# kind Kubernetes in Docker

## CONCEPTS

Each kind node is a container. Your cluster lives inside Docker (or Podman), so it needs no VM and starts in under a minute.

**Docker / Podman** host runtime
- **Node container** kindest/node image
  - **Kubernetes** kubelet, pods

Loaded images with a :latest tag are pulled anyway. Use a versioned tag or imagePullPolicy: IfNotPresent.

Contexts are named kind-<name>, so the default cluster is kind-kind.

## CLUSTERS

`kind create cluster`
Create a cluster named kind

`kind create cluster --name <name>`
Create a named cluster

`kind get clusters`
List clusters

`kind delete cluster`
Delete the default cluster

## CLUSTERS (cont.)

`kind delete cluster --name <name>`
Delete a named cluster

`kind create cluster --image kindest/node:<tag>`
Pick the Kubernetes version

`kind create cluster --wait 5m`
Block until the control plane is ready

`kind get nodes --name <name>`
List node containers

`kind delete clusters --all`
Delete every cluster

`kind version`
Show the kind version

## CONFIG FILE

`kind create cluster --config <file>`
Create from a config file

`nodes: [{role: control-plane}, {role: worker}]`
Add worker nodes

`extraPortMappings: [{containerPort, hostPort}]`
Publish a node port on the host

`image: kindest/node:<tag>@sha256:<digest>`
Pin a node image

## CONFIG FILE (cont.)

`featureGates: {<Gate>: true}`
Enable a feature gate

Use three control-plane nodes in the config for an HA control plane.

## IMAGES

`kind load docker-image <image>`
Copy a local image into the nodes

`kind load docker-image <image> --name <name>`
Load into a named cluster

`kind load image-archive <file.tar>`
Load an image from a tarball

`docker exec -it <name>-control-plane crictl images`
List images inside a node

`kind build node-image`
Build a node image from Kubernetes source

## KUBECONFIG

`kubectl cluster-info --context kind-<name>`
Check you can reach the cluster

`kubectl config use-context kind-<name>`
Switch kubectl to this cluster

## KUBECONFIG (cont.)

`kind get kubeconfig --name <name>`
Print the kubeconfig

`kind export kubeconfig --name <name>`
Write the context into your kubeconfig

`kind create cluster --kubeconfig <file>`
Write to a separate file

## DEBUGGING

`kind export logs <dir>`
Dump node and pod logs to a folder

`docker exec -it <name>-control-plane bash`
Shell into a node

`docker ps --filter name=<name>`
See the node containers

`KIND_EXPERIMENTAL_PROVIDER=podman kind create cluster`
Use Podman instead of Docker

`kind create cluster -v 5`
Verbose output

Behind a proxy, set HTTP_PROXY, HTTPS_PROXY and NO_PROXY before creating the cluster.

## RECIPES

### Three nodes with ports 80 and 443

```
cat <<EOF > kind.yaml
kind: Cluster
apiVersion: kind.x-k8s.io/v1alpha4
nodes:
- role: control-plane
  extraPortMappings:
  - {containerPort: 80, hostPort: 80}
  - {containerPort: 443, hostPort: 443}
- role: worker
- role: worker
EOF
kind create cluster --name dev --config kind.yaml
```

### Test a local image

```
docker build -t myapp:dev .
kind load docker-image myapp:dev --name dev
kubectl create deployment myapp --image=myapp:dev
# set imagePullPolicy: IfNotPresent so it is not pulled
```

### Throwaway CI cluster

```
kind create cluster --name ci --wait 5m
kubectl --context kind-ci get nodes
# run tests ...
kind export logs ./logs --name ci
kind delete cluster --name ci
```