests, and CRDs for the tests:
    kubectl kuttl test --crd-dir ./config/crds/ --manifests-dir ./test/manifests/ ./test/integration/

  Run a Kubernetes control plane and install manifests and CRDs for the running tests:
    kubectl kuttl test --start-control-plane  --crd-dir ./config/crds/ --manifests-dir ./test/manifests/ ./test/integration/

  Run tests against an existing Kubernetes cluster with a JUnit XML file output:
    kubectl kuttl test ./test/integration/ --report xml
```

Test Steps

Files and Format

Test files: *.yaml or *.yml

Other files ignored
- useful for docs, license, etc.

<index>-<step-name>.yaml
- tests/e2e/example/00-pod.yaml
- tests/e2e/example/00-assert.yaml
- tests/e2e/example/01-staging.yaml

Step is all indexed files, evaluated followed by asserts (more to come)

Multiple YAML docs is common in a file

Test Steps

Create or Update

Step files are:

- **Created** if they do not exist in cluster
- Patch **Updated** if they exist
  - Possible to express minimum updates
- Delete is possible through a TestStep Object

Asserts and Errors

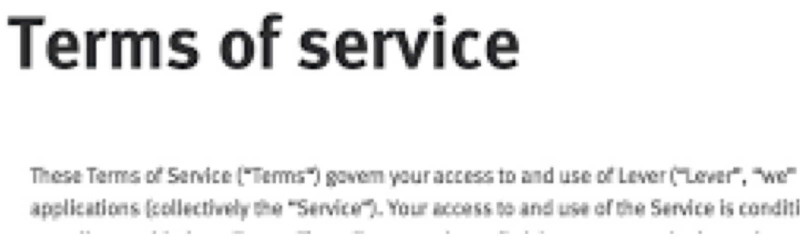
Format

<index>-assert.yaml

- Asserts the state was met within a time limit (default: 30 secs)

<index>-errors.yaml

- Asserts if a state exists that it is an error
- Asserts the absence of an object



Terms of service

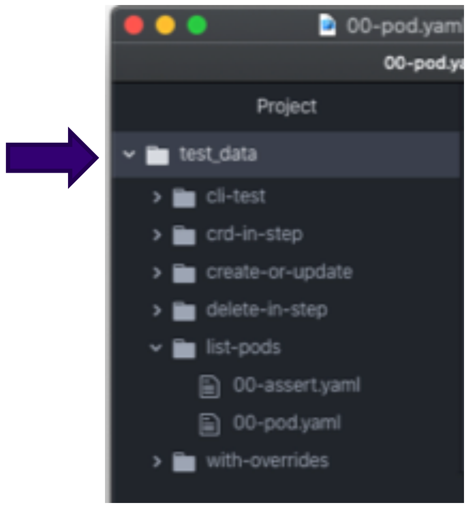
These Terms of Service ("Terms") govern your access to and use of Lever ("Lever", "we"
applications (collectively the "Service"). Your access to and use of the Service is conditi

TestSuite
  A collection of Tests
Test
  A collection of TestSteps
TestStep
  A “Step” in a Test
  A Collection of declarative CRUD
  Usually has an assert or error defined
TestAssert
  Assert conditions

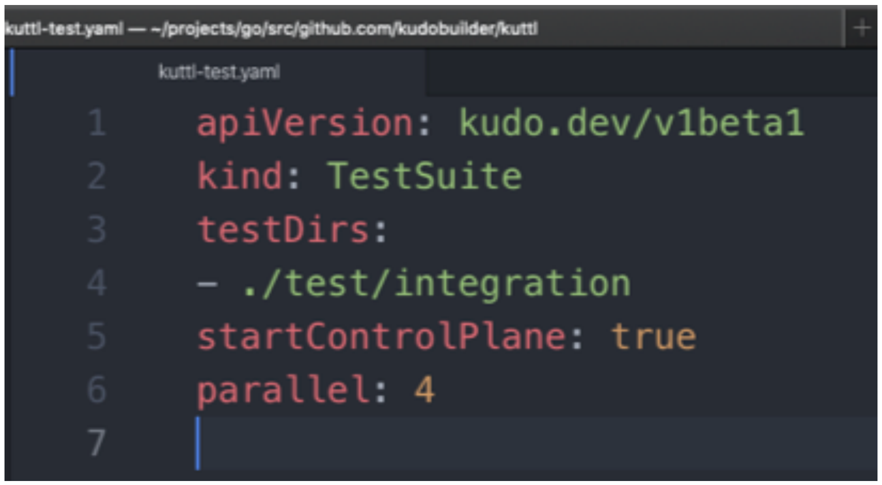
TestSuite

2 Concepts define a **TestSuite**

Folder of Tests



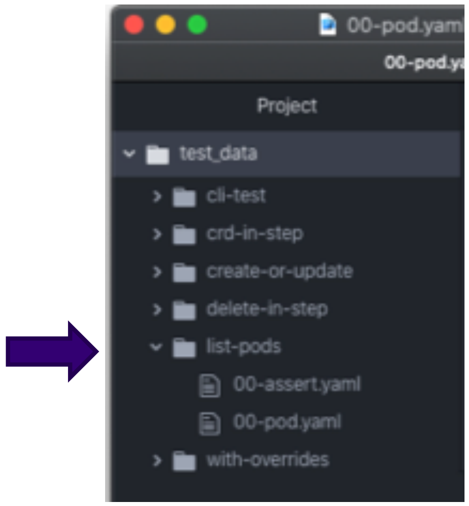
Configuration File


kuttl-test.yaml — ~/projects/go/src/github.com/kudobuilder/kuttl
kuttl-test.yaml

```yaml
apiVersion: kudo.dev/v1beta1
kind: TestSuite
testDirs:
- ./test/integration
startControlPlane: true
parallel: 4
```

Test

- A Collection of Test Steps
- Test Name == Folder Name
- “list-pods” is the name of this test

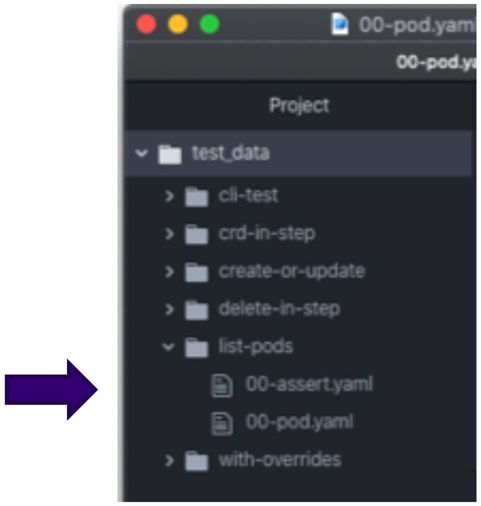


```
test_data
  cli-test
  crd-in-step
  create-or-update
  delete-in-step
  list-pods
    00-assert.yaml
    00-pod.yaml
  with-overrides
```

TestStep

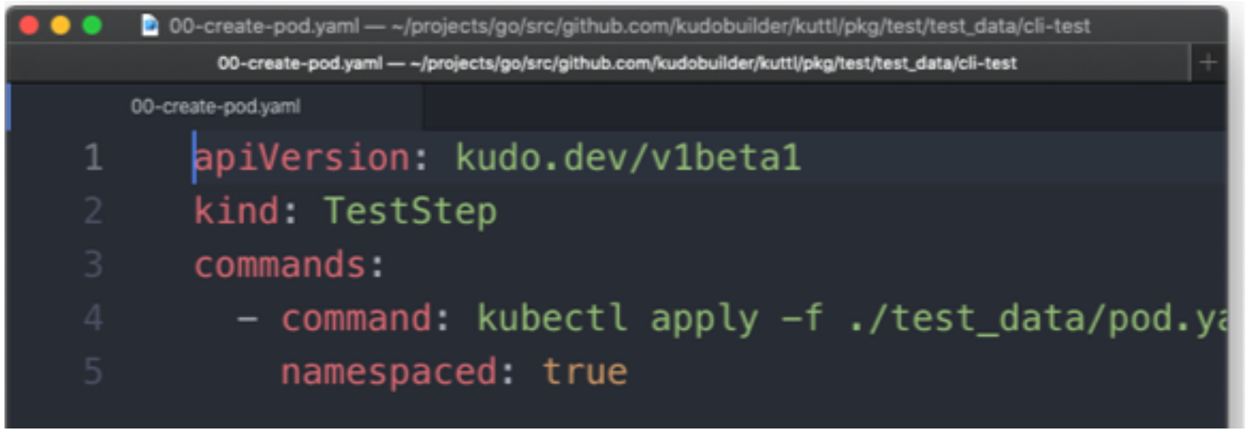
2 Concepts define a **TestStep**

Indexed Files
Same Index, Same Step



```
00-pod.yaml
Project
test_data
  cli-test
  crd-in-step
  create-or-update
  delete-in-step
  list-pods
    00-assert.yaml
    00-pod.yaml
  with-overrides
```

Defined Kind



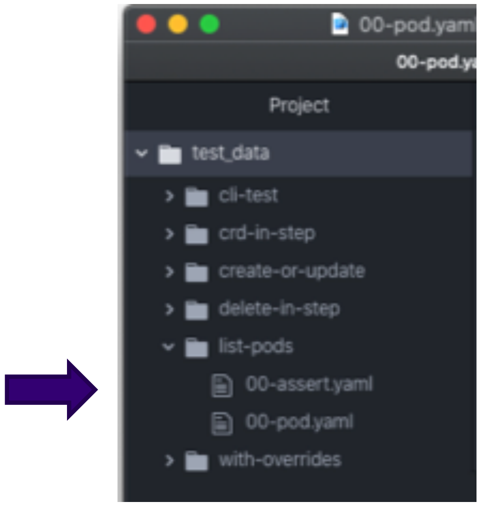
00-create-pod.yaml — ~/projects/go/src/github.com/kudobuilder/kuttl/pkg/test/test_data/cli-test

```
apiVersion: kudo.dev/v1beta1
kind: TestStep
commands:
  - command: kubectl apply -f ./test_data/pod.ya
    namespaced: true
```

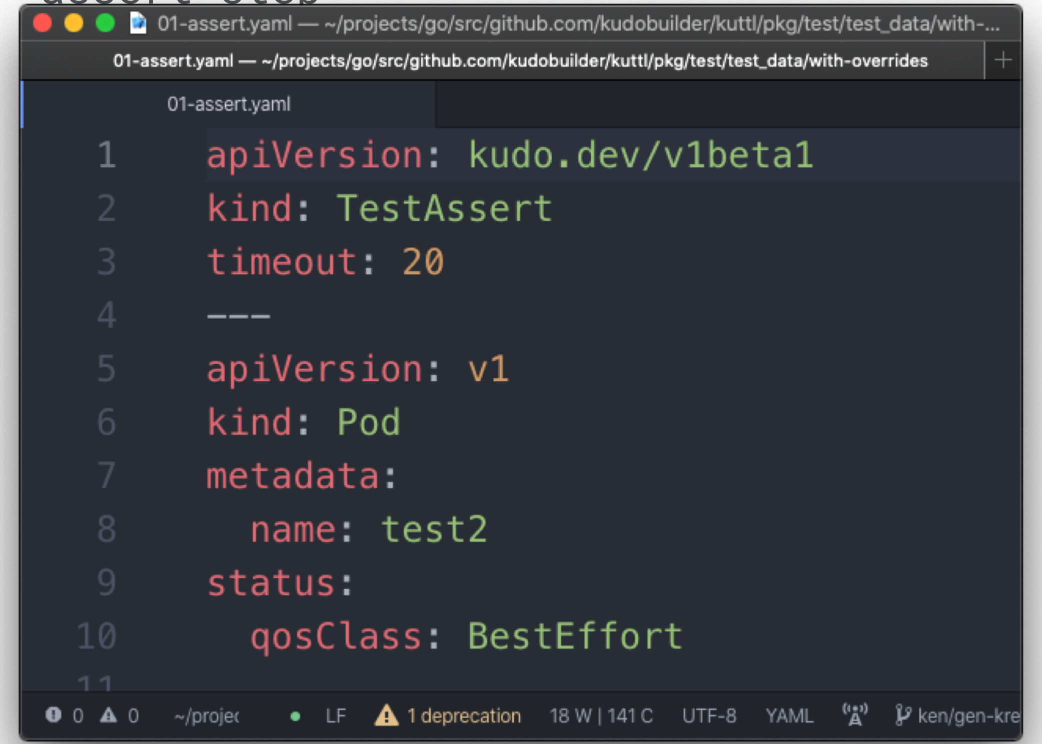
TestAssert

2 Concepts define a **TestAssert**

Step file named with "assert" or "errors"

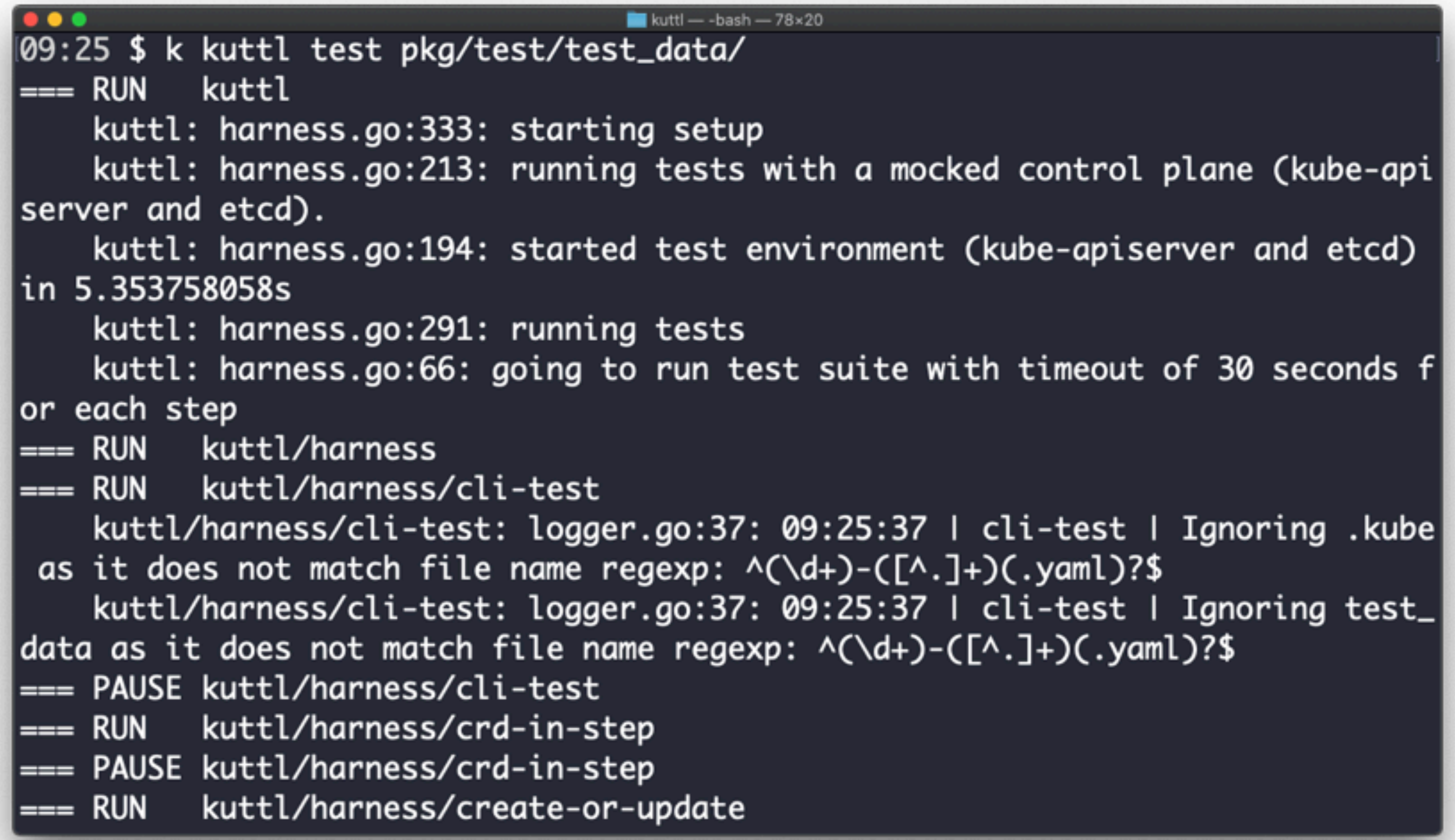


Defined Kind used within an assert step


01-assert.yaml — ~/projects/go/src/github.com/kudobuilder/kuttl/pkg/test/test_data/with-...
01-assert.yaml — ~/projects/go/src/github.com/kudobuilder/kuttl/pkg/test/test_data/with-overrides
01-assert.yaml
0 0 ~/projec LF 1 deprecation 18 W | 141 C UTF-8 YAML ken/gen-kre

```yaml
apiVersion: kudo.dev/v1beta1
kind: TestAssert
timeout: 20
---
apiVersion: v1
kind: Pod
metadata:
  name: test2
status:
  qosClass: BestEffort
```

KUTTL a TestSuite


kuttl — -bash — 78×20

```
09:25 $ k kuttl test pkg/test/test_data/
=== RUN   kuttl
    kuttl: harness.go:333: starting setup
    kuttl: harness.go:213: running tests with a mocked control plane (kube-api
server and etcd).
    kuttl: harness.go:194: started test environment (kube-apiserver and etcd)
in 5.353758058s
    kuttl: harness.go:291: running tests
    kuttl: harness.go:66: going to run test suite with timeout of 30 seconds f
or each step
=== RUN   kuttl/harness
=== RUN   kuttl/harness/cli-test
    kuttl/harness/cli-test: logger.go:37: 09:25:37 | cli-test | Ignoring .kube
 as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
    kuttl/harness/cli-test: logger.go:37: 09:25:37 | cli-test | Ignoring test_
data as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
=== PAUSE kuttl/harness/cli-test
=== RUN   kuttl/harness/crd-in-step
=== PAUSE kuttl/harness/crd-in-step
=== RUN   kuttl/harness/create-or-update
```

KUTTL Namespace

By Default… KUTTL creates a namespace for each test

Providing test isolation

Your first **KUTTL**

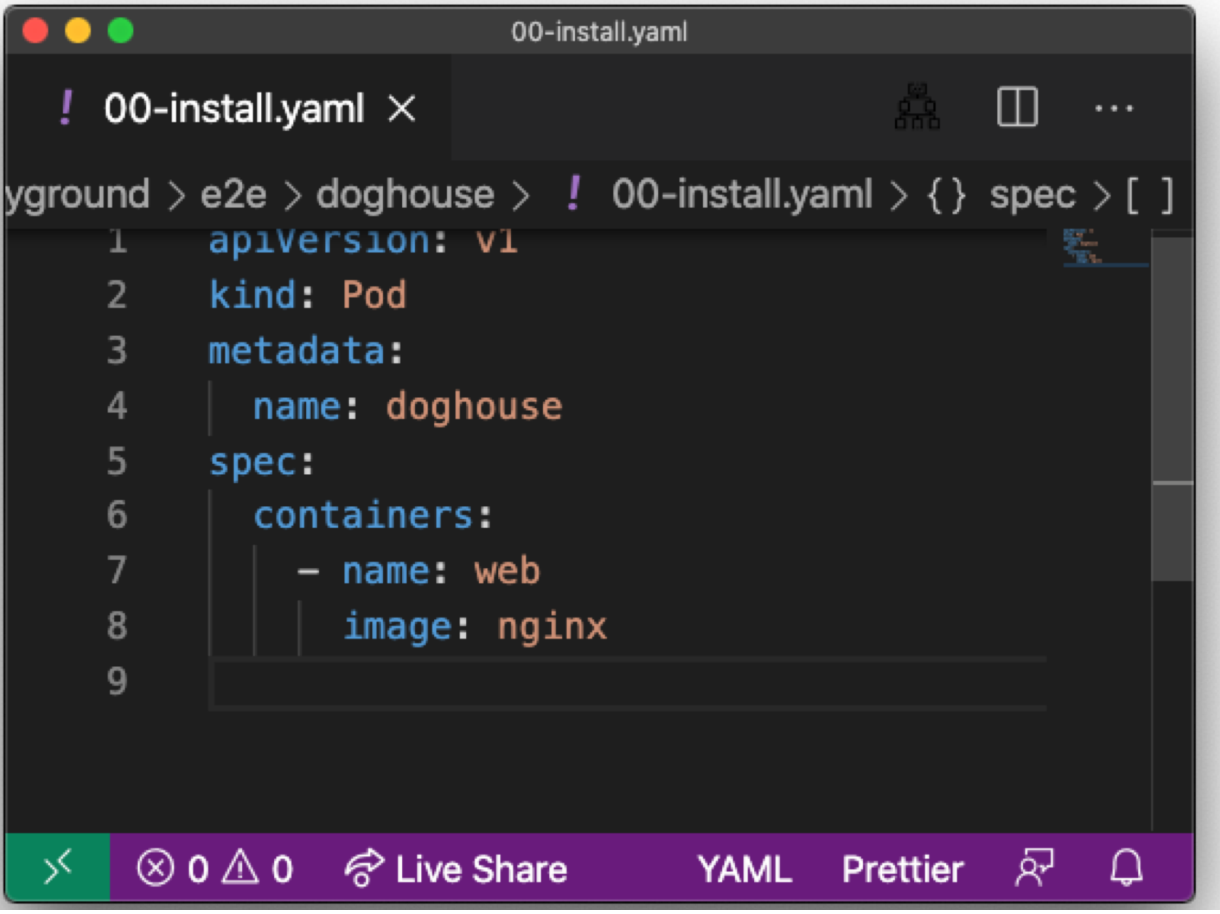
Test Case Setup

```
mkdir -p tests/e2e
```

```sh
mkdir tests/e2e/doghouse
```

Test Step 00

Setup



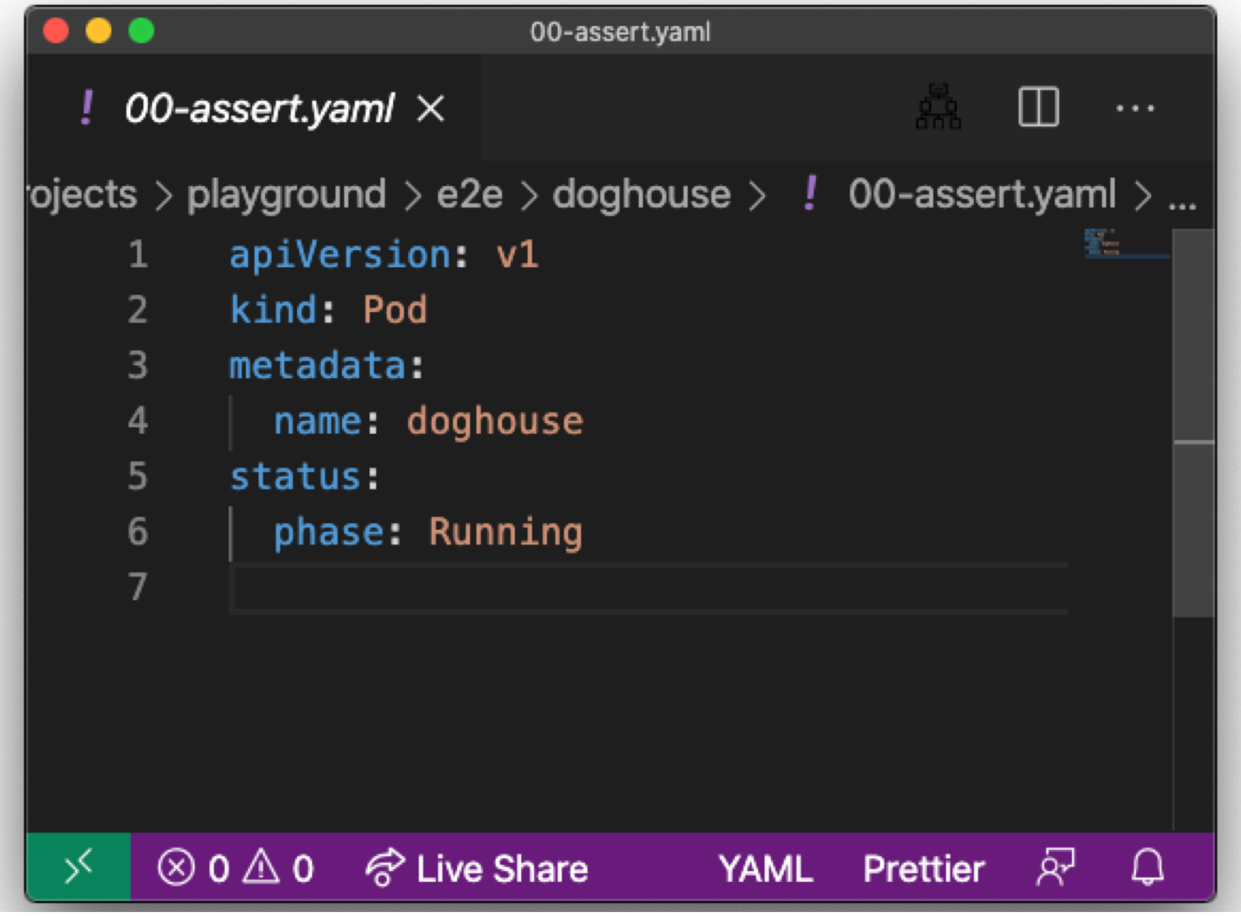
00-install.yaml
yground > e2e > doghouse > ! 00-install.yaml > { } spec > [ ]
0 ⚠ 0
Live Share
YAML
Prettier

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: doghouse
spec:
  containers:
    - name: web
      image: nginx

```

Test Step 00

Assert



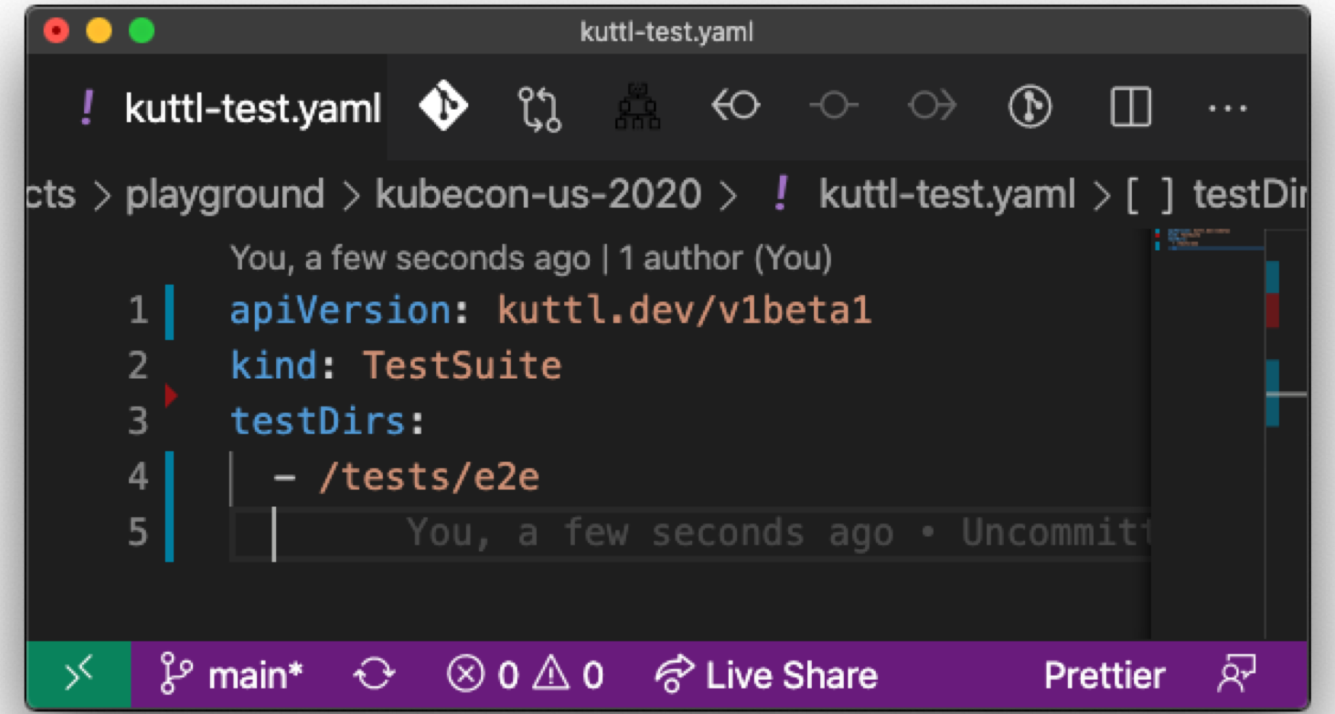
00-assert.yaml
ojects > playground > e2e > doghouse > 00-assert.yaml > ...
0 0 Live Share YAML Prettier

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: doghouse
status:
  phase: Running
```

Test Suite Configuration

kuttl-test.yaml

Located in the working directory of kuttl



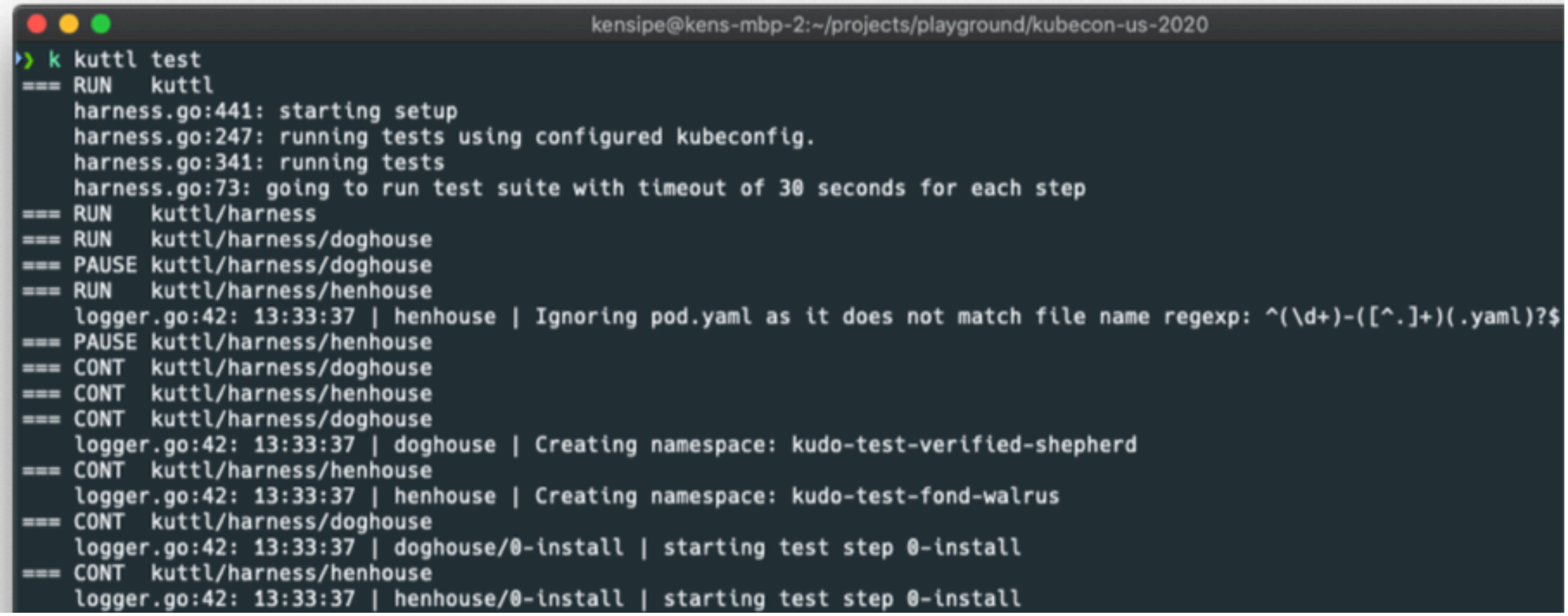
cts > playground > kubecon-us-2020 > ! kuttl-test.yaml > [ ] testDir

You, a few seconds ago | 1 author (You)

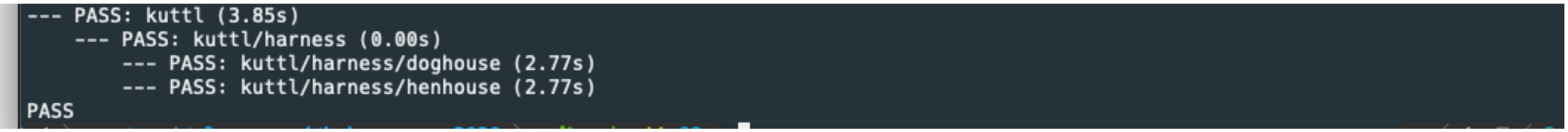
```yaml
apiVersion: kuttl.dev/v1beta1
kind: TestSuite
testDirs:
  - /tests/e2e
```

You, a few seconds ago • Uncommitt

Run Test Suite



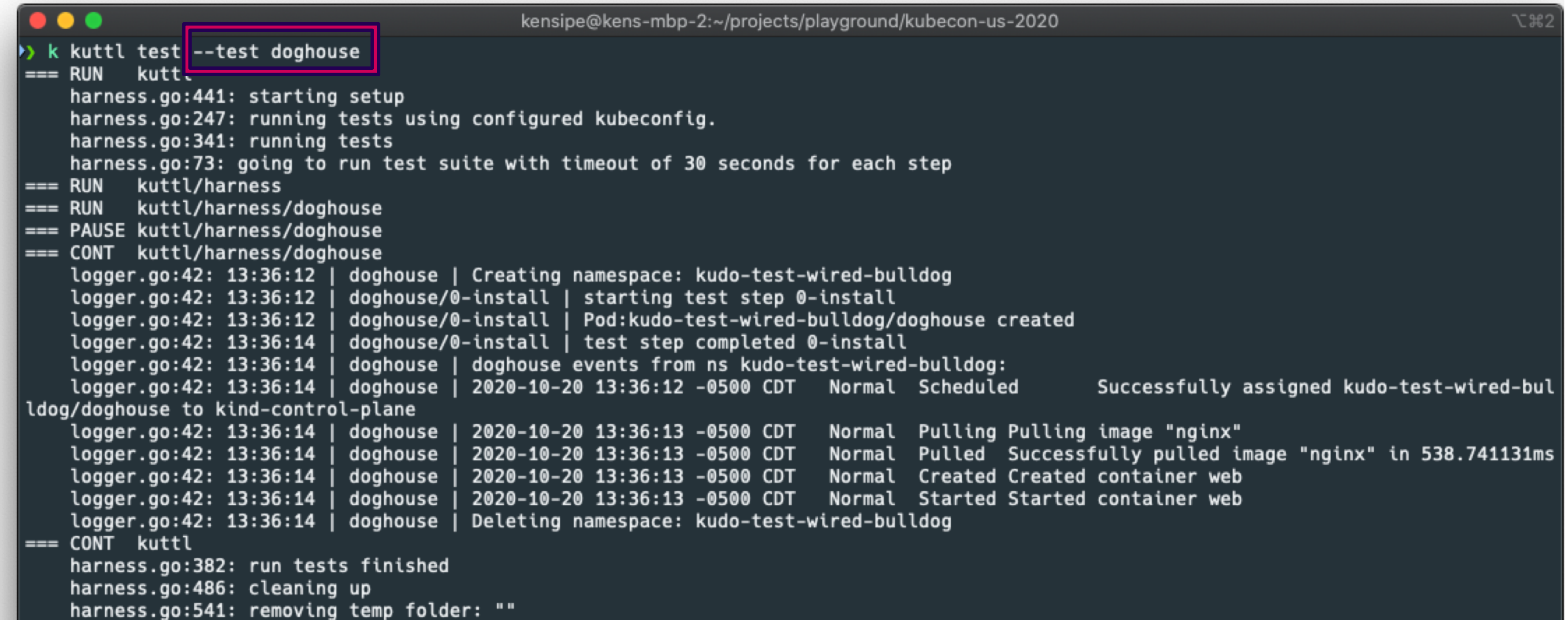
```
kensipe@kens-mbp-2:~/projects/playground/kubecon-us-2020
> k kuttl test
=== RUN   kuttl
    harness.go:441: starting setup
    harness.go:247: running tests using configured kubeconfig.
    harness.go:341: running tests
    harness.go:73: going to run test suite with timeout of 30 seconds for each step
=== RUN   kuttl/harness
=== RUN   kuttl/harness/doghouse
=== PAUSE kuttl/harness/doghouse
=== RUN   kuttl/harness/henhouse
    logger.go:42: 13:33:37 | henhouse | Ignoring pod.yaml as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
=== PAUSE kuttl/harness/henhouse
=== CONT  kuttl/harness/doghouse
=== CONT  kuttl/harness/henhouse
=== CONT  kuttl/harness/doghouse
    logger.go:42: 13:33:37 | doghouse | Creating namespace: kudo-test-verified-shepherd
=== CONT  kuttl/harness/henhouse
    logger.go:42: 13:33:37 | henhouse | Creating namespace: kudo-test-fond-walrus
=== CONT  kuttl/harness/doghouse
    logger.go:42: 13:33:37 | doghouse/0-install | starting test step 0-install
=== CONT  kuttl/harness/henhouse
    logger.go:42: 13:33:37 | henhouse/0-install | starting test step 0-install
```



```
--- PASS: kuttl (3.85s)
    --- PASS: kuttl/harness (0.00s)
        --- PASS: kuttl/harness/doghouse (2.77s)
        --- PASS: kuttl/harness/henhouse (2.77s)
PASS
```

Running 1 Test From the Suite

```
--test <test-name>
```



kensipe@kens-mbp-2:~/projects/playground/kubecon-us-2020

```
› k kuttl test --test doghouse
=== RUN   kuttl
    harness.go:441: starting setup
    harness.go:247: running tests using configured kubeconfig.
    harness.go:341: running tests
    harness.go:73: going to run test suite with timeout of 30 seconds for each step
=== RUN   kuttl/harness
=== RUN   kuttl/harness/doghouse
=== PAUSE kuttl/harness/doghouse
=== CONT  kuttl/harness/doghouse
    logger.go:42: 13:36:12 | doghouse | Creating namespace: kudo-test-wired-bulldog
    logger.go:42: 13:36:12 | doghouse/0-install | starting test step 0-install
    logger.go:42: 13:36:12 | doghouse/0-install | Pod:kudo-test-wired-bulldog/doghouse created
    logger.go:42: 13:36:14 | doghouse/0-install | test step completed 0-install
    logger.go:42: 13:36:14 | doghouse | doghouse events from ns kudo-test-wired-bulldog:
    logger.go:42: 13:36:14 | doghouse | 2020-10-20 13:36:12 -0500 CDT   Normal  Scheduled       Successfully assigned kudo-test-wired-bul
ldog/doghouse to kind-control-plane
    logger.go:42: 13:36:14 | doghouse | 2020-10-20 13:36:13 -0500 CDT   Normal  Pulling Pulling image "nginx"
    logger.go:42: 13:36:14 | doghouse | 2020-10-20 13:36:13 -0500 CDT   Normal  Pulled  Successfully pulled image "nginx" in 538.741131ms
    logger.go:42: 13:36:14 | doghouse | 2020-10-20 13:36:13 -0500 CDT   Normal  Created Created container web
    logger.go:42: 13:36:14 | doghouse | 2020-10-20 13:36:13 -0500 CDT   Normal  Started Started container web
    logger.go:42: 13:36:14 | doghouse | Deleting namespace: kudo-test-wired-bulldog
=== CONT  kuttl
    harness.go:382: run tests finished
    harness.go:486: cleaning up
    harness.go:541: removing temp folder: ""
```

KUTTL Features

Test Steps

Delete

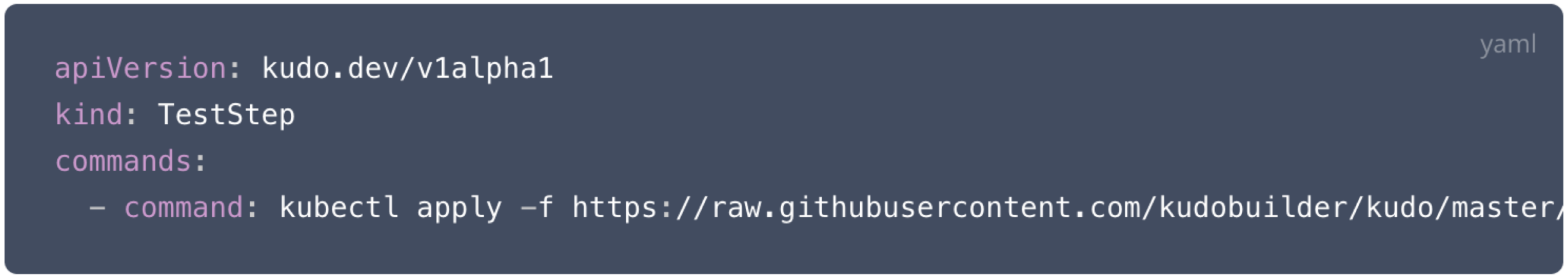
Delete is possible through a TestStep Object:

```yaml
apiVersion: kudo.dev/v1alpha1
kind: TestStep
delete:
# Delete a Pod
- apiVersion: v1
  kind: Pod
  name: my-pod
# Delete all Pods with app=nginx
- apiVersion: v1
  kind: Pod
  labels:
    app: nginx
# Delete all Pods in the test namespace
- apiVersion: v1
  kind: Pod
```

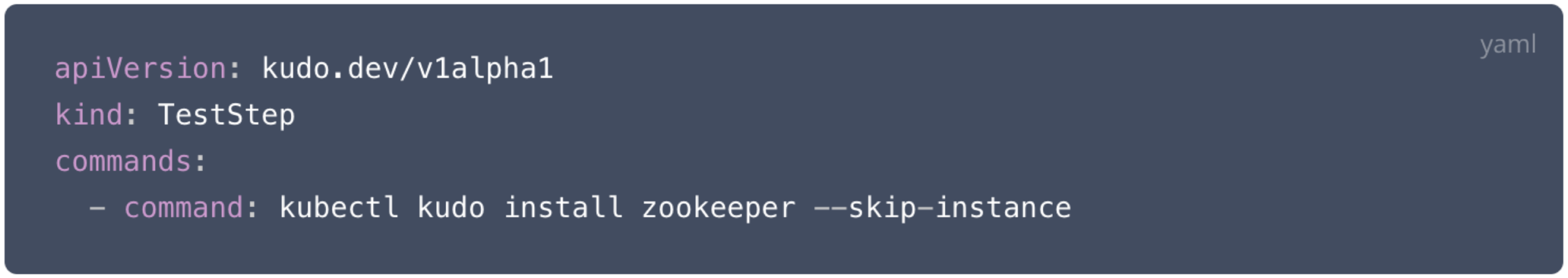
Test Steps

commands

Arbitrary commands are possible and are run at the beginning of the step and run until complete

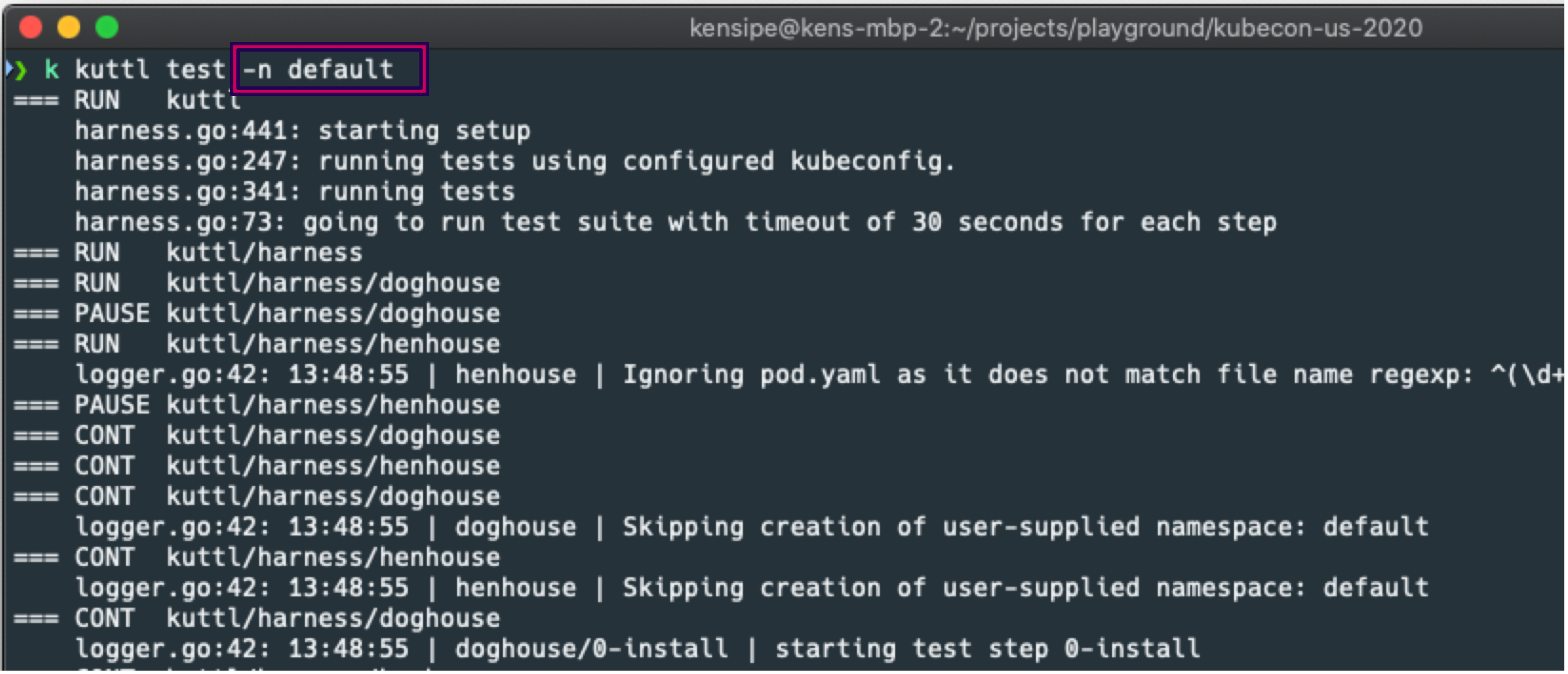


```yaml
apiVersion: kudo.dev/v1alpha1
kind: TestStep
commands:
  - command: kubectl apply -f https://raw.githubusercontent.com/kudobuilder/kudo/master/
```



```yaml
apiVersion: kudo.dev/v1alpha1
kind: TestStep
commands:
  - command: kubectl kudo install zookeeper --skip-instance
```

Control the Namespace



kensipe@kens-mbp-2:~/projects/playground/kubecon-us-2020

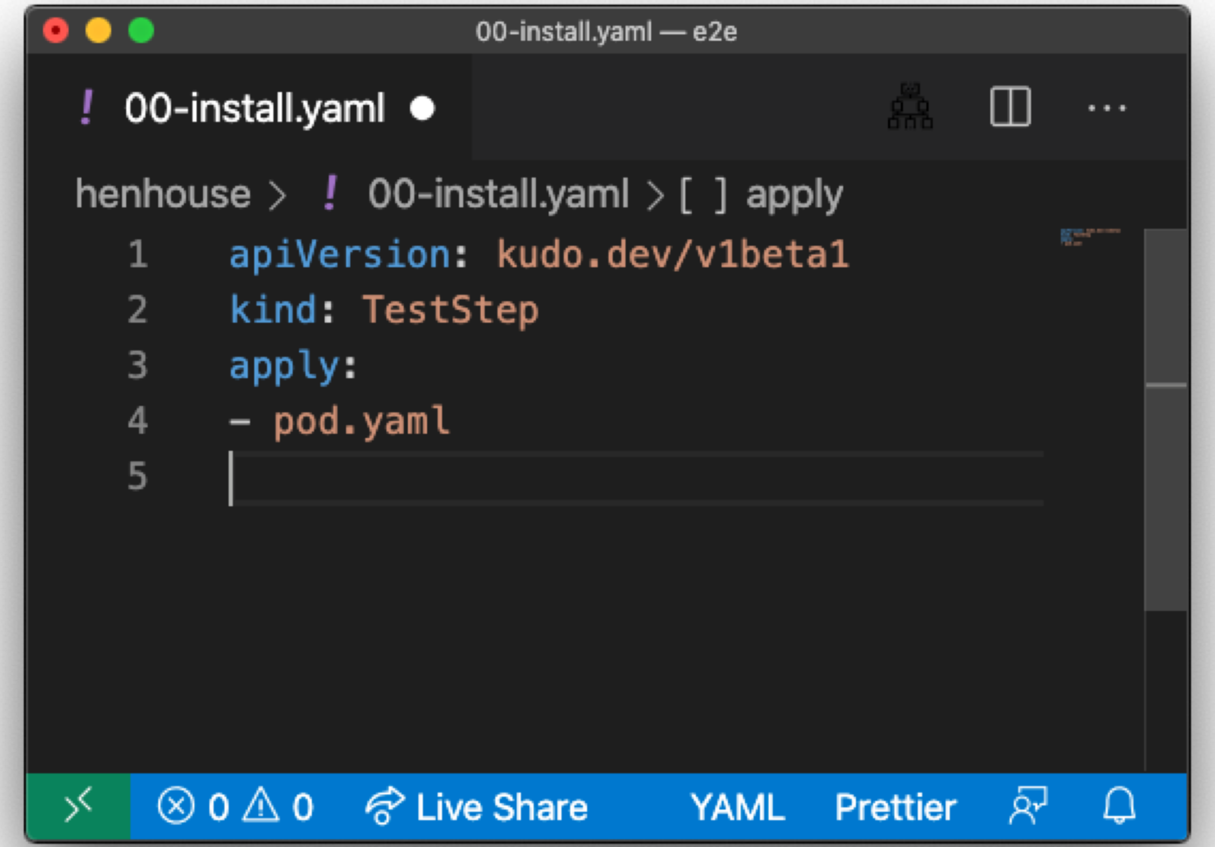
```
❯ k kuttl test -n default
=== RUN   kuttl
    harness.go:441: starting setup
    harness.go:247: running tests using configured kubeconfig.
    harness.go:341: running tests
    harness.go:73: going to run test suite with timeout of 30 seconds for each step
=== RUN   kuttl/harness
=== RUN   kuttl/harness/doghouse
=== PAUSE kuttl/harness/doghouse
=== RUN   kuttl/harness/henhouse
    logger.go:42: 13:48:55 | henhouse | Ignoring pod.yaml as it does not match file name regexp: ^(\d+
=== PAUSE kuttl/harness/henhouse
=== CONT  kuttl/harness/doghouse
=== CONT  kuttl/harness/henhouse
=== CONT  kuttl/harness/doghouse
    logger.go:42: 13:48:55 | doghouse | Skipping creation of user-supplied namespace: default
=== CONT  kuttl/harness/henhouse
    logger.go:42: 13:48:55 | henhouse | Skipping creation of user-supplied namespace: default
=== CONT  kuttl/harness/doghouse
    logger.go:42: 13:48:55 | doghouse/0-install | starting test step 0-install
```

Reusing Apply and Assert

Example

TestStep can have array

- Apply
- Asserts



```yaml
apiVersion: kudo.dev/v1beta1
kind: TestStep
apply:
- pod.yaml
```

KUTTLing Tips

Kubernetes Events are Objects

```yaml
apiVersion: v1
kind: Event
reason: Started
source:
  component: kubelet
involvedObject:
  apiVersion: v1
  kind: Pod
  name: my-pod
```

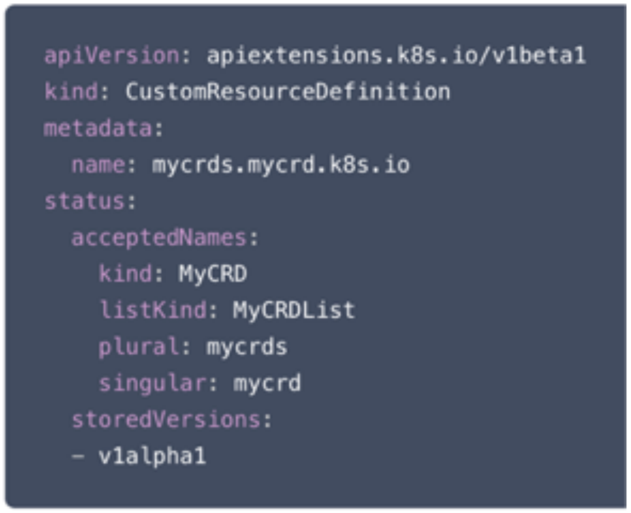
Asserts that an Event with reason “Started” happened for `my-pod`

KUTTLing Tips

CRDs or Waiting for K8S

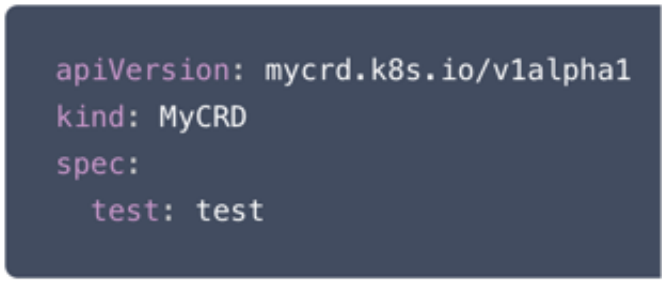
Certain objects (like CRDs) **take time** before they are available resources.
At the TestSuite level, defined CRDs are waited for prior to tests
IF you have a **CRD as part of a step**, it is necessary to assert for that CRD prior to using.
Assuming 00-crd.yaml

00-assert.yaml



```yaml
apiVersion: apiextensions.k8s.io/v1beta1
kind: CustomResourceDefinition
metadata:
  name: mycrds.mycrd.k8s.io
status:
  acceptedNames:
    kind: MyCRD
    listKind: MyCRDList
    plural: mycrds
    singular: mycrd
  storedVersions:
  - v1alpha1
```

01-use.yaml



```yaml
apiVersion: mycrd.k8s.io/v1alpha1
kind: MyCRD
spec:
  test: test
```

https://kudo.dev/docs/testing/tips.html#custom-resource-definitions

KUTTLing Tips

Helm

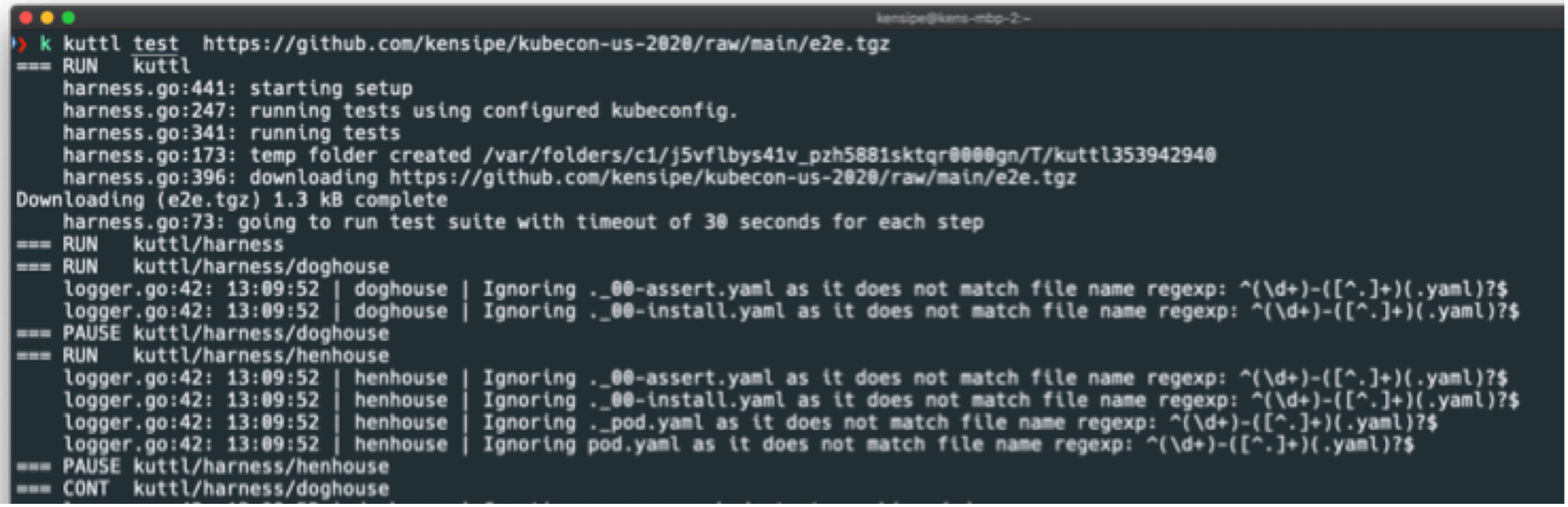
yaml

```yaml
apiVersion: kudo.dev/v1alpha1
kind: TestSuite
commands:
- command: kubectl create serviceaccount -n kube-system tiller
  ignoreFailure: true
- command: kubectl create clusterrolebinding tiller --clusterrole=cluster-admin --servi
  ignoreFailure: true
- command: helm init --wait --service-account tiller
- command: helm delete --purge memcached
  ignoreFailure: true
- command: helm install --replace --namespace memcached --name nginx stable/memcached
testDirs:
- ./test/integration
startKIND: true
kindNodeCache: true
```

Also possible in a TestStep

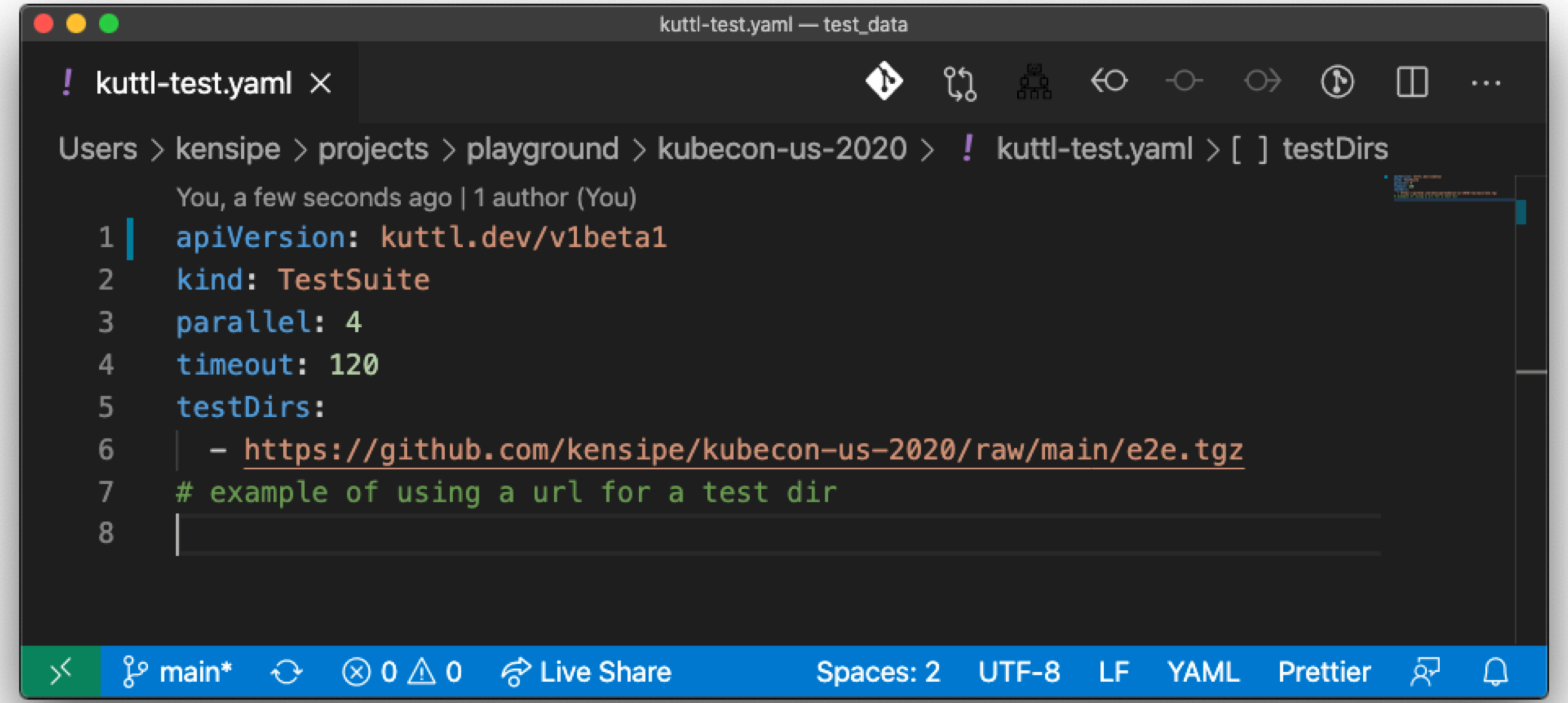
KUTTL a URL

Pulls TestSuite and Runs!



```
❯ k kuttl test  https://github.com/kensipe/kubecon-us-2020/raw/main/e2e.tgz
=== RUN   kuttl
    harness.go:441: starting setup
    harness.go:247: running tests using configured kubeconfig.
    harness.go:341: running tests
    harness.go:173: temp folder created /var/folders/c1/j5vflbys41v_pzh5881sktqr0000gn/T/kuttl353942940
    harness.go:396: downloading https://github.com/kensipe/kubecon-us-2020/raw/main/e2e.tgz
Downloading (e2e.tgz) 1.3 kB complete
    harness.go:73: going to run test suite with timeout of 30 seconds for each step
=== RUN   kuttl/harness
=== RUN   kuttl/harness/doghouse
    logger.go:42: 13:09:52 | doghouse | Ignoring ._00-assert.yaml as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
    logger.go:42: 13:09:52 | doghouse | Ignoring ._00-install.yaml as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
=== PAUSE kuttl/harness/doghouse
=== RUN   kuttl/harness/henhouse
    logger.go:42: 13:09:52 | henhouse | Ignoring ._00-assert.yaml as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
    logger.go:42: 13:09:52 | henhouse | Ignoring ._00-install.yaml as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
    logger.go:42: 13:09:52 | henhouse | Ignoring ._pod.yaml as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
    logger.go:42: 13:09:52 | henhouse | Ignoring pod.yaml as it does not match file name regexp: ^(\d+)-([^.]+)(.yaml)?$
=== PAUSE kuttl/harness/henhouse
=== CONT  kuttl/harness/doghouse
```

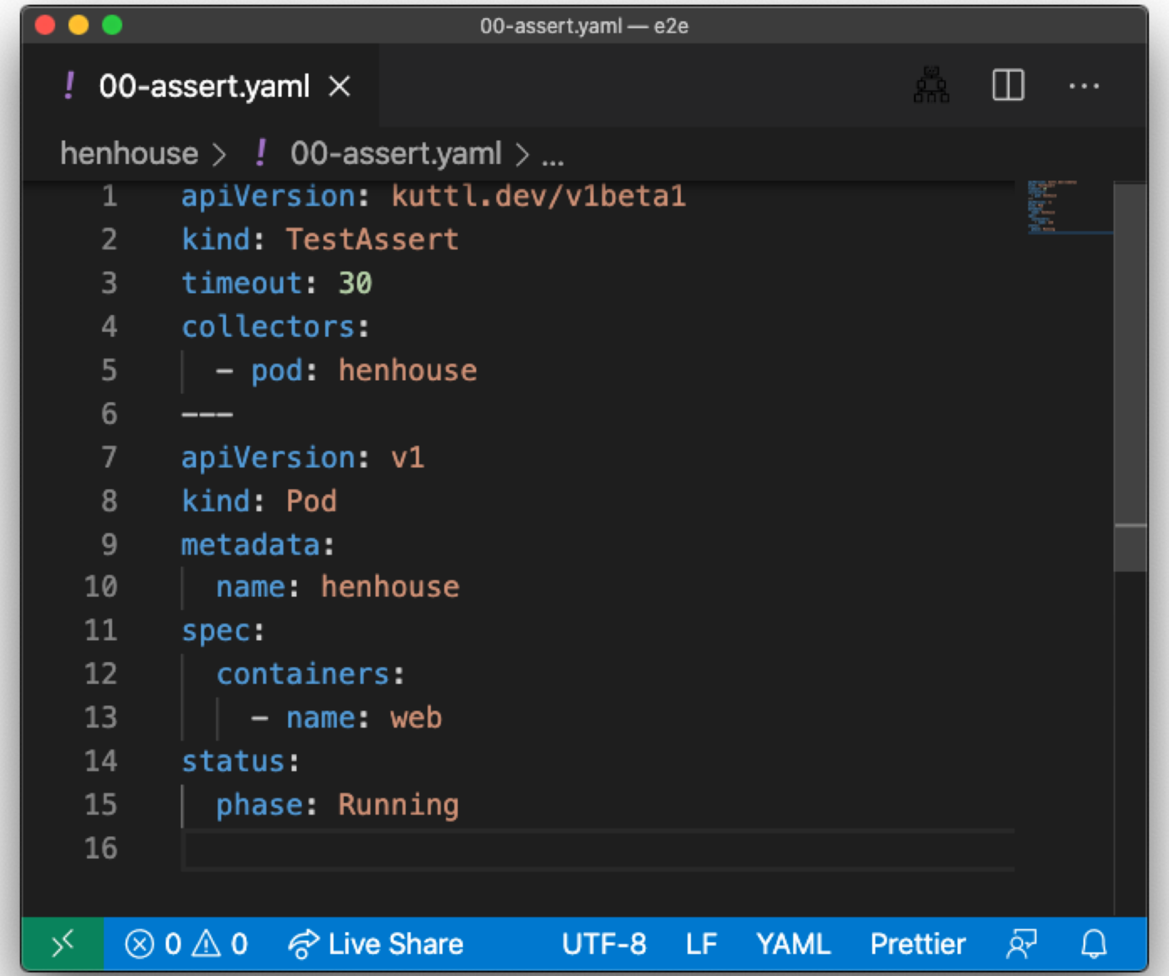
KUTTL URL in TestSuite


kuttl-test.yaml — test_data
kuttl-test.yaml
Users > kensipe > projects > playground > kubecon-us-2020 > kuttl-test.yaml > [ ] testDirs
You, a few seconds ago | 1 author (You)
main*
0 0
Live Share
Spaces: 2
UTF-8
LF
YAML
Prettier

```yaml
apiVersion: kuttl.dev/v1beta1
kind: TestSuite
parallel: 4
timeout: 120
testDirs:
  - https://github.com/kensipe/kubecon-us-2020/raw/main/e2e.tgz
# example of using a url for a test dir
```

KUTTL Assert Collectors

- Pod
- Command


00-assert.yaml — e2e
00-assert.yaml
henhouse > 00-assert.yaml > ...
0 0 Live Share UTF-8 LF YAML Prettier

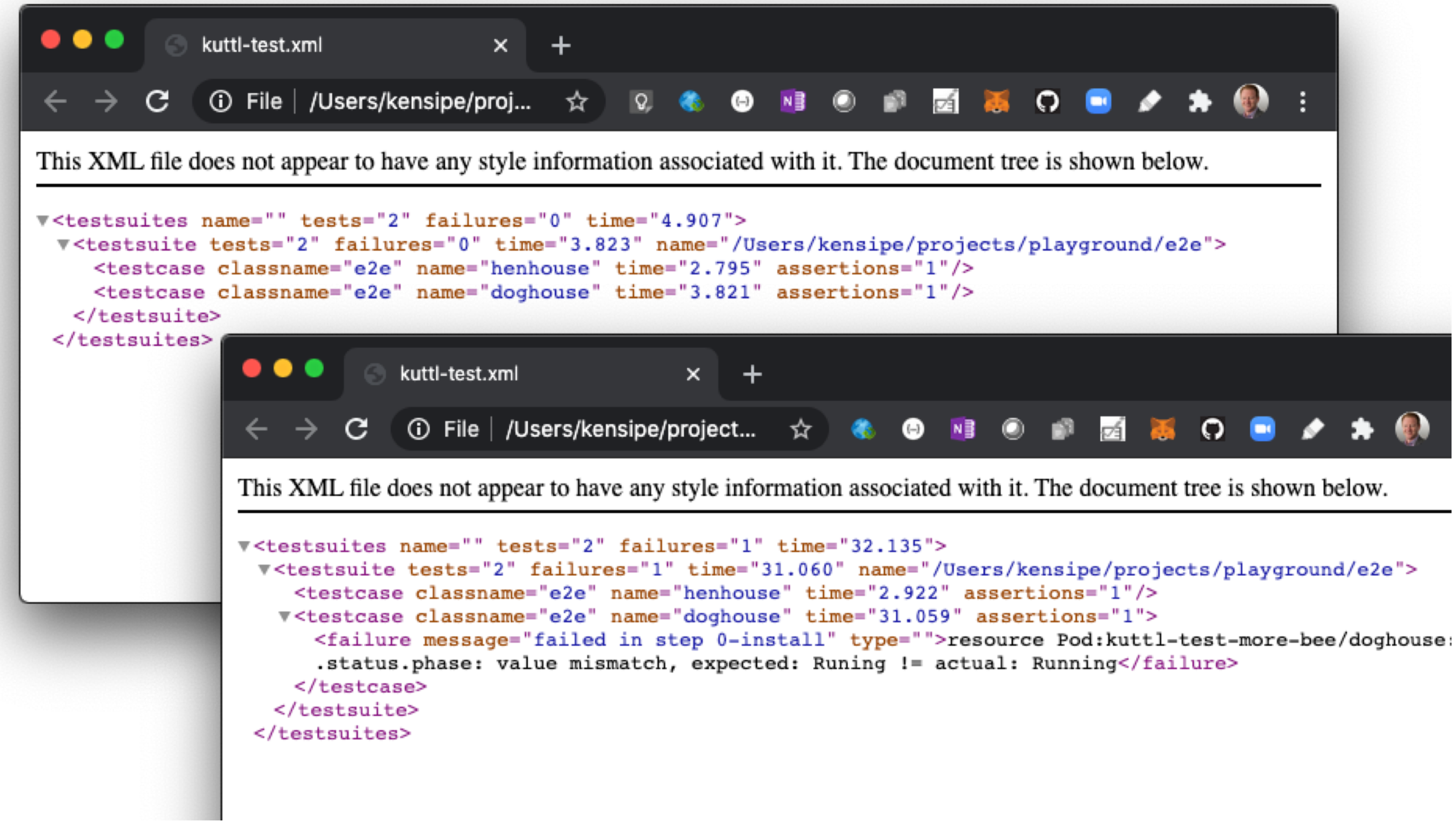
```yaml
apiVersion: kuttl.dev/v1beta1
kind: TestAssert
timeout: 30
collectors:
  - pod: henhouse
---
apiVersion: v1
kind: Pod
metadata:
  name: henhouse
spec:
  containers:
    - name: web
status:
  phase: Running

```

KUTTL Reports

```
k kuttl test --report xml
```

- Junit XML
- JSON


kuttl-test.xml
File | /Users/kensipe/proj...
kuttl-test.xml
File | /Users/kensipe/project...

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
▼<testsuites name="" tests="2" failures="0" time="4.907">
  ▼<testsuite tests="2" failures="0" time="3.823" name="/Users/kensipe/projects/playground/e2e">
     <testcase classname="e2e" name="henhouse" time="2.795" assertions="1"/>
     <testcase classname="e2e" name="doghouse" time="3.821" assertions="1"/>
   </testsuite>
 </testsuites>
```

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
▼<testsuites name="" tests="2" failures="1" time="32.135">
  ▼<testsuite tests="2" failures="1" time="31.060" name="/Users/kensipe/projects/playground/e2e">
     <testcase classname="e2e" name="henhouse" time="2.922" assertions="1"/>
    ▼<testcase classname="e2e" name="doghouse" time="31.059" assertions="1">
       <failure message="failed in step 0-install" type="">resource Pod:kuttl-test-more-bee/doghouse:
       .status.phase: value mismatch, expected: Runing != actual: Running</failure>
     </testcase>
   </testsuite>
 </testsuites>
```

KUTTLing an Operator

Operators

CRD

Installing CRDs

crdDir in kuttl-test.yaml

Or

k kuttl test **--crd-dir**

Loads and Waits for CRD

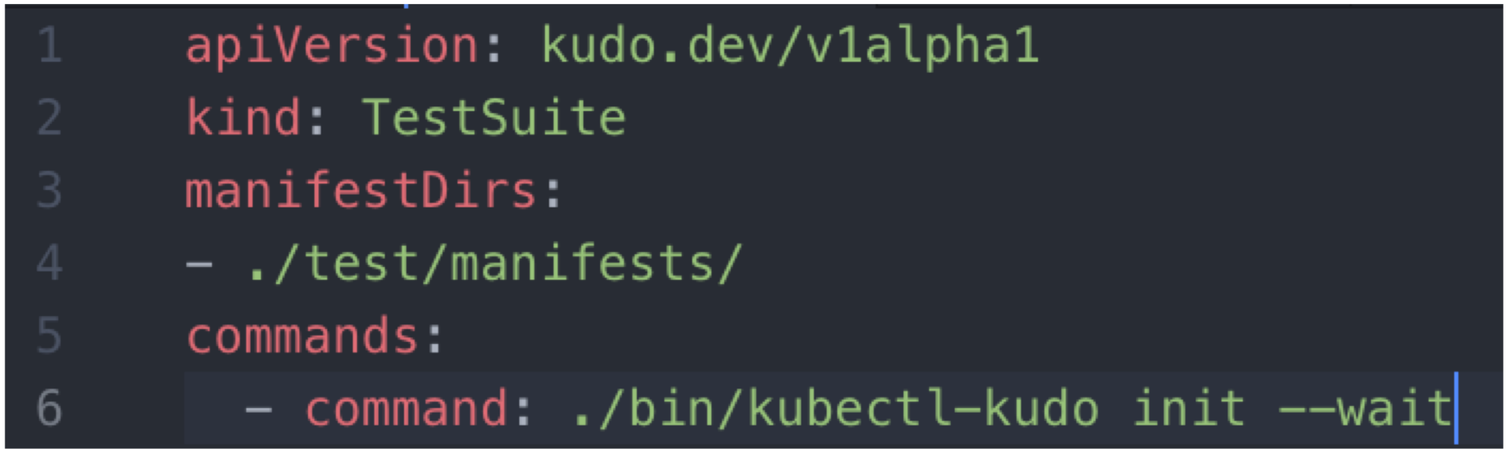
Operators

Controller

Examples for KUDO

KUDO controller (named manager) can be installed from the kudo cli

* k kudo init --wait



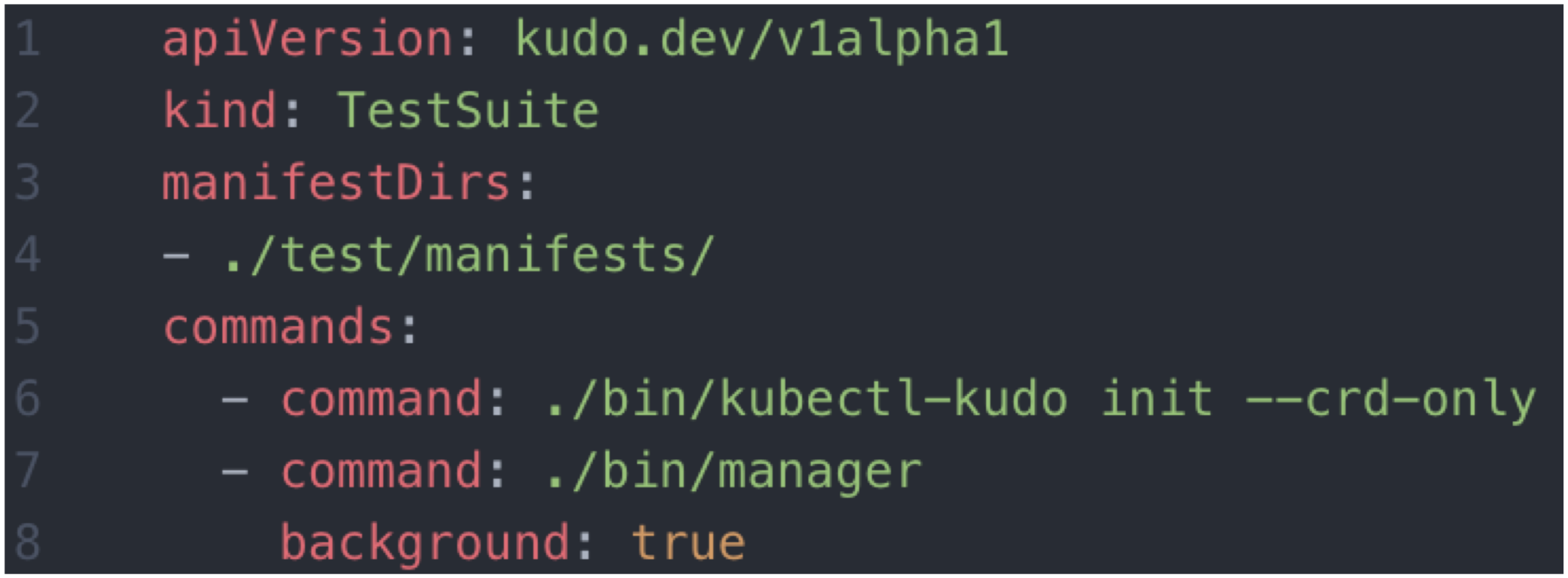
```yaml
apiVersion: kudo.dev/v1alpha1
kind: TestSuite
manifestDirs:
- ./test/manifests/
commands:
  - command: ./bin/kubectl-kudo init --wait
```

Operators

Controller in Dev

Examples for KUDO

After a `make manager` makefile task, run the `bin/manager` and set the `background` to true.

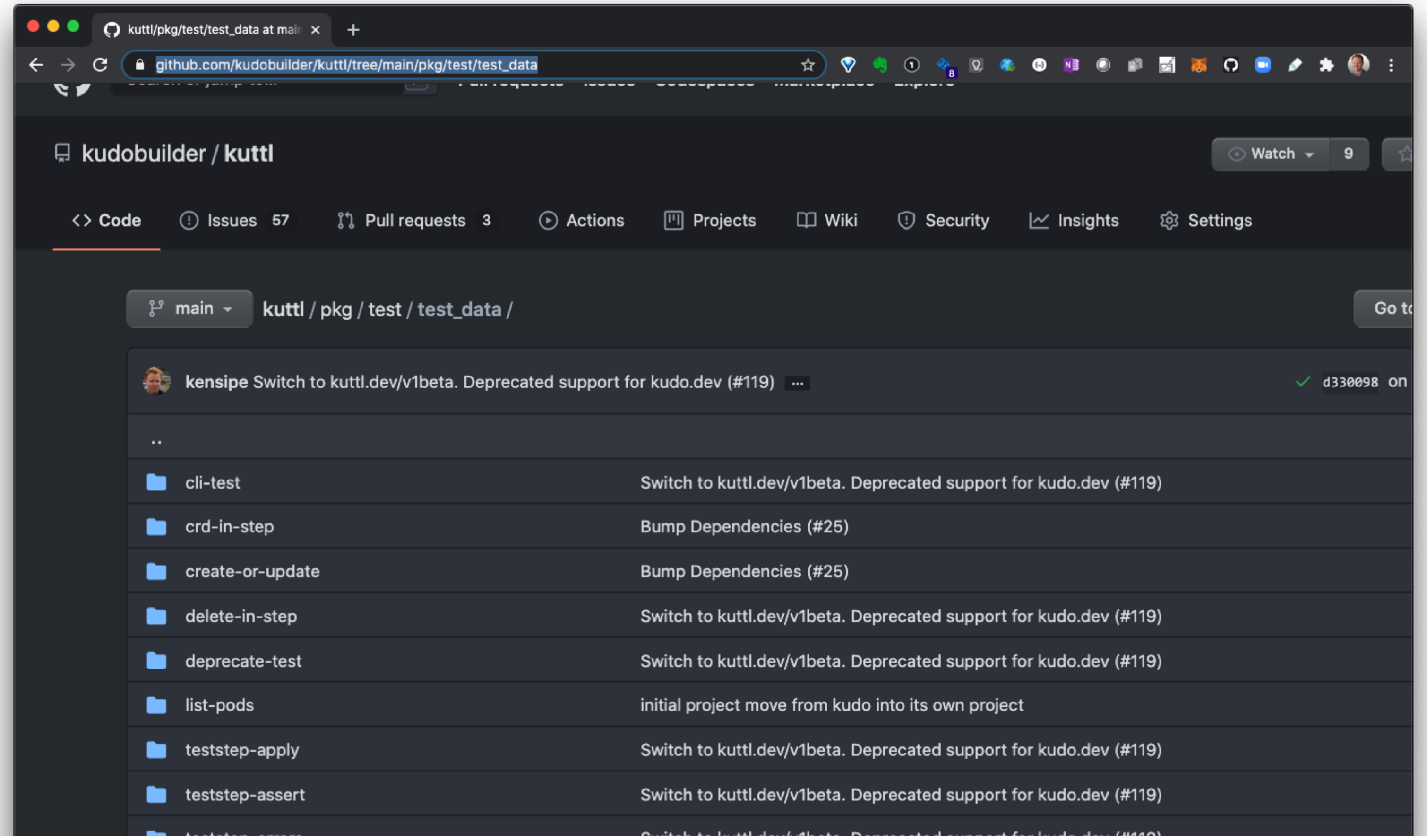


```yaml
apiVersion: kudo.dev/v1alpha1
kind: TestSuite
manifestDirs:
- ./test/manifests/
commands:
  - command: ./bin/kubectl-kudo init --crd-only
  - command: ./bin/manager
    background: true
```

Project KUTTL

More KUTTLing

https://github.com/kudobuilder/kuttl/tree/main/pkg/test/test_data



kudobuilder / kuttl

kuttl / pkg / test / test_data /

kensipe Switch to kuttl.dev/v1beta. Deprecated support for kudo.dev (#119) d330098 on

..	
cli-test	Switch to kuttl.dev/v1beta. Deprecated support for kudo.dev (#119)
crd-in-step	Bump Dependencies (#25)
create-or-update	Bump Dependencies (#25)
delete-in-step	Switch to kuttl.dev/v1beta. Deprecated support for kudo.dev (#119)
deprecate-test	Switch to kuttl.dev/v1beta. Deprecated support for kudo.dev (#119)
list-pods	initial project move from kudo into its own project
teststep-apply	Switch to kuttl.dev/v1beta. Deprecated support for kudo.dev (#119)
teststep-assert	Switch to kuttl.dev/v1beta. Deprecated support for kudo.dev (#119)

KUTTL Released

- KUTTL v0.1.0
  - Released March 26, 2020
  - However it was based on 1 year of KUDO development
- KUTTL v0.7.0
  - Released Oct 20, 2020

- Roughly 1 Month Cadence

Call to Action

Get Involved

- KUTTL Project
- https://github.com/kudobuilder/kuttl

- k8s.io slack #kudo
- https://app.slack.com/client/T09NY5SBT/CG3HTFCMV

- Current docs:
  - http://kuttl.dev

- KEP Process
  - https://github.com/kudobuilder/kuttl/blob/master/keps/0001-kep-process.md

Thank you for KUTTLing with us!

KUTTL

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