

# Kubernetes - Workshop

This is just an intro, which tights to the presentation of Modern Application. For this workshop we will leverage kind.

Kind is a tool for running local Kubernetes clusters using Docker container “nodes”. kind was primarily designed for testing Kubernetes itself, but may be used for local development or CI.

We will first build a simple cluster with a specific name. If you omit the flag `--name` default name will be kind. As we get a little more familiar with kind cli, keep in mind that the other tool we could have selected was minikube, however, kind is newer and allows you to run a small kubernetes cluster for testing and learning purposes.

Shortcut your typing

```
echo "alias k=kubectl" >> ~/.bashrc
```

Understand how to use help with kubectl. Each main subcommand has a subset of help. The main will be `kubectl -h` or `kubectl --help`. Of course, this workshop is not going through each of the commands, that's something you can explore in your own. We will however cover many of them.

Show Merged kubeconfig settings.

```
kubectl config view
```

Use multiple kubeconfig files at the same time and view merged config

```
KUBECONFIG=~/.kube/config:~/.kube/kubconfig2
```

```
kubectl config view
```

Display list of contexts

```
kubectl config get-contexts
```

Display the current-context

```
kubectl config current-context
```

Set the default context to my-cluster-name, the name can be showed with the command above.

```
kubectl config use-context <<cluster-name>>
kubectl config set-context kind-remo
kubectl config -h <to get some additional help>
```

EXAMPLE: (in my case I have two running, KIND and Minikube, and it shows you which is the default config)

```
kubectl config get-contexts
CURRENT  NAME      CLUSTER  AUTHINFO  NAMESPACE
*        kind-kind kind-kind kind-kind
         minikube minikube minikube  default
```

Add a new user to your kubeconf that supports basic auth. We use this example in our Agility Lab, which was offered the last couple of years. [CIS Lab](#)

```
kubectl config set-credentials kubeuser/foo.kubernetes.com --username=kubeuser  
--password=kubepassword
```

Permanently save the namespace for all subsequent kubectl commands in that context.

```
kubectl config set-context --current --namespace=ciao
```

Set a context utilizing a specific username and namespace.

```
kubectl config set-context gce --user=cluster-admin --namespace=ciao \  
&& kubectl config use-context gce
```

This unsets the config for the user ciao `kubectl config unset users.ciao`

## Single Cluster

First let's evaluate kind's help

```
kind --help
kind creates and manages local Kubernetes clusters using Docker container 'nodes'
```

#### Usage:

```
kind [command]
```

#### Available Commands:

```
build      Build one of [node-image]
completion Output shell completion code for the specified shell (bash, zsh or fish)
create     Creates one of [cluster]
delete     Deletes one of [cluster]
export     Exports one of [kubeconfig, logs]
get        Gets one of [clusters, nodes, kubeconfig]
help       Help about any command
load       Loads images into nodes
version    Prints the kind CLI version
```

#### Flags:

```
-h, --help          help for kind
--loglevel string   DEPRECATED: see -v instead
-q, --quiet         silence all stderr output
-v, --verbosity int32 info log verbosity
--version           version for kind
```

Use "kind [command] --help" for more information about a command.

```
kind create cluster --name workshop
```

#### OUTPUT:

```
❏ kind create cluster --name workshop
Creating cluster "workshop" ...
❏ Ensuring node image (kindest/node:v1.20.2) ❏
❏ Preparing nodes ❏
❏ Writing configuration ❏
❏ Starting control-plane ❏❏
❏ Installing CNI ❏
❏ Installing StorageClass ❏
Set kubectl context to "kind-workshop"
You can now use your cluster with:

kubectl cluster-info --context kind-workshop

Have a nice day! ❏
```

Using kind command to verify we have a cluster

```
❏ kind get clusters
```

OUTPUT:

```
❏ kind get clusters
workshop
```

Check nodes

```
❏ kubectl get nodes
```

OUTPUT: We can see the workshop name for the control plane.

```
❏ k get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
workshop-control-plane	Ready	control-plane,master	11m	v1.20.2

We will use the describe subcommand to see the details of the node.

```
❏ kubectl describe no <<your node name>>
```

Example:

```
❏ kubectl describe no workshop-control-plane
```

**NOTE** | the option no is short for nodes.

OUTPUT:

```
❏ kubectl describe no workshop-control-plane
Name:                workshop-control-plane
Roles:               control-plane,master
Labels:              beta.kubernetes.io/arch=amd64
                    beta.kubernetes.io/os=linux
                    kubernetes.io/arch=amd64
                    kubernetes.io/hostname=workshop-control-plane
                    kubernetes.io/os=linux
                    node-role.kubernetes.io/control-plane=
                    node-role.kubernetes.io/master=
Annotations:         kubeadm.alpha.kubernetes.io/cri-socket:
                    unix:///run/containerd/containerd.sock
                    node.alpha.kubernetes.io/ttl: 0
                    volumes.kubernetes.io/controller-managed-attach-detach: true
```

```

CreationTimestamp: Wed, 12 May 2021 20:44:18 -0700
Taints:           <none>
Unschedulable:    false
Lease:
  HolderIdentity: workshop-control-plane
  AcquireTime:     <unset>
  RenewTime:       Wed, 12 May 2021 21:09:02 -0700
Conditions:
  Type              Status  LastHeartbeatTime             LastTransitionTime
  Reason            Message
  ----            -
  MemoryPressure    False   Wed, 12 May 2021 21:05:02 -0700   Wed, 12 May 2021 20:44:17
-0700 KubeletHasSufficientMemory kubelet has sufficient memory available
  DiskPressure      False   Wed, 12 May 2021 21:05:02 -0700   Wed, 12 May 2021 20:44:17
-0700 KubeletHasNoDiskPressure kubelet has no disk pressure
  PIDPressure       False   Wed, 12 May 2021 21:05:02 -0700   Wed, 12 May 2021 20:44:17
-0700 KubeletHasSufficientPID kubelet has sufficient PID available
  Ready             True    Wed, 12 May 2021 21:05:02 -0700   Wed, 12 May 2021 20:45:02
-0700 KubeletReady kubelet is posting ready status
Addresses:
  InternalIP: 172.18.0.2
  Hostname:   workshop-control-plane
Capacity:
  cpu:                8
  ephemeral-storage:  61255492Ki
  hugepages-1Gi:      0
  hugepages-2Mi:      0
  memory:             2034536Ki
  pods:              110
Allocatable:
  cpu:                8
  ephemeral-storage:  61255492Ki
  hugepages-1Gi:      0
  hugepages-2Mi:      0
  memory:             2034536Ki
  pods:              110
System Info:
  Machine ID:         a7799064a9e74d6cb45448b4c172f5e0
  System UUID:        ff810c9a-bbad-4497-8ac1-f369ac65ce6e
  Boot ID:            fb696cfd-2560-4842-9d50-7b84f86326a9
  Kernel Version:     5.10.25-linuxkit
  OS Image:           Ubuntu 20.10
  Operating System:    linux
  Architecture:       amd64
  Container Runtime Version: containerd://1.4.0-106-gce4439a8
  Kubelet Version:     v1.20.2
  Kube-Proxy Version:  v1.20.2
PodCIDR:             10.244.0.0/24
PodCIDRs:            10.244.0.0/24
ProviderID:          kind://docker/workshop/workshop-control-plane

```

```

Non-terminated Pods:          (9 in total)
  Namespace                  Name                      CPU
Requests  CPU Limits  Memory Requests  Memory Limits  AGE
-----
  kube-system                coredns-74ff55c5b-p2bch          100m
(1%)      0 (0%)      70Mi (3%)      170Mi (8%)      24m
  kube-system                coredns-74ff55c5b-wk5d5          100m
(1%)      0 (0%)      70Mi (3%)      170Mi (8%)      24m
  kube-system                etcd-workshop-control-plane       100m
(1%)      0 (0%)      100Mi (5%)      0 (0%)          24m
  kube-system                kindnet-hfj8j                    100m
(1%)      100m (1%)     50Mi (2%)      50Mi (2%)       24m
  kube-system                kube-apiserver-workshop-control-plane 250m
(3%)      0 (0%)      0 (0%)          0 (0%)          24m
  kube-system                kube-controller-manager-workshop-control-plane 200m
(2%)      0 (0%)      0 (0%)          0 (0%)          24m
  kube-system                kube-proxy-tqt8q                  0 (0%)
0 (0%)      0 (0%)      0 (0%)          24m
  kube-system                kube-scheduler-workshop-control-plane 100m
(1%)      0 (0%)      0 (0%)          0 (0%)          24m
  local-path-storage         local-path-provisioner-78776bfc44-fg2hn 0 (0%)
0 (0%)      0 (0%)      0 (0%)          24m

Allocated resources:
(Total limits may be over 100 percent, i.e., overcommitted.)
Resource           Requests      Limits
-----
cpu                 950m (11%)   100m (1%)
memory              290Mi (14%)  390Mi (19%)
ephemeral-storage   100Mi (0%)   0 (0%)
hugepages-1Gi       0 (0%)       0 (0%)
hugepages-2Mi       0 (0%)       0 (0%)

Events:
Type      Reason                      Age              From      Message
-----
Normal    NodeHasSufficientPID        24m (x4 over 25m) kubelet    Node workshop-
control-plane status is now: NodeHasSufficientPID
Normal    NodeHasSufficientMemory     24m (x5 over 25m) kubelet    Node workshop-
control-plane status is now: NodeHasSufficientMemory
Normal    NodeHasNoDiskPressure       24m (x5 over 25m) kubelet    Node workshop-
control-plane status is now: NodeHasNoDiskPressure
Normal    Starting                     24m             kubelet    Starting kubelet.
Normal    NodeHasSufficientMemory     24m             kubelet    Node workshop-
control-plane status is now: NodeHasSufficientMemory
Normal    NodeHasNoDiskPressure       24m             kubelet    Node workshop-
control-plane status is now: NodeHasNoDiskPressure
Normal    NodeHasSufficientPID        24m             kubelet    Node workshop-
control-plane status is now: NodeHasSufficientPID
Normal    NodeAllocatableEnforced     24m             kubelet    Updated Node
Allocatable limit across pods
Warning   readOnlySysFS               24m             kube-proxy  CRI error: /sys is

```

```
read-only: cannot modify conntrack limits, problems may arise later (If running
Docker, see docker issue #24000)
Normal    Starting                24m                  kube-proxy  Starting kube-
proxy.
Normal    NodeReady                  24m                  kubelet     Node workshop-
control-plane status is now: NodeReady
```

Delete the current kind cluster. If you have the default cluster, named **kind**, you do not have to use the `--name` option.

```
kind delete cluster --name workshop
```

OUTPUT:

```
❯ kind delete cluster --name workshop
Deleting cluster "workshop" ...
```

Create a cluster with 3 workers. create a file, called `mykind` with the directions below:

```
❯ vi mykind
```

Directives for the file `mykind`. This will build the control plane and 3 workers node.

```
kind: Cluster
apiVersion: kind.x-k8s.io/v1alpha4
# One control plane node and three "workers".
#
# While these will not add more real compute capacity and
# have limited isolation, this can be useful for testing
# rolling updates etc.
#
# The API-server and other control plane components will be
# on the control-plane node.
#
# You probably don't need this unless you are testing Kubernetes itself.
nodes:
- role: control-plane
- role: worker
- role: worker
- role: worker
```

To build the new cluster with 3 workers and 1 control-plane execute the following:

```
kind create cluster --config mykind
```



OUTPUT:

```
❯ kind create cluster --config mykind
Creating cluster "kind" ...
❯ Ensuring node image (kindest/node:v1.20.2) ❯
❯ Preparing nodes ❯ ❯ ❯
❯ Writing configuration ❯
❯ Starting control-plane ❯❯
❯ Installing CNI ❯
❯ Installing StorageClass ❯
❯ Joining worker nodes ❯
Set kubectl context to "kind-kind"
You can now use your cluster with:

kubectl cluster-info --context kind-kind

Thanks for using kind! ❯
```

Check nodes

```
❯ kubectl get nodes
```

OUTPUT: We can see the workshop name for the control plane.

```
❯ k get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
kind-control-plane	Ready	control-plane,master	2m35s	v1.20.2
kind-worker	Ready	<none>	2m4s	v1.20.2
kind-worker2	Ready	<none>	2m4s	v1.20.2
kind-worker3	Ready	<none>	2m4s	v1.20.2

OUTPUT: with the wide option

As you recall from our docker section, we will check how many containers are running in docker.

```
❯ docker ps
```

OUTPUT:

```

❯ docker ps
CONTAINER ID   IMAGE                                COMMAND                                  CREATED        STATUS
PORTS          NAMES
4edfee1fd18f   kindest/node:v1.20.2               "/usr/local/bin/entr..." 3 minutes ago  Up 3
minutes       127.0.0.1:54190->6443/tcp   kind-control-plane
5671a7b7c983   kindest/node:v1.20.2               "/usr/local/bin/entr..." 3 minutes ago  Up 3
minutes       kind-worker3
29c2eb8fa722   kindest/node:v1.20.2               "/usr/local/bin/entr..." 3 minutes ago  Up 3
minutes       kind-worker2
0812af2b6e37   kindest/node:v1.20.2               "/usr/local/bin/entr..." 3 minutes ago  Up 3
minutes       kind-worker

```

Once kubectl and kind are ready, open bash console and run these commands.

```

export KUBECONFIG=$(kind get kubeconfig)
kubectl cluster-info

```

OUTPUT:

```

k cluster-info
W0512 22:00:22.527953 98101 loader.go:223] Config not found: [apiVersion, v1
clusters,
- cluster,
  certificate-authority-data, https, //127.0.0.1, 54190
  name, kind-kind
contexts,
- context,
  cluster, kind-kind
  user, kind-kind
  name, kind-kind
current-context, kind-kind
kind, Config
preferences, {}
users,
- name, kind-kind
  user,
    client-certificate-data
error loading config file "
LS0tLS1CRUdJTiBDRVJUSUZJQ0FURSB0tLS0tCk1JSUM1ekNDQWMrZ0F3SUJBZ0lCQURBTklna3Foa2lHOXcwQk
FRc0ZBREFTWVJN0VRWURWUVFERXdwcmRXSmwKY201bGRHVnpNQjRYRFRJeE1EVXhNekEwTkRBMU9G6b1hEVE14
TURVeE1UQTBOREExT0Zvd0ZURVRNqkVHQTFFVRQpBeE1LYTNWVpYSnVaWFFJsY3pDQ0FTSXdEUVlKS29aSWh2Y0
5BUUVCQlFBRGdnRVBBRENDQVFvQ2dnRUJBT3lpClQrdkxtVk1jeGQwT2xNU3VVbGRrRWFaQjNsUm1uRDRSL29S
cjVHeFZ5Mksra2VzQ1R3SC9ld2I2ZXp1d3dqQ0UKRUdYR0V1d1JSWWhzbW5lbndzdEJjQmJTR055Vm5DRFRwa1
VaTXY3K2dxdS91V0FyUTdTWWc3UmZZdmI2dVl5VWp3aFA5S1N2RXlLaTGNWditSaLRscI9oQ3lYNm1PQlPpEeXgz
ek9hZFNtcDFZbXlI4eS9YdENNAjRUekxWWDDxZnR0ClJ4ZUtNMkFMb0NkS1d2cWExSTBHckQ5cWdZTHFGVmxGRW
hLM1d1ejZPeHhtc0ZpbmVPMDFoZFdkWEpTTWdJM0cKRm11VUhpREtQYTg1VFVXSFlYRlVBZFRjbTFFqbXFXMkZp
dHVIYXAremxnZ2FXcmg5bFNocmd0Q1IvTUZndzBBNgpsNDhCMXYrN3dZU1VSMElscm5zQ0F3RUFBYU5DTUVBd0
RnWURWUjBQVVFIL0JBURBZ0trTUE4R0ExVWRFd0VCCi93UUZNQU1CQWY4d0hRWURWUjBPQkZJRZUZNmis0SkdN

```

RnNCSUVDZEpZSm1RejBjUCtGMTBNQTBHQ1NxR1NJYjMKRFFFQkN3VUFBNElCQVFDL0s40GtVakk4V1NZUDBNAG  
FzN1LTbXZzVnMvL3F5K0JHODRkQTdnUHR4Zi90SUR1agpQSkxLd0hMU1F4eDZvZ2L1S3VKY21jK0LOZFF1dXRE  
dUphUmh3WkLZaitS9GMXdJdUI2VjJJQTh2VS8reLM4Cm4yTnZJcENrUTlpM0tNbnhBcG1zL2Nwb1M2Y3pVZX  
NLQTB1eVVGWEtjbUpTS2pzdW5aeGFM0Gh4Y3ZjCHFLmUKM3BPRnR4eEcrdnNjN0pIL0xtd2ZGS0R0NXB0QnIz  
NVRRNzBoUllpMULnNjQrVkvKrkJ2bLziYUNJaGpDQW5KNQpiaTbkNmxaMTZ6VnJtSnfJR21DNVA2RCs5eLRKem  
1tMzKxUmI50U9pc2pzRTZFdS9pVky2N1AzZVFWTnVhazVrCnJ1UGLkaTcwZnZTRjB3TE5qc2NjS1LLz90Ukp5  
dmRJSVFTdwotLS0tLUVORCBDRVJUSUZJQ0FURS0tLS0tCg==

server": open

LS0tLS1CRudJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSUM1ekNDQWMrZ0F3SUJBZ0lCQURBTkNa3Foa2lHOXcwQk  
FRc0ZBREFTVjN0dVRWURWUVFERXdwcmRXSmwKY201bGRHVnpNQjRYFRFJeE1EVXhNekEwTkRBMU9G6b1hEVE14  
TURVeE1UQTBOREExT0Zvd0ZURVRNqkVHQTFVRQpBeE1LYTNwaVpYSnVaWFJsY3pDQ0FTSXdEUVlKS29aSWh2Y0  
5BUUVCQlFBRGdnRVBBERNDQVFvQ2dnRUJBT3lpClQrdkxtVk1jeGQwT2xNU3VVbGRrRWFaQjNsUm1uRDRSL29S  
cjVHeFZ5Mksra2VzQ1R3SC9ld2I2ZXP1d3dQ0UKRUdYR0V1d1JSWWhzBW5lbndzdEJjQmJTR055Vm5DRFRwa1  
VaTXy3K2dxdS91V0FyUTdTWWc3UmZZdmI2dVl5Vwp3aFA5S1N2RXlaTGNWditSaLRscI9oQ3LYNm1PQlPeeXgz  
ek9hZFNtcDFZbXI4eS9YdENNAjRUekxWWDdxZnR0ClJ4ZUtNMkFMb0NkS1d2cWEExSTBHckQ5cWdZTHFGVmxGRW  
hLM1dlejZPeHhtc0ZpbmVPMDFoZFdkWEpTTWdJM0cKRm11VUhpREtQYTg1VFVXSFlYRlVBZFPjbTFqbXfXmkZp  
dHVIYXAremxnZ2FXcmg5bFNocmd0Q1IvTUZndzBBNgpsNDhCMXYrN3dZU1VSMElsdm5zQ0F3RUFBU5DTUVBd0  
RnWURWUjBQOVFILOJBUURBZ0trTUE4R0ExVWRfd0VCCi93UUZNQU1CQWY4d0hRWURWUjBPQkJZRUZNMis0SkdN  
RnNCSUVDZEpZSm1RejBjUCtGMTBNQTBHQ1NxR1NJYjMKRFFFQkN3VUFBNElCQVFDL0s40GtVakk4V1NZUDBNAG  
FzN1LTbXZzVnMvL3F5K0JHODRkQTdnUHR4Zi90SUR1agpQSkxLd0hMU1F4eDZvZ2L1S3VKY21jK0LOZFF1dXRE  
dUphUmh3WkLZaitS9GMXdJdUI2VjJJQTh2VS8reLM4Cm4yTnZJcENrUTlpM0tNbnhBcG1zL2Nwb1M2Y3pVZX  
NLQTB1eVVGWEtjbUpTS2pzdW5aeGFM0Gh4Y3ZjCHFLmUKM3BPRnR4eEcrdnNjN0pIL0xtd2ZGS0R0NXB0QnIz  
NVRRNzBoUllpMULnNjQrVkvKrkJ2bLziYUNJaGpDQW5KNQpiaTbkNmxaMTZ6VnJtSnfJR21DNVA2RCs5eLRKem  
1tMzKxUmI50U9pc2pzRTZFdS9pVky2N1AzZVFWTnVhazVrCnJ1UGLkaTcwZnZTRjB3TE5qc2NjS1LLz90Ukp5  
dmRJSVFTdwotLS0tLUVORCBDRVJUSUZJQ0FURS0tLS0tCg==

server: file name too long

error loading config file "

LS0tLS1CRudJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSURFekNDQWZ1Z0F3SUJBZ0lJYktHMQG3cHJRZ2N3RFFZSk  
tvWklodmNOQVFFTEJRQXdGVEVUTUJFR0ExVUUKQXhNS2EzVmIaWEp1WlhSbGN6QWVGdzb5TVRBMU1UTXdORFF3  
TlRoYUJZ3Mh1NakExTVRNd05EUXhNREZhTURReApGekFWQmd0VkJBb1REbk41YzNSbGJUcHRZWE4wWlhKek1Sa3  
dGd1LEVlFRREV4QnJkV0psY201bGRHVnpMV0ZrCmJXbHVNSU1CSWpBTkNa3Foa2lHOXcwQkFRUjZBQU9DQVE4  
QU1JSUJDZ0tDQVFFQTVQU5NYjBCa0NYd1hRVTYKWEROV2V5ams1c1IxNndvNFlnD2NYM3lnbE94WjdmMjZBb3  
IveTI2TktMTJib1VqY2cybG0vVWF1QU10RGVdQgpGL1Q2cy9Tdm9S0GnUa0Jya3hNZnZyChpNZlY4SXRpWDVR  
R0c2eWd0YnFjaVJ10FdRM21NNVhScVZudnVNRUE2Cl1LM2RWK2dQNGdpSGtiVjkveLJSQjdCYlBqd1NPUGJqak  
FhZW5GR0R5UmV3K1lQZWZMTjFSMzBTNjFSQ0NJK1oKd3VoQ293VFVWR1E2RzNST2dFbzVDOERQdzAxSitsenFL  
Sut0L3htcGE2cGVuUEUyOU5Va2JnbXN2bHczbjNMcgovaytBaGLHM1hJNEVPV0pNaDMzR2srUkJySFF0amJvRk  
xBUWxYRUQ3NDlnT0ftdT0RHViTkNwUUR2WDVtSGhUCj14QXdwU1EQVFBQm8wZ3dSakFPQmd0VkhROEJBZjhF  
QkFNQ0JhQXdFd1LEVlIwBEJBd3dDZ1LJS3dZQkJRVUgKQXdJd0h3WURWUjBqQkJnd0ZvQVV6Yjdna1L3V3dFZ1  
FKMGxnbVpEUfJ3LzRYWFF3RFFZSkTVWklodmNOQVFFTApcUUEFEZ2dFQkFLUXNaNXy5NHJlV1NmDMZGWLBEbkh1  
dmF4Tmc4WkJZU3RVdzNmbHdTd2cySTZH0kvQVFhND1LcmMxMkNyL2pUcDBuZ3RfWlJ4Wgd0cVVDWnQ3RWxLZn  
VwQzAxeUZtRwXqR2sxMy9rbWp2VkJ3VlpjTGpZSxJ1dW8KQ0JGdTJvWnRHUU1DaXA4Q1EraTIZaW5QKy9udWJs  
UGswZzJGEmZQNHRwSG5mbzVGQzEyQ0xvTXV1Q2JNK0tSZQovQ1L2NHN5N3JqdGJHTVkrZ2dFRU5CcWFrZDhsL1  
BEQVM5dG9YQTRYdjJvTDY5OFZMRzBhQVJaTULIKzJJT291Ci9MeEQ2aXMzTzJHQUFJQUJKQVg2dDhraG0yaU4v  
L1B6WnhjUmpik3VaTW1uR1lvVWRVODkzSzJPZ3ZGcUowemkKcWlsZmVLR0NhRXlqbWk5K0VocHU3bE1QOE1VVj  
NLWT0KLS0tLS1FtkQgQ0VSVElGSUNBVEUtLS0tLQo=

client-key-data": open

LS0tLS1CRudJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSURFekNDQWZ1Z0F3SUJBZ0lJYktHMQG3cHJRZ2N3RFFZSk  
tvWklodmNOQVFFTEJRQXdGVEVUTUJFR0ExVUUKQXhNS2EzVmIaWEp1WlhSbGN6QWVGdzb5TVRBMU1UTXdORFF3  
TlRoYUJZ3Mh1NakExTVRNd05EUXhNREZhTURReApGekFWQmd0VkJBb1REbk41YzNSbGJUcHRZWE4wWlhKek1Sa3  
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IveTI2TkptMTJib1VqY2cybG0vVWFiQU10RGVDQgpGL1Q2cy9Tdm9S0GnUa0Jya3hNZnZYcHpNZ1Y4SXRpWDVR  
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VwQzAxeUZtRWxqR2sxMy9rbWp2V6k93VlpjTgPZSXJ1dW8KQ0JGdTJvWnRHU1DaXA4QLEraTizaW5QKy9udWJs  
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L1B6WnhjUmpiK3VaTW1uR1lvVWRVODkzSzJPZ3ZGcUowemkKcWlsZmVLROhRXlqbWk5K0VocHU3bELQOE1VVj  
NLWT0KLS0tLS1FTkQgQ0VSVE1GSUNBVEUtlS0tLQo=

client-key-data: file name too long

error loading config file "

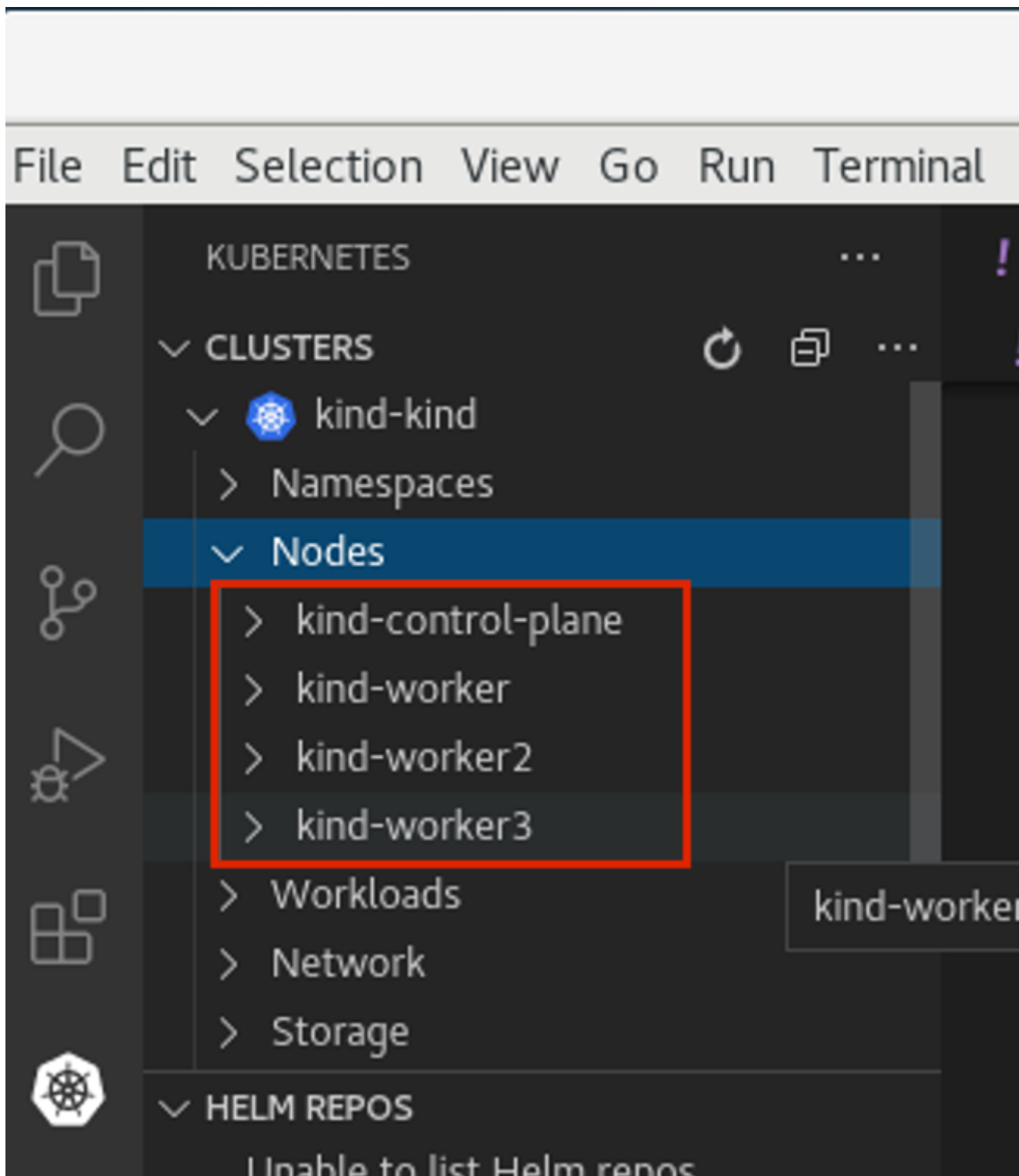
LS0tLS1CRUdJTiBSU0EgUFJJVkFURSBLRVktLS0tLQpNSU1Fb3dJQkFBS0NBUEUvBM1VBTk1iMEJrQ1h3WFFVN1  
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": open

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```
JiT0lNUlNvRFJJU0h3Z0NGbjYrUGpFd0dYQXlBMmo4bWdFcQpmNnQ0Z1hSZm93SlN4cTc3cm5tS3pET2VpTi9N
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T25mbW9XK0JvdFQ3eXhLNE9lQ1IzejFnemhDSjJNa2JYRDJyRDZkenozQgpjNet5YzBCZW53VE5vQmp0bXdVaD
FEU0RaNmMySHg2WUVSRGVzN3E1c0VEUHB1WE5ETF1SCi0tLS0tRU5EIFJTQSBQUk1WQVRFIEtFWS0tLS0tCg==
[]: file name too long
```

## Let's check the vscode kube cluster window we will see the nodes there let's verify them with the cli

Open vscode, from the cli type **code**, Since this is an overview, we are not going to use VSCode that much, just wanted to share so you could take advantage of the great plugin offered within the VSCode community.



```
kubectl get nodes
```

OUTPUT:

NAME	STATUS	ROLES	AGE	VERSION
kind-control-plane	Ready	control-plane,master	7m14s	v1.20.2
kind-worker	Ready	<none>	6m45s	v1.20.2
kind-worker2	Ready	<none>	6m46s	v1.20.2
kind-worker3	Ready	<none>	6m46s	v1.20.2

# Build a frontend using wordpress and backend using mysql

Luckily, there is an official tutorial which is pretty well described. We can try most steps of it using kind cluster which we just created. [Kubernetes Docs](#)

We will create 3 files and add the following data.

*You can copy and paste it, which creates a secret and sets a password to f5demo.*

```
❯ cat <<EOF >./kustomization.yaml
secretGenerator:
- name: mysql-pass
  literals:
  - password=f5demo
EOF
```

OUTPUT:

```
❯ cat kustomization.yaml
secretGenerator:
- name: mysql-pass
  literals:
  - password=f5demo
```

*Now we will get the mysql deployment, the curl will save the file locally.*

```
❯ curl -LO https://k8s.io/examples/application/wordpress/mysql-deployment.yaml
```

OUTPUT:

```
❯ curl -LO https://k8s.io/examples/application/wordpress/mysql-deployment.yaml
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left   Speed
100   178   100   178    0     0    751      0 --:--:-- --:--:-- --:--:--    751
100  1193   100  1193    0     0   2475      0 --:--:-- --:--:-- --:--:--  17289
```

READ mysql deployment file

```
❯ cat mysql-deployment.yaml
apiVersion: v1
kind: Service
metadata:
  name: wordpress-mysql
  labels:
```

```

    app: wordpress
spec:
  ports:
    - port: 3306
  selector:
    app: wordpress
    tier: mysql
  clusterIP: None
---
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: mysql-pv-claim
  labels:
    app: wordpress
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 20Gi
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: wordpress-mysql
  labels:
    app: wordpress
spec:
  selector:
    matchLabels:
      app: wordpress
      tier: mysql
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: wordpress
        tier: mysql
    spec:
      containers:
        - image: mysql:5.6
          name: mysql
          env:
            - name: MYSQL_ROOT_PASSWORD
              valueFrom:
                secretKeyRef:
                  name: mysql-pass
                  key: password
          ports:

```



```

- containerPort: 3306
  name: mysql
volumeMounts:
- name: mysql-persistent-storage
  mountPath: /var/lib/mysql
volumes:
- name: mysql-persistent-storage
  persistentVolumeClaim:
    claimName: mysql-pv-claim

```

We notice the version of MySQL as well as the key for the password. In addition we will be able to see the port used by the container.

*We will now get the wordpress deployment as well, using curl.*

```
❏ curl -LO https://k8s.io/examples/application/wordpress/wordpress-deployment.yaml
```

OUTPUT:

```
❏ curl -LO https://k8s.io/examples/application/wordpress/wordpress-deployment.yaml
```

% Total	% Received	% Xferd	Average Speed	Time	Time	Time	Current
			Dload	Upload	Total	Spent	Left
100	178	100	178	0	0	2022	0
100	1278	100	1278	0	0	7139	0

READ wordpress deployment file

```
❏ cat wordpress-deployment.yaml
apiVersion: v1
kind: Service
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  ports:
    - port: 80
  selector:
    app: wordpress
    tier: frontend
  type: LoadBalancer
---
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: wp-pv-claim
  labels:
    app: wordpress

```

```

spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 20Gi
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: wordpress
  labels:
    app: wordpress
spec:
  selector:
    matchLabels:
      app: wordpress
      tier: frontend
  strategy:
    type: Recreate
  template:
    metadata:
      labels:
        app: wordpress
        tier: frontend
    spec:
      containers:
        - image: wordpress:4.8-apache
          name: wordpress
          env:
            - name: WORDPRESS_DB_HOST
              value: wordpress-mysql
            - name: WORDPRESS_DB_PASSWORD
              valueFrom:
                secretKeyRef:
                  name: mysql-pass
                  key: password
          ports:
            - containerPort: 80
              name: wordpress
          volumeMounts:
            - name: wordpress-persistent-storage
              mountPath: /var/www/html
      volumes:
        - name: wordpress-persistent-storage
          persistentVolumeClaim:
            claimName: wp-pv-claim

```

As well as mysql, we can see which port is used and which image is going to be launched for the frontend wordpress.

As we have downloaded the two files for our deployment, we will now add the resources into our original file called kustomization. The following data will be appended.

```
cat <<EOF >>./kustomization.yaml
resources:
  - mysql-deployment.yaml
  - wordpress-deployment.yaml
EOF
```

Let's look how the file is now constructed

```
❯ cat kustomization.yaml
secretGenerator:
- name: mysql-pass
  literals:
  - password=f5demo
resources:
- mysql-deployment.yaml
- wordpress-deployment.yaml
```

As we have all our files and configuration we will execute them using the kubectl command to start the deployment. Instead of running each command separately, we will leverage the flag -k.

**NOTE**

from the help the -k shows us the following: -k, --kustomize="": Process a kustomization directory. This flag can't be used together with -f or -R. --openapi-patch=true: If true, use openapi to calculate diff when the openapi presents and the resource can be found in the openapi spec. Otherwise, fall back to use baked-in types.

```
kubectl apply -k ./
```

OUTPUT:

```
❯ kubectl apply -k .
secret/mysql-pass-7564dm6k4b created
service/wordpress-mysql created
service/wordpress created
deployment.apps/wordpress-mysql created
deployment.apps/wordpress created
persistentvolumeclaim/mysql-pv-claim created
persistentvolumeclaim/wp-pv-claim created
```

Now let's check the secrets.

```
kubectl get secrets
```

OUTPUT:

```
kubectl get secrets
```

NAME	TYPE	DATA	AGE
default-token-rkcdp	kubernetes.io/service-account-token	3	22h
mysql-pass-7564dm6k4b	Opaque	1	79s

We want to get a little more information from that, therefore, we will run the describe flag.

```
kubectl describe secrets mysql-pass
```

OUTPUT:

```
❏ kubectl describe secrets mysql-pass
```

Name: mysql-pass-7564dm6k4b  
Namespace: default  
Labels: <none>  
Annotations: <none>

Type: Opaque

Data  
====  
password: 6 bytes

We do however want to understand storage used on the container we built with K8s. If you scroll up you will see the reference Volumes and the name used for that container. Therefore, we want to check that out.

```
kubectl get pvc
```

OUTPUT:

```
❏ kubectl get pvc
```

NAME	STATUS	VOLUME	CAPACITY	ACCESS
mysql-pv-claim	Bound	pvc-c60d5c62-23a8-4866-a2ac-2ce4c0577c8f	20Gi	RWO
standard	8m6s			
wp-pv-claim	Bound	pvc-1266556a-8cad-4afb-821c-aa94f780b9f5	20Gi	RWO
standard	8m6s			

As we can see the name matches with what's in the describe.

As we have started our deployment, now let's check our pods. The second command is giving you the exact output of the first, however, less typing.

```
kubectl get pods (full)
kubectl get po
```

We want to use services in K8s for many reason we have discussed during our presentation, now let's check them.

```
kubectl get services <name of the services>
kubectl get svc <name of the services >
```

OUTPUT:

```
kubectl get svc
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	22h
wordpress	LoadBalancer	10.96.212.79	<pending>	80:30782/TCP	12m
wordpress-mysql	ClusterIP	None	<none>	3306/TCP	12m

The above command shows you what's in the default namespace, if you want or need to check out a specific namespace, then you can use the -A option or -n follow by the namespace name. Furthermore,

OUTPUT -A

```
❏ kubectl get svc -A
```

NAMESPACE	NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)
default	kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP
default	wordpress	LoadBalancer	10.96.212.79	<pending>	80:30782/TCP
default	wordpress-mysql	ClusterIP	None	<none>	3306/TCP
kube-system	kube-dns	ClusterIP	10.96.0.10	<none>	53/UDP,53/TCP,9153/TCP

Endpoints are important and therefore we want to get as much data as possible. Example: (ip addresses of the pods)

```
kubectl get endpoints
```

## OUTPUT:

```
❏ kubectl get endpoints
NAME                ENDPOINTS                AGE
kubernetes          172.18.0.4:6443         22h
wordpress           10.244.1.3:80            15m
wordpress-mysql     10.244.3.3:3306         15m
```

If we are looking at this, we can detect that each node has its block, 10.244.1.x for pod 3, 10.244.3.x for pod 2 etc.

To make sure that's the case, let's check to confirm

```
❏ kubectl describe node kind-worker2
Name:                kind-worker2
Roles:               <none>
Labels:              beta.kubernetes.io/arch=amd64
                    beta.kubernetes.io/os=linux
                    kubernetes.io/arch=amd64
                    kubernetes.io/hostname=kind-worker2
                    kubernetes.io/os=linux
Annotations:         kubeadm.alpha.kubernetes.io/cri-socket:
unix:///run/containerd/containerd.sock
                    node.alpha.kubernetes.io/ttl: 0
                    volumes.kubernetes.io/controller-managed-attach-detach: true
CreationTimestamp:   Thu, 13 May 2021 12:35:30 -0700
Taints:              <none>
Unschedulable:       false
Lease:
  HolderIdentity:    kind-worker2
  AcquireTime:        <unset>
  RenewTime:          Fri, 14 May 2021 11:19:34 -0700
Conditions:
  Type              Status  LastHeartbeatTime               LastTransitionTime
Reason              Message
-----
MemoryPressure      False   Fri, 14 May 2021 11:15:44 -0700   Thu, 13 May 2021 12:35:30
-0700   KubeletHasSufficientMemory   kubelet has sufficient memory available
DiskPressure        False   Fri, 14 May 2021 11:15:44 -0700   Thu, 13 May 2021 12:35:30
-0700   KubeletHasNoDiskPressure     kubelet has no disk pressure
PIDPressure          False   Fri, 14 May 2021 11:15:44 -0700   Thu, 13 May 2021 12:35:30
-0700   KubeletHasSufficientPID      kubelet has sufficient PID available
Ready               True     Fri, 14 May 2021 11:15:44 -0700   Thu, 13 May 2021 12:35:51
-0700   KubeletReady                 kubelet is posting ready status
Addresses:
  InternalIP: 172.18.0.3
  Hostname:   kind-worker2
Capacity:
```

```

cpu: 8
ephemeral-storage: 61255492Ki
hugepages-1Gi: 0
hugepages-2Mi: 0
memory: 2034536Ki
pods: 110
Allocatable:
  cpu: 8
  ephemeral-storage: 61255492Ki
  hugepages-1Gi: 0
  hugepages-2Mi: 0
  memory: 2034536Ki
  pods: 110
System Info:
  Machine ID: d1c0cbc1360a42b1b615caf2d2d8e63e
  System UUID: 09dc1919-355b-4353-b8cf-d58045111f27
  Boot ID: ea3c38c2-56e1-41d4-8392-74320225a7a2
  Kernel Version: 5.10.25-linuxkit
  OS Image: Ubuntu 20.10
  Operating System: linux
  Architecture: amd64
  Container Runtime Version: containerd://1.4.0-106-gce4439a8
  Kubelet Version: v1.20.2
  Kube-Proxy Version: v1.20.2
PodCIDR: 10.244.3.0/24
PodCIDRs: 10.244.3.0/24
ProviderID: kind:///docker/kind/kind-worker2
Non-terminated Pods: (3 in total)
  Namespace      Name      CPU Requests  CPU
Limits  Memory Requests  Memory Limits  AGE
-----
default         wordpress-mysql-dd6c4c7c9-mkxfr  0 (0%)      0 (0%)
0 (0%)          0 (0%)      19m
kube-system     kindnet-mnhvz  100m (1%)   100m
(1%)  50Mi (2%)  50Mi (2%)   22h
kube-system     kube-proxy-m87sm  0 (0%)      0 (0%)
0 (0%)          0 (0%)      22h
Allocated resources:
(Total limits may be over 100 percent, i.e., overcommitted.)
Resource      Requests  Limits
-----
cpu           100m (1%) 100m (1%)
memory        50Mi (2%) 50Mi (2%)
ephemeral-storage 0 (0%)    0 (0%)
hugepages-1Gi 0 (0%)    0 (0%)
hugepages-2Mi 0 (0%)    0 (0%)
Events: <none>

```

**NOTE** Check the cidr for that node.

Now we are at the final steps to access our application. As we have talked, there are 3 type in Kubernetes which allows you to access the container. One is NodePort, (not suggested for produciton), default is ClusterIP, which allows communication between the pods, and the last one is LoadBalancer, but we do not have an IPAM which gives us an IP address. Therefore, we will use port-forward to test the application we just span up.

```
kubectl port-forward svc/wordpress 8000:80
```

OUTPUT:

```
kubectl port-forward svc/wordpress 8000:80
Forwarding from 127.0.0.1:8000 -> 80
Forwarding from [::1]:8000 -> 80
```

**NOTE**

do not break out from the terminal otherwise you will not be able to access the application. Open a new terminal.

As we have a MySQL container, and we know there is a password we set let's evaluate the pod. Find the password from the container info

```
kubectl describe po wordpress-mysql (look for the MYSQL_ROOT_PASSWORD).
```

OUTPUT:

```
❏ kubectl describe po wordpress-mysql
Name:          wordpress-mysql-dd6c4c7c9-mkxfr
Namespace:     default
Priority:       0
Node:          kind-worker2/172.18.0.3
Start Time:    Fri, 14 May 2021 11:00:05 -0700
Labels:        app=wordpress
               pod-template-hash=dd6c4c7c9
               tier=mysql
Annotations:   <none>
Status:        Running
IP:            10.244.3.3
IPs:           IP: 10.244.3.3
Controlled By: ReplicaSet/wordpress-mysql-dd6c4c7c9
Containers:
  mysql:
    Container ID:
containerd://ca5c4a78d86a36a220aaf6c16e5e3af762b25d03ebd56f6633dfb80bba237d91
    Image:          mysql:5.6
    Image ID:
docker.io/library/mysql@sha256:1d96ea86f9173607f1534c05041bf18dba691ded86d2ab51f6fd453
```



```

3377fac39
  Port:          3306/TCP
  Host Port:     0/TCP
  State:         Running
    Started:     Fri, 14 May 2021 11:00:15 -0700
  Ready:         True
  Restart Count: 0
  Environment:
    MYSQL_ROOT_PASSWORD: <set to the key 'password' in secret 'mysql-pass-7564dm6k4b'> Optional: false
  Mounts:
    /var/lib/mysql from mysql-persistent-storage (rw)
    /var/run/secrets/kubernetes.io/serviceaccount from default-token-rkcdp (ro)
Conditions:
  Type            Status
  Initialized      True
  Ready            True
  ContainersReady  True
  PodScheduled     True
Volumes:
  mysql-persistent-storage:
    Type:          PersistentVolumeClaim (a reference to a PersistentVolumeClaim in the same namespace)
    ClaimName:     mysql-pv-claim
    ReadOnly:      false
  default-token-rkcdp:
    Type:          Secret (a volume populated by a Secret)
    SecretName:    default-token-rkcdp
    Optional:      false
QoS Class:        BestEffort
Node-Selectors:    <none>
Tolerations:      node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                  node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type    Reason      Age   From          Message
  ----    -
  Normal  Scheduled   27m   default-scheduler  Successfully assigned default/wordpress-mysql-dd6c4c7c9-mkxfp to kind-worker2
  Normal  Pulling     27m   kubelet         Pulling image "mysql:5.6"
  Normal  Pulled      27m   kubelet         Successfully pulled image "mysql:5.6" in 8.7183841s
  Normal  Created     27m   kubelet         Created container mysql
  Normal  Started     27m   kubelet         Started container mysql

```

Now let's open firefox and go to

```
localhost:8000
```

Spend a few min configuring your new application.

## Optional Lab,

to see how scale works we will start with one and then scale up and down.

Scale example:

Run a new deployment

```
kubectl create deployment grey --image=itlinux/httpd_grey
```

OUTPUT:

```
kubectl get deploy
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
grey          1/1     1            0           13s
wordpress     1/1     1            1           36m
wordpress-mysql 1/1     1            1           36m
```

Now let's leverage help

```
kubectl scale -h
```

OUTPUT:

```
❏ kubectl scale -h
Set a new size for a Deployment, ReplicaSet, Replication Controller, or StatefulSet.

Scale also allows users to specify one or more preconditions for the scale action.

If --current-replicas or --resource-version is specified, it is validated before the
scale is attempted, and it is
guaranteed that the precondition holds true when the scale is sent to the server.

Examples:
# Scale a replicaset named 'foo' to 3.
kubectl scale --replicas=3 rs/foo

# Scale a resource identified by type and name specified in "foo.yaml" to 3.
kubectl scale --replicas=3 -f foo.yaml

# If the deployment named mysql's current size is 2, scale mysql to 3.
kubectl scale --current-replicas=2 --replicas=3 deployment/mysql

# Scale multiple replication controllers.
kubectl scale --replicas=5 rc/foo rc/bar rc/baz

# Scale statefulset named 'web' to 3.
kubectl scale --replicas=3 statefulset/web
```

## Options:

`--all=false`: Select all resources in the namespace of the specified resource types

`--allow-missing-template-keys=true`: If true, ignore any errors in templates when a field or map key is missing in the template. Only applies to go lang and jsonpath output formats.

`--current-replicas=-1`: Precondition for current size. Requires that the current size of the resource match this value in order to scale.

`--dry-run='none'`: Must be "none", "server", or "client". If client strategy, only print the object that would be sent, without sending it. If server strategy, submit server-side request without persisting the resource.

`-f, --filename=[]`: Filename, directory, or URL to files identifying the resource to set a new size

`-k, --kustomize=''`: Process the kustomization directory. This flag can't be used together with `-f` or `-R`.

`-o, --output=''`: Output format. One of: `json|yaml|name|go-template|go-template-file|template|templatefile|jsonpath|jsonpath-as-json|jsonpath-file`.

`--record=false`: Record current kubectl command in the resource annotation. If set to false, do not record the command. If set to true, record the command. If not set, default to updating the existing annotation value only if one already exists.

`-R, --recursive=false`: Process the directory used in `-f, --filename` recursively. Useful when you want to manage related manifests organized within the same directory.

`--replicas=0`: The new desired number of replicas. Required.

`--resource-version=''`: Precondition for resource version. Requires that the current resource version match this value in order to scale.

`-l, --selector=''`: Selector (label query) to filter on, supports '=', '==', and '!='. (e.g. `-l key1=value1,key2=value2`)

`--template=''`: Template string or path to template file to use when `-o=go-template`, `-o=go-template-file`. The template format is go lang templates [<http://golang.org/pkg/text/template/#pkg-overview>].

`--timeout=0s`: The length of time to wait before giving up on a scale operation, zero means don't wait. Any other values should contain a corresponding time unit (e.g. 1s, 2m, 3h).

## Usage:

```
kubectl scale [--resource-version=version] [--current-replicas=count]
--replicas=COUNT (-f FILENAME | TYPE NAME)
[options]
```

Use "kubectl options" for a list of global command-line options (applies to all commands).

We notice in the Examples a scale for the deployment. Therefore, we will use a similar one, but first let's check our pods.

### *Pods*

```
❏ kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
grey-664f87894f-zr52n	1/1	Running	0	3m12s
wordpress-9f58bb5bc-pdn7r	1/1	Running	0	39m
wordpress-mysql-dd6c4c7c9-mkxfp	1/1	Running	0	39m

We do see there is only one grey pod. Now let's scale up. But before we scale let's make sure we can access the new container.

```
kubectl port-forward deployment/grey 8222:80
```

Open firefox at

```
localhost:8222
```

### *Scale our Pod*

```
❏ kubectl scale --current-replicas=1 --replicas=3 deployment/grey
```

Now let's check pods again. .Pods

```
❏ kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
grey-664f87894f-542x1	1/1	Running	0	13s
grey-664f87894f-8wvm5	1/1	Running	0	13s
grey-664f87894f-zr52n	1/1	Running	0	4m54s
wordpress-9f58bb5bc-pdn7r	1/1	Running	0	41m
wordpress-mysql-dd6c4c7c9-mkxfp	1/1	Running	0	41m

As well as we scaled up we can now scale down. Similar command.

```
❏ kubectl scale --current-replicas=3 --replicas=1 deployment/grey
```

OUTPUT:

```
❏ kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
grey-664f87894f-542xl	1/1	Running	0	2m13s
grey-664f87894f-8wvm5	1/1	Terminating	0	2m13s
grey-664f87894f-zr52n	1/1	Terminating	0	6m54s
wordpress-9f58bb5bc-pdn7r	1/1	Running	0	43m
wordpress-mysql-dd6c4c7c9-mkxfp	1/1	Running	0	43m

**NOTE** | your application still runs :) even when we scaled down.

If we want to access a specific worker node where the app is running for the grey app, you can use the following as an example, your id maybe diff:

```
kubectl port-forward grey-5794d7f866-w8t98 8088:80
```

This ends the lab.

Thanks