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Quick Response Kubernetes Dev Workflow

Immanuel Sims
BED-Con 2023, Berlin

Agenda

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- Motivation
- Available Tools
- Solution
  - Plan
  - Execution with Maven
  - Execution with Gradle
- Reviewing our Achievements

Motivation

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Keycloak

Motivation

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Motivation

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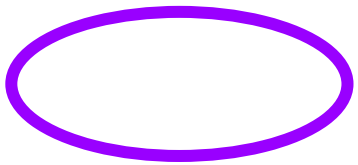

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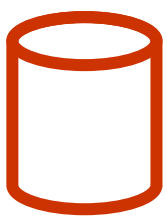

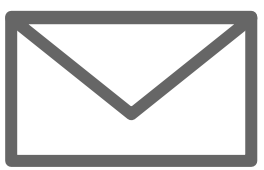

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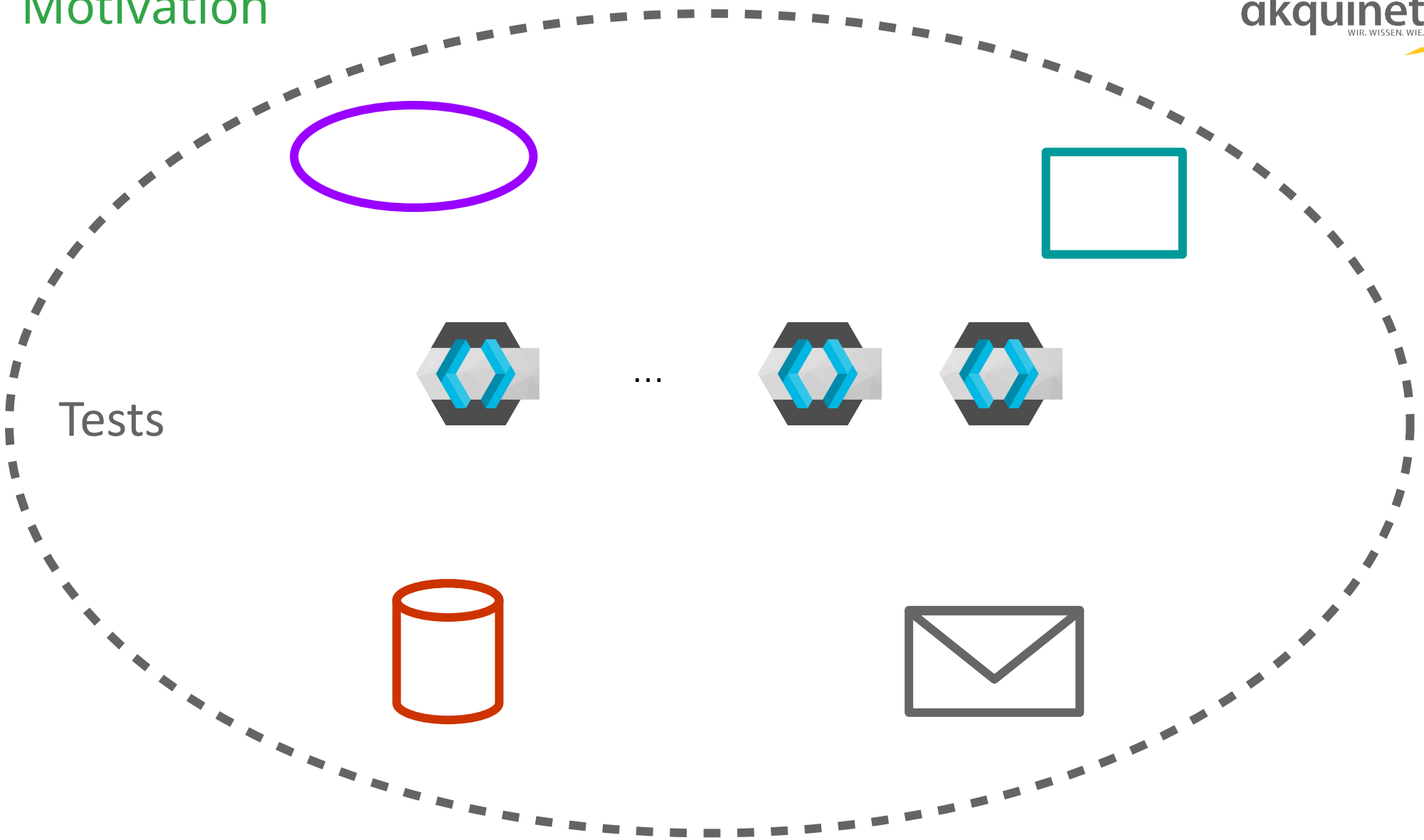

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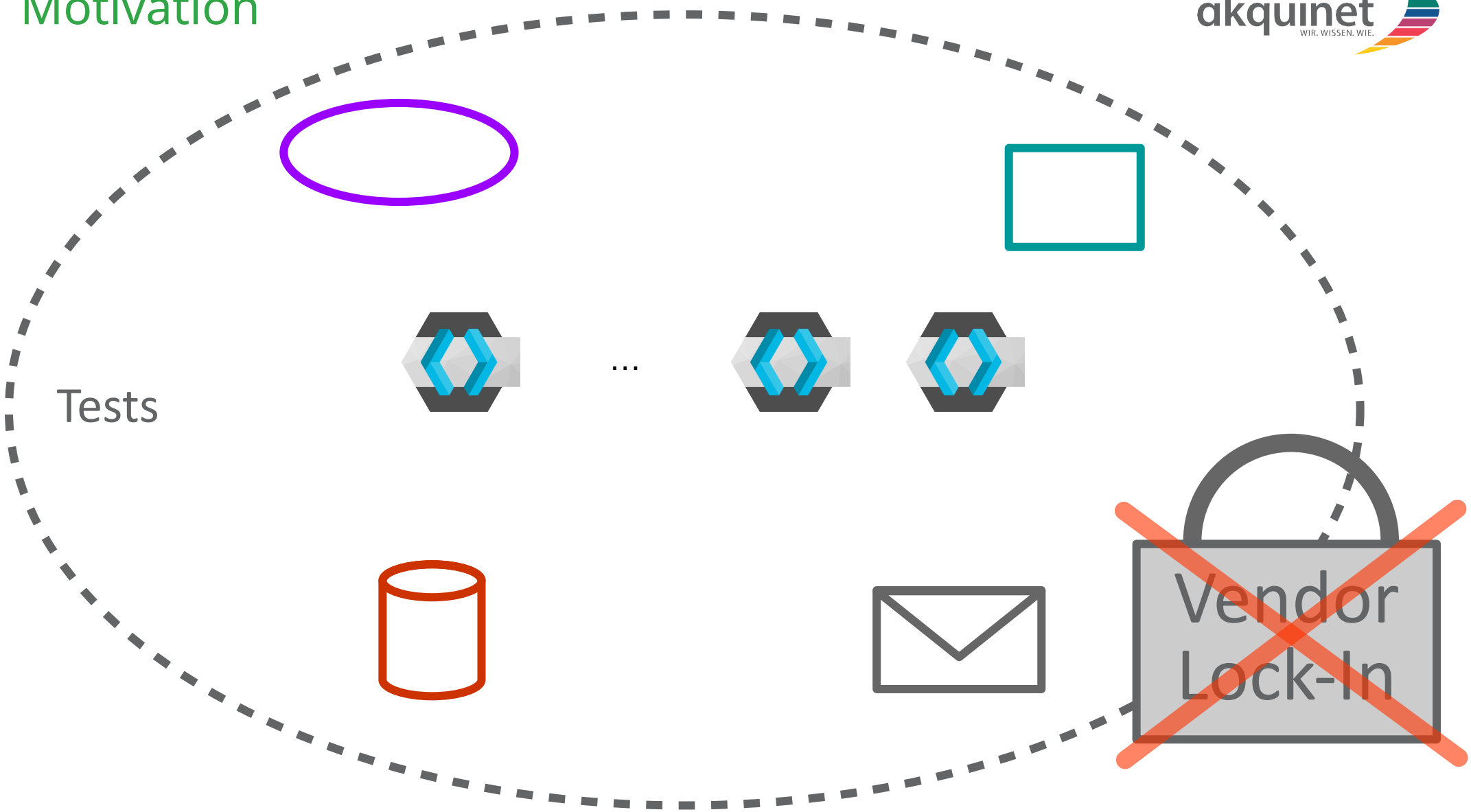

Requirements

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- easy to install
- easy to scale
- no vendor lock in
- quick & realistic E2E testing

Requirements

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easy to install	→	container
easy to scale	→	container orchestration
no vendor lock in	→	K8S
quick & realistic E2E testing	→	K8S for each dev

Requirements

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easy to install	→	container
easy to scale	→	container orchestration
no vendor lock in	→	K8S
quick & realistic E2E testing	→	K8S for each dev
want to use CRDs	→	definitely K8S for each dev

Tooling Options

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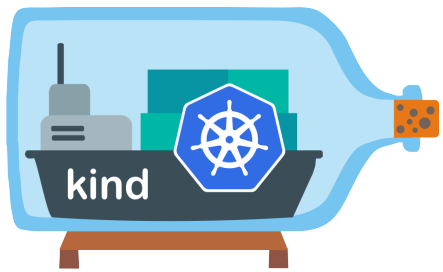
minikube

SKAFFOLD



Google Cloud Platform

Tooling Options

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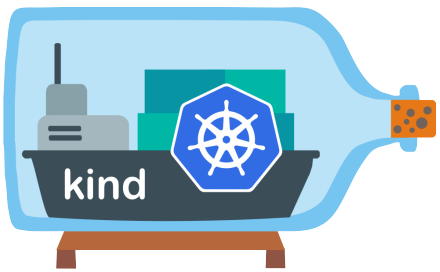
minikube

SKAFFOLD



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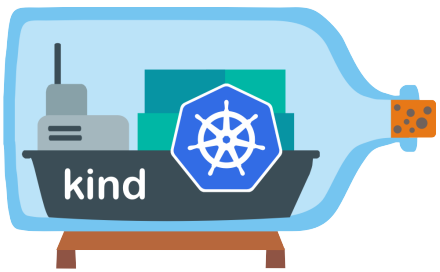

Google Cloud Platform

Tooling Options

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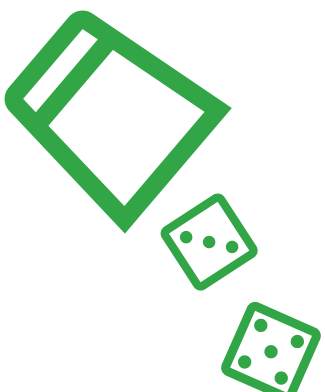
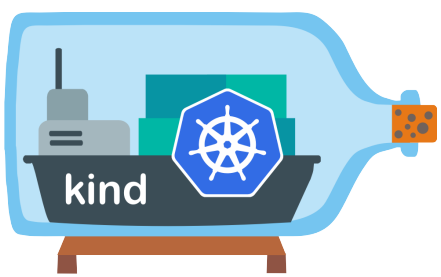


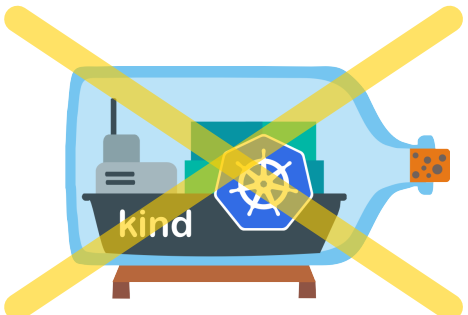


Credits for Cup and Dice: Google Fonts

Tooling Options

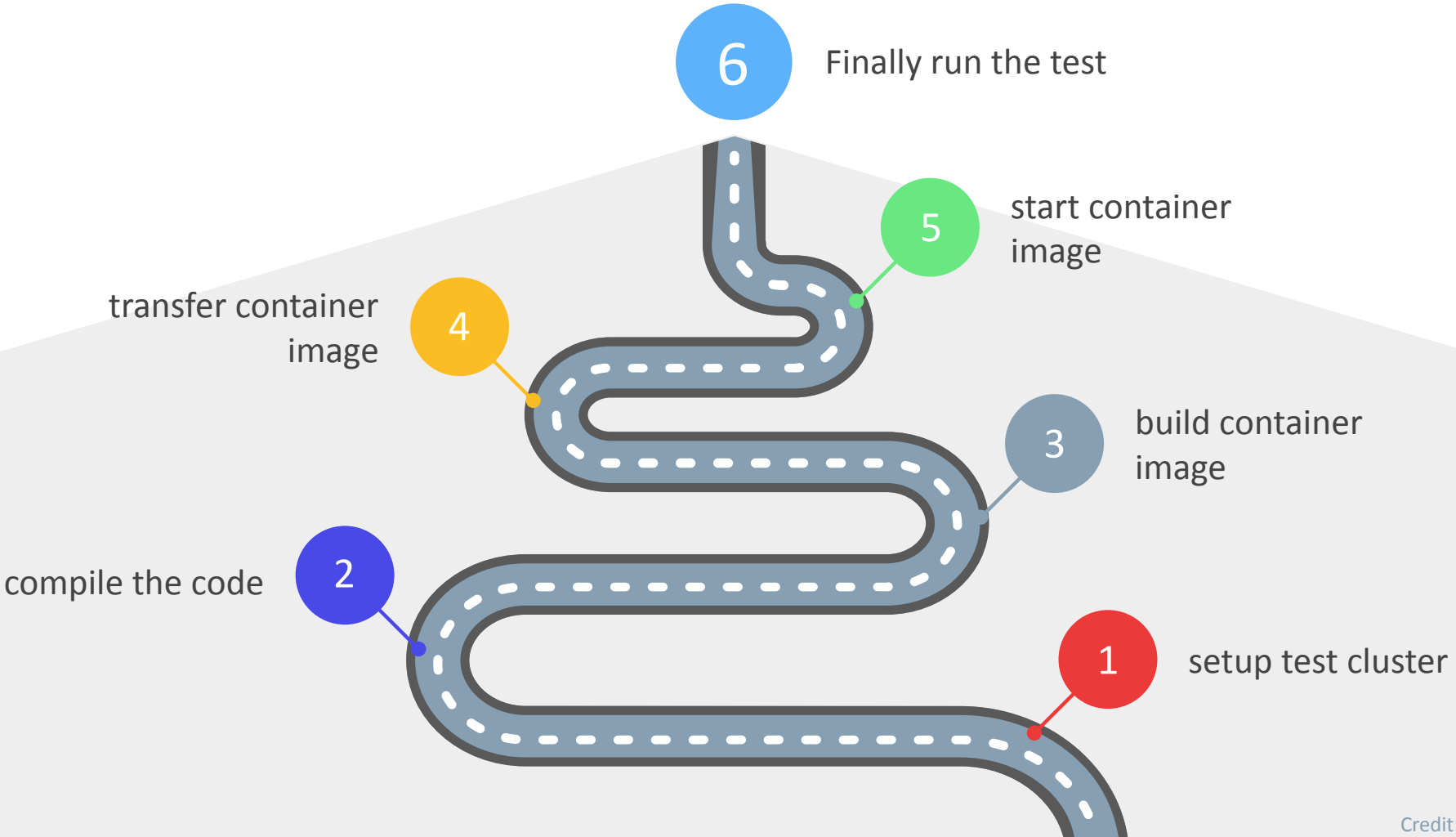
- driver options
- configurable k8s version
- persistent storage
- ...

minikube



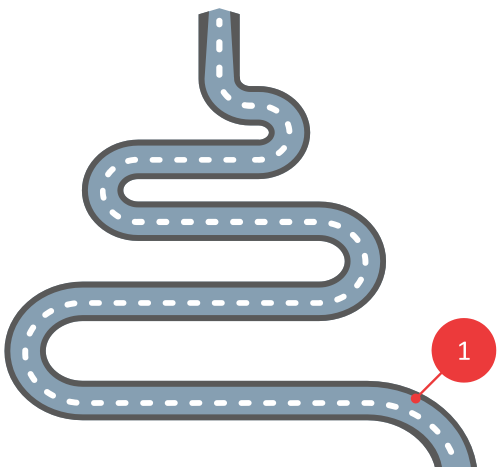
What needs to be done?

Running a System Test



1) set up access to test cluster

- `» minikube start`
- options for
  - `--memory`
  - `--cpus`
  - `--container-runtime`
  - `--kubernetes-version`



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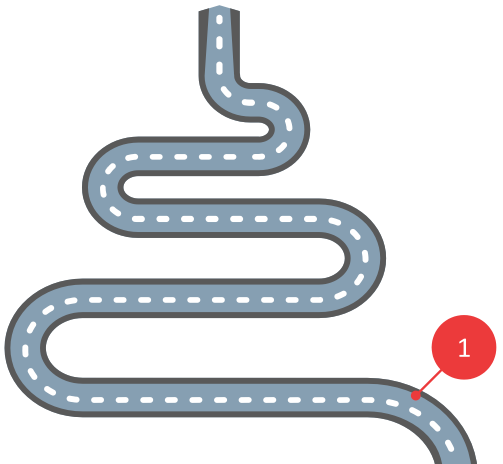
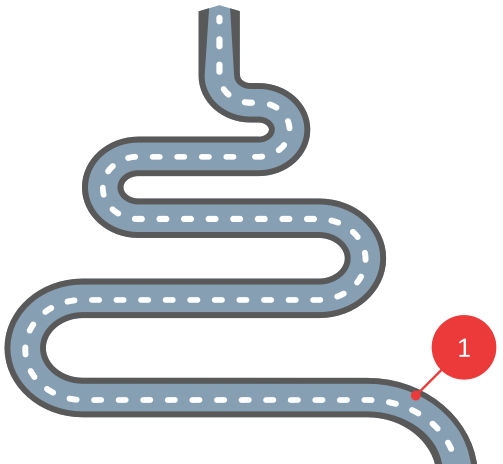


1) set up access to test cluster

- `» minikube start`
- options for
  - `--memory` → on MacOs beware docker machine memory
  - `--cpus`
  - `--container-runtime`
  - `--kubernetes-version`
- more options because apple
  - `--driver=docker`
  - `--ports […]` ← Forward Node Ports

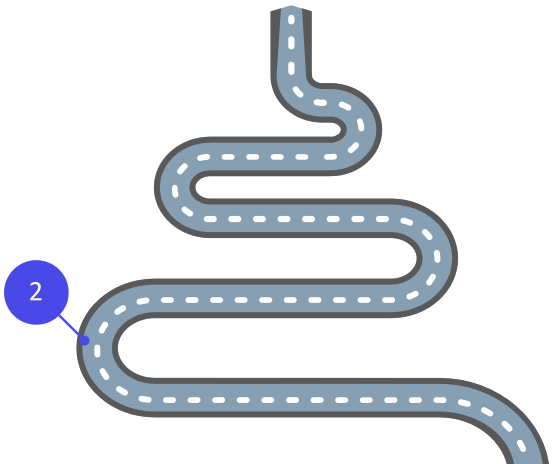
All Happy:



2) compile code

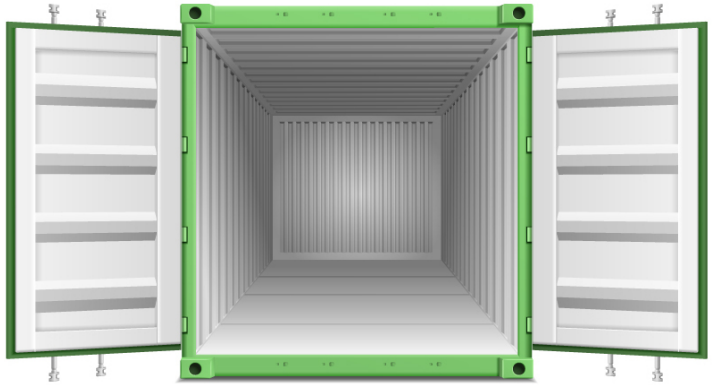
- business as usual

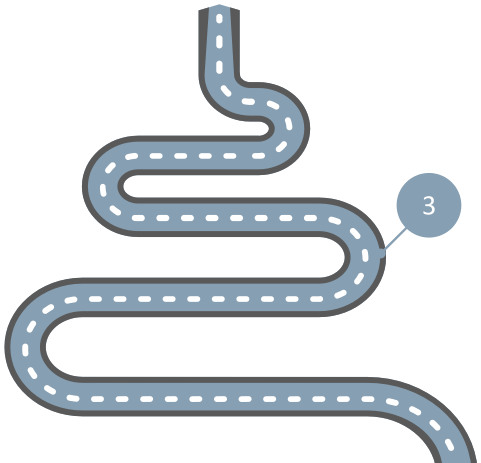
Credit: Imageflip



3) build container image

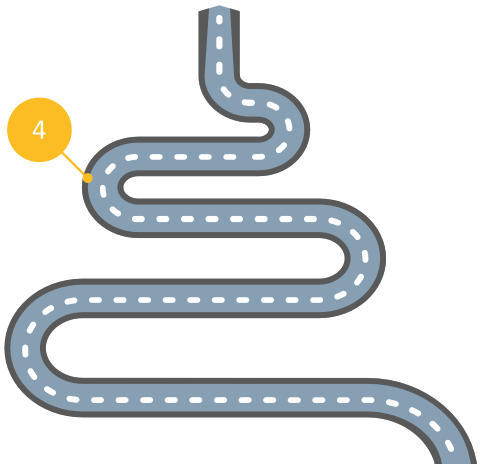
- Options:
  a) » `docker build`
  b) jib





Credit: macrovector on Freepik

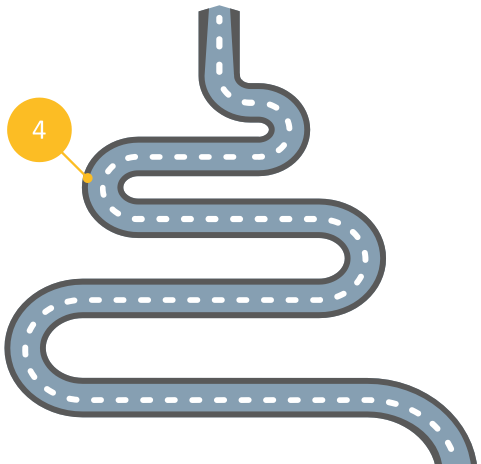
4) transfer container image



Credit: vecstock on Freepik

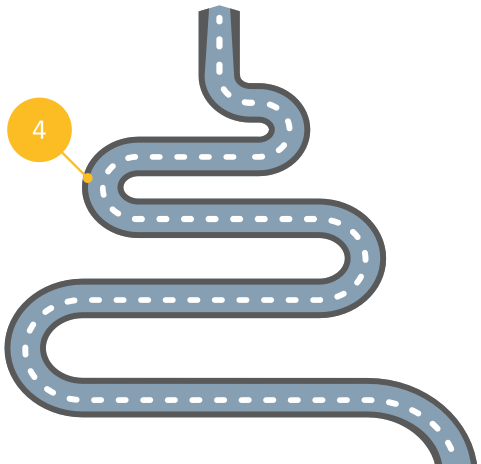
4) transfer container image

- Options:
  a) » `docker push`



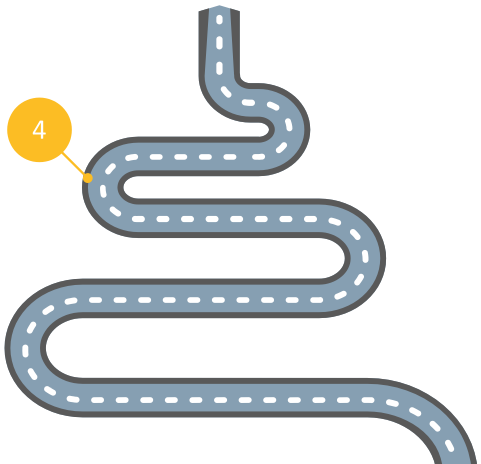
4) transfer container image

- Options:
  - a) ~~» `docker push`~~
  - b) » `minikube load`



4) transfer container image

- Options:
  - a) » ~~`docker push`~~
  - b) » `minikube load`
  - c) » `minikube docker-env` with
    - → » `docker build`
    - → » `jib:dockerBuild`



4) transfer container image

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1. bad because net roundtrips
2. bad because confusion in registry

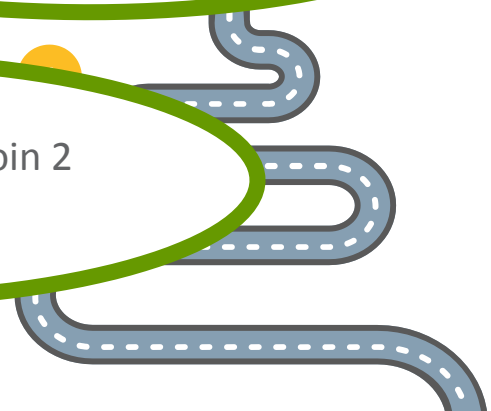
- Options:
  - a) ~~» `docker push`~~
  - b) » `minikube load`
  - c) » `minikube docker-env` with
    - → » `docker build`
    - → » `jib:dockerBuild`

bad because rare bugs

good because it's flexible

can't do cache optimizations

good because it can join 2 steps

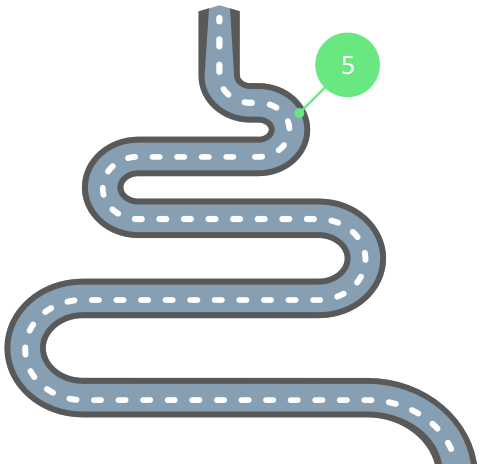


5) start container image

- make use of your config management
  - » `kubectl apply & kubectl rollout status`
  - » `helm`
  - …
- use image pull policy: `Never`

Kustomize.io

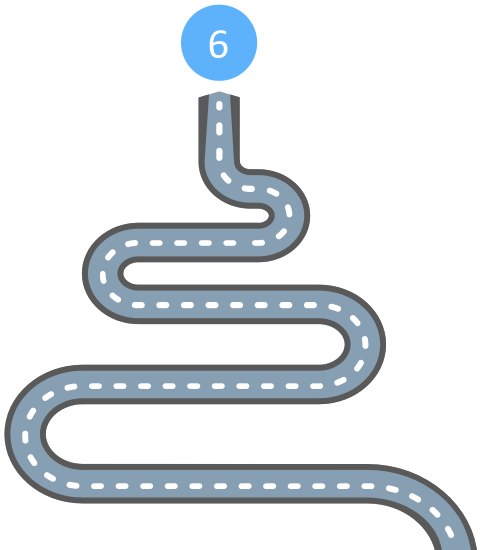
HELM



6) actually run systemtest

- business as usual

Credit: Imageflip



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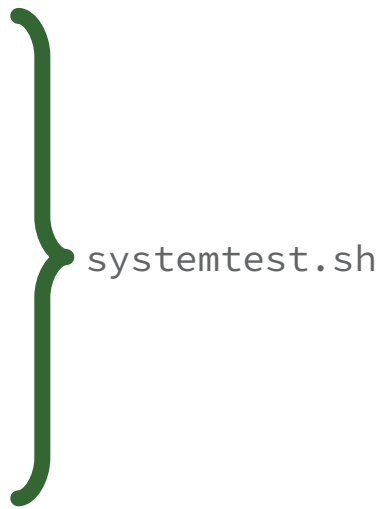
How could this look like with

maven ?

Maven

1) setup test cluster
2) compile the code
3) build container image
4) transfer container image
5) start container image
6) run the test



Maven

1) setup test cluster
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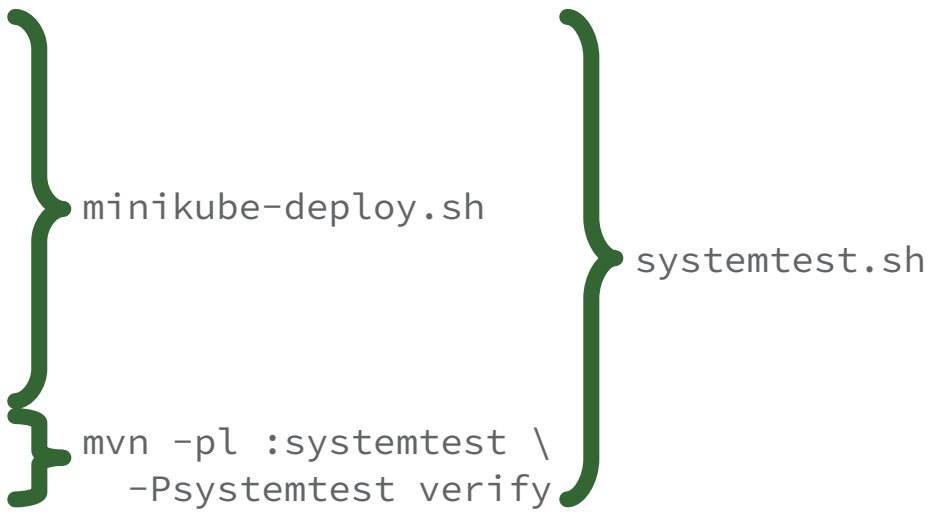

Maven

1) setup test cluster
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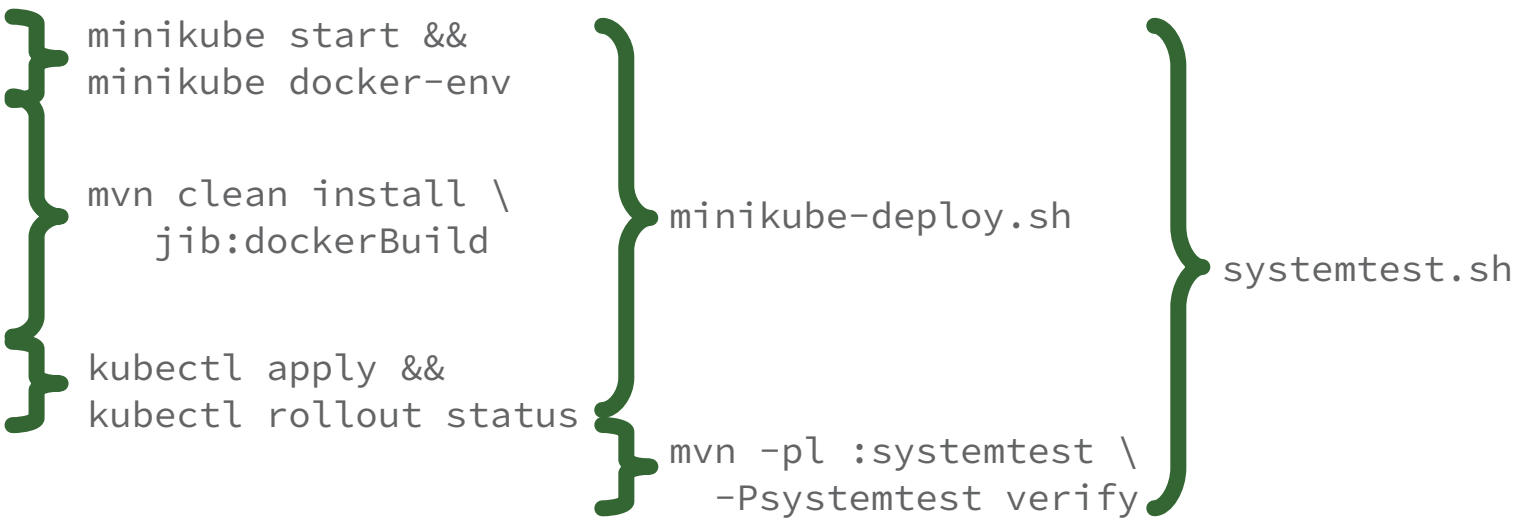

Maven native solution

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1) setup test cluster → pre-integration-test
2) compile the code → compile
3) build container image → package
4) transfer container image → pre-integration-test but after 1)
5) start container image → pre-integration-test but after 4)
6) run the test → integration-test

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How could this look like with

gradle?

Gradle Task Dependencies

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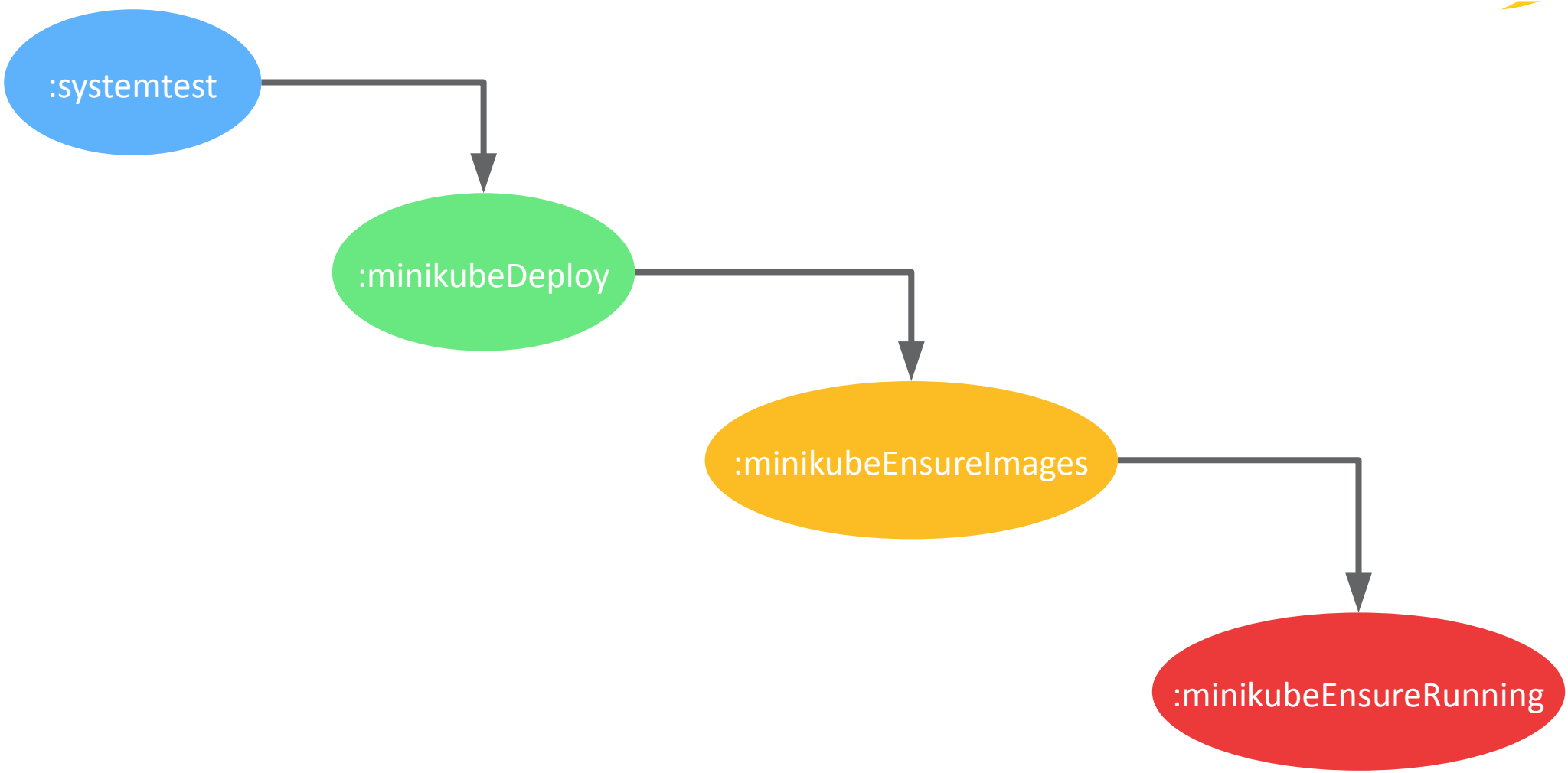

Gradle Task Dependencies

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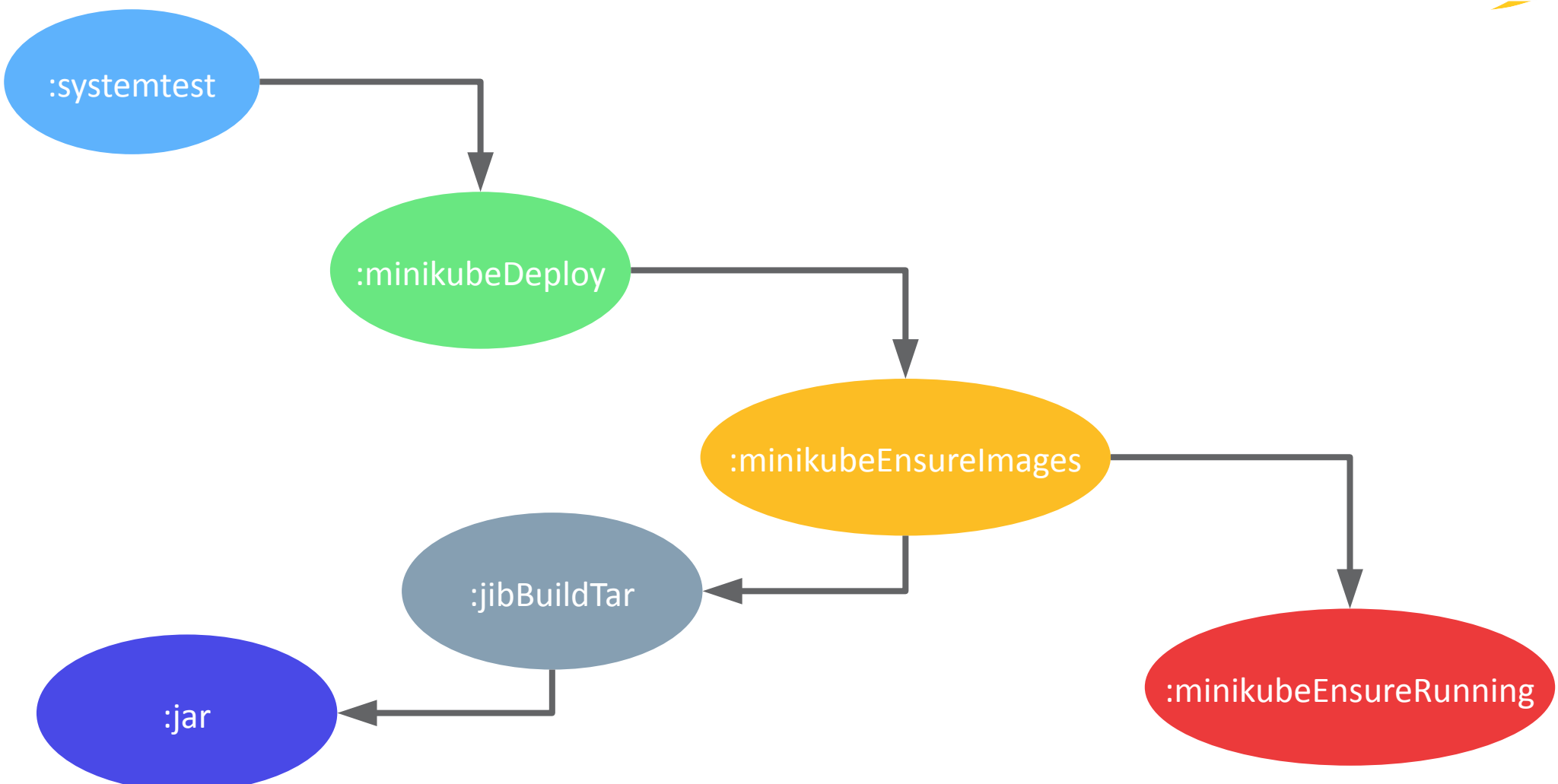
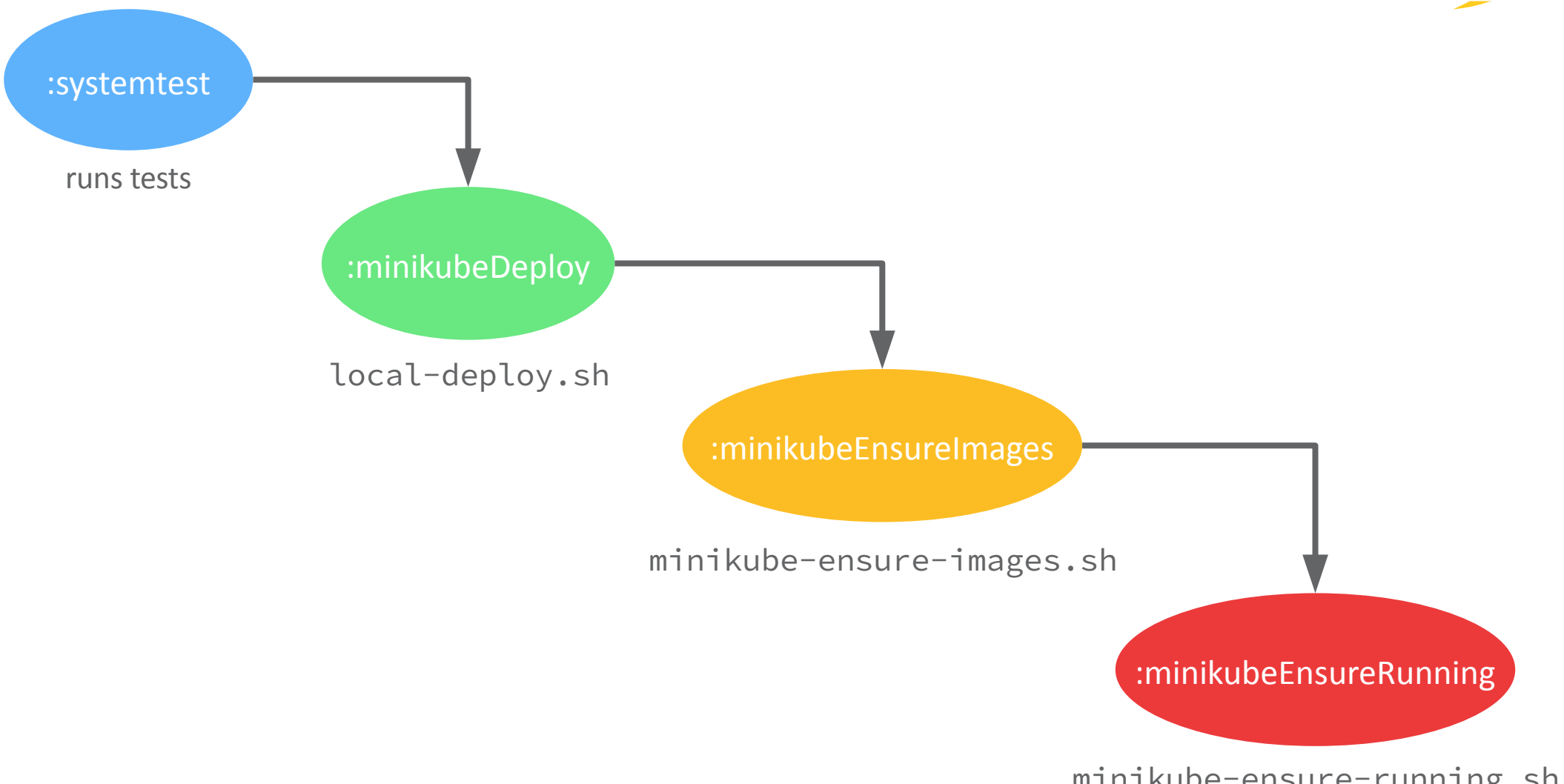


Gradle Task Content



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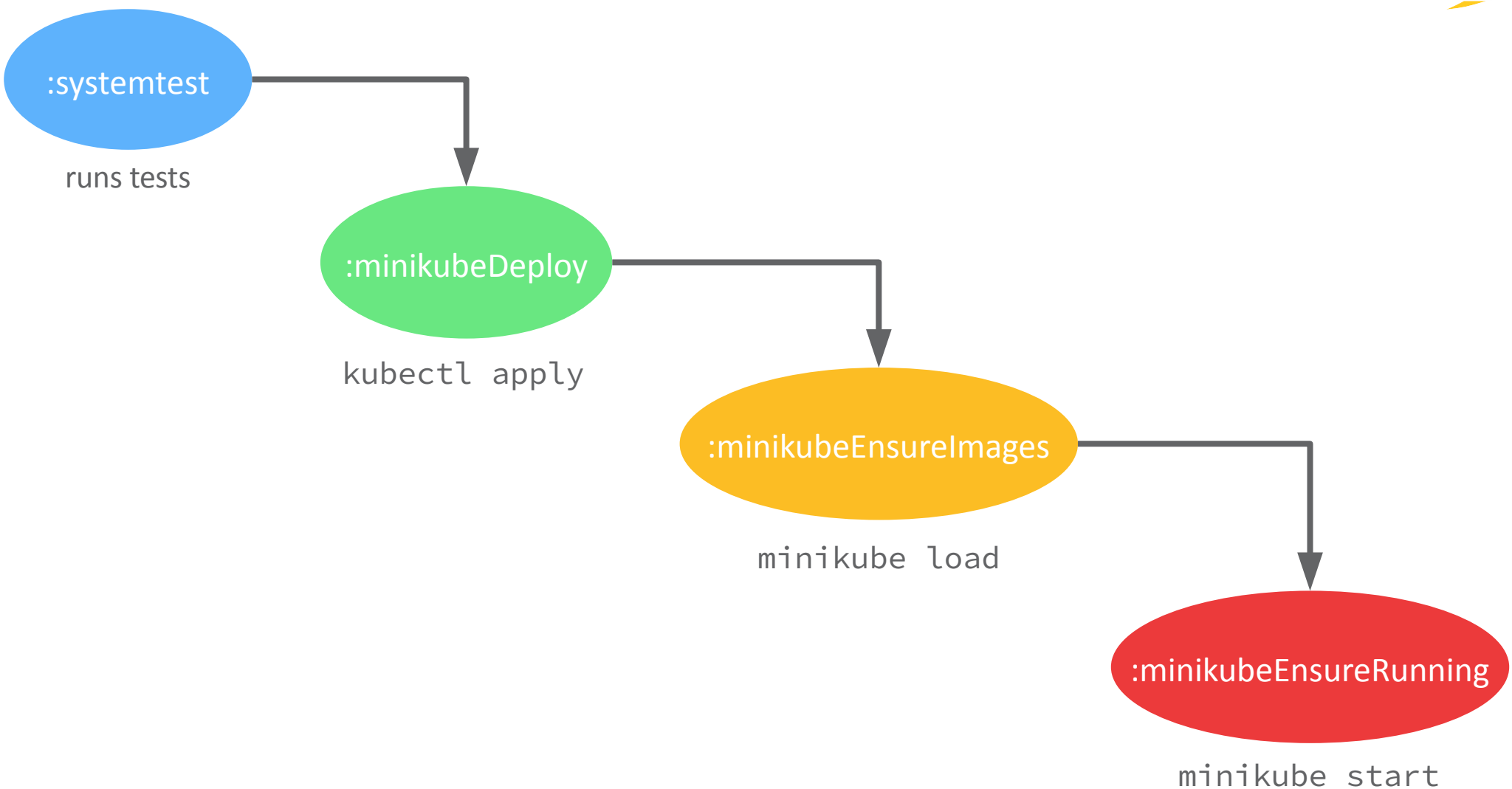
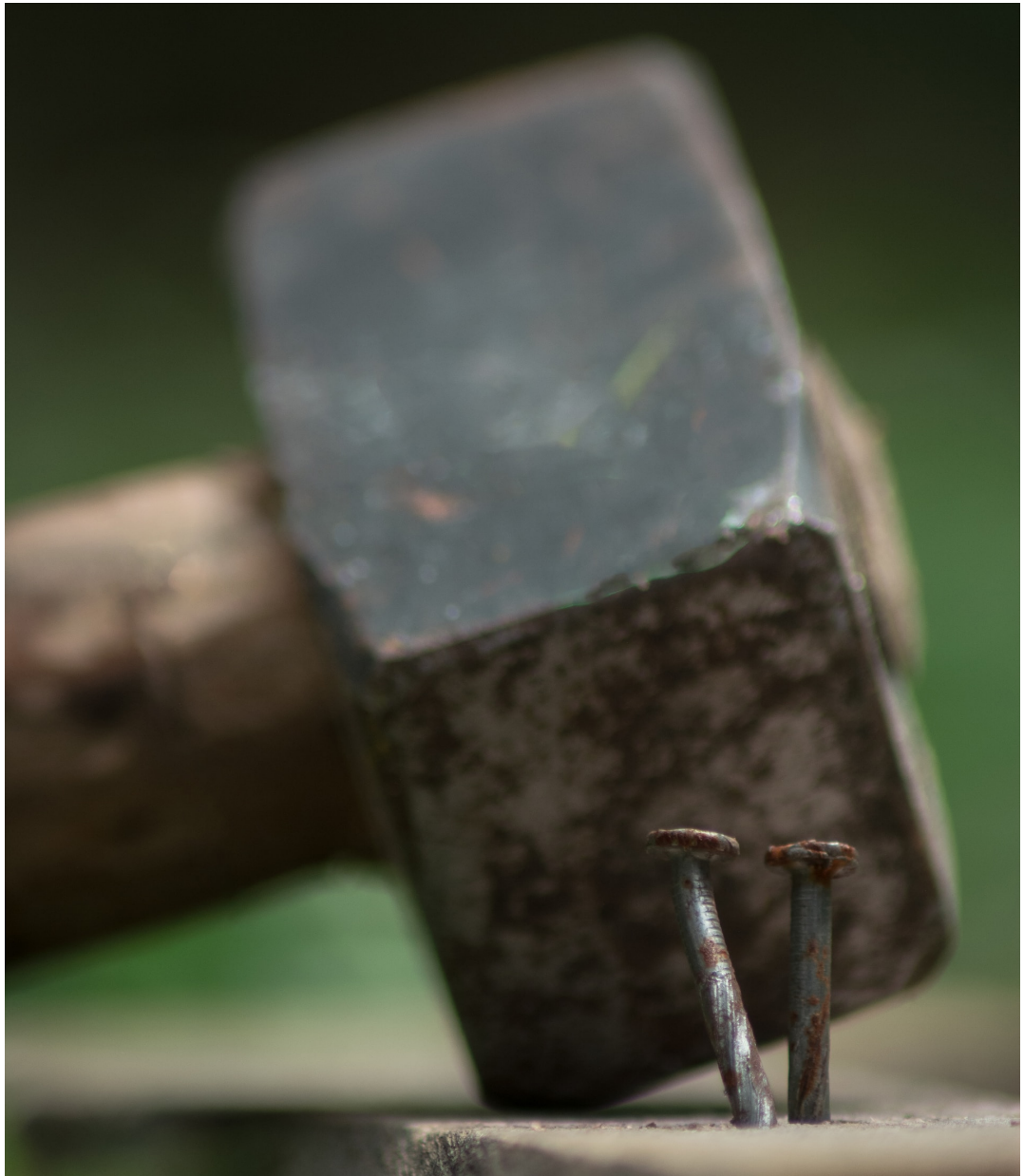


What have we achieved?

» minikube
delete



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more realism

Credit Sander Sammy on Unsplash

Credit Jaromír Kavan on Unsplash

more realism

- fewer diffs local vs prod
  - more realistic tests
  - less room for errors
  - better understanding

Quick Dev Cycle

- test very high integration
- test high reliability features like Auto Scalers, HA, ...
- use K8S API
- low pain when adding services

Credit: John Cameron on Unsplash

Recommendations

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- bring lots of RAM → >=32GB → 64GB recommended
- standard stack project → use skaffold
- have good network → use proper cluster per dev
- do both dev & ops
- maybe try KIND ?

Credits & Links

- Example Project: https://github.com/gitreelike/quickK8sFlow
- Contact Me: immanuel . sims ˝ÄT˝ akquinet de

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¿ QUESTIONS ?