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Spawning Kubernetes In CI For Integration Tests

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- Integration tests ensures the controller **works in-cluster**
- Therefore, integration tests require **a real Kubernetes cluster**

But how can we get **a real Kubernetes cluster** in our **CI pipeline**?

Running Kubernetes for a CI pipeline

- There are **many tools** for running Kubernetes
- Many tools require **systemd**
- CI environment is usually **minimal,** with **no access** to systemd

kind

(Kubernetes in Docker)

sigs.k8s.io/kind

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What is *kind*?

- A tool for running **local Kubernetes clusters** using **Docker**
- Supports **Kubernetes 1.11+**
- Maintained by the **Kubernetes community**

Why *kind*?

- Only requirement is **Docker**
- Comes with **pre-built Docker image** containing **all dependencies**
- Clusters are provisioned using **kubeadm**
- **Customizable** cluster provisioning process

kind in Travis-CI

github.com/xmudrii/travis-kind

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language: go
go:
  - '1.11.x'
services:
  - docker

jobs:
  include:
    - stage: Integration Tests
      before_script:
        # Download kubectl
        - curl -Lo kubectl \
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        # Download and build kind
        - go get sigs.k8s.io/kind
        # Create a new kind cluster using default properties
        - kind create cluster
        # Set KUBECONFIG environment variable
        - export KUBECONFIG="$(kind get kubeconfig-path)"
      script: make test-integration
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Building Docker images

@xmudrii

Building Docker Images

- *kind* **creates** container **with another Docker inside** where Kubernetes runs
- How to **pass controller's image** to Docker running **inside kind's container**?
- Option 1: **run container registry** and point kind's Docker to use it
- Option 2: **sideload image** to Docker running in kind's container

Building Docker Images

- **Native feature** for sideloading images is **work in progress (#28)**
- Sample **script for sideloading is** available in **jetstack/cert-manager** repo

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IMAGE=xmudrii/travis-kind
KIND_CLUSTER_NAME="kind-1"
KIND_CONTAINER_NAME="${KIND_CLUSTER_NAME}-control-plane"

build_image() {
   # Switch to the project's root directory
   cd $SCRIPT_ROOT
   # Create a temporary directory to store generated Docker image
   TMP_DIR=$(mktemp -d)
   IMAGE_FILE=${TMP_DIR}/image.tar.gz

   # Build Docker image
   docker build -t "${IMAGE}":latest .
   # Export generated Docker image to an archive
   docker save "${IMAGE}" -o "${IMAGE_FILE}"
   # Copy saved archive into kind's Docker container
   docker cp "${IMAGE_FILE}" "${KIND_CONTAINER_NAME}":/image.tar.gz
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Conclusion

- **sigs.k8s.io/kind**
- Projects using **kind**:
  - **Kubernetes**
  - **Kubernetes Federation v2** (https://github.com/kubernetes-sigs/federation-v2)
  - **Cert-Manager** (https://github.com/jetstack/cert-manager)

Thank you for your time!

- Example repository: **https://github.com/xmudrii/travis-kind**
- Twitter/GitHub/Slack: **@xmudrii**
- *kind* on Slack: **#kind**