

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
kubectl completion bash | sed 's/kubectl/k/g' >> .bashrc
. .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.

Verbose mode, it shows how kubectl makes the API calls. Test it by starting with debug mode 6 and then by checking the debug 7, and debug 8.

You can also try debug level 9 for more verbose and also level 10 if you really want to see all call, even it's not listed on this page. [Kubernetes CheatSheet](#)

```
kubectl get -v6 pods
```

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
VaTXY3K2dxdS91V0FyUTdTWWc3UmZZdmI2dVl5VWp3aFA5S1N2RXlaTGNWditSaLRscI9oQ3lYNm1PQlPpEeXgz
ek9hZFNtcDFZbXI4eS9YdENNajRUekxWWdDxZnR0ClJ4ZUtNMkFMb0NkS1d2cWExSTBHckQ5cWdZTHFGVmxGRW
hLM1d1ejZPeHhtc0ZpbmVPMDFoZFdkWEpTTWdJM0cKRm11VUhpREtQYTg1VFVXSFlYRlVBZFRjbTFFqbXFXMkZp
dHVIYXAremxnZ2FXcmg5bFNocmd0Q1IvTUZndzBBNgpsNDhCMXYrN3dZU1VSMElscm5zQ0F3RUFBYU5DTUVBd0
RnWURWUjBQVVFIL0JBURBZ0trTUE4R0ExVWRFd0VCCi93UUZNQU1CQWY4d0hRWURWUjBPQkZJRZUZNmis0SkdN

```

RnNCSUVDZEpZSm1RejBjUCtGMTBNQTBHQ1NxR1NJYjMKRFFFQkN3VUFBNElCQVFDL0s40GtVakk4V1NZUDBNAG
FzN1LTbXZzVnMvL3F5K0JHODRkQTdnUHR4Zi90SUR1agpQSkxLd0hMU1F4eDZvZ2L1S3VKY21jK0LOZFF1dXRE
dUphUmh3WkLZaitS9GMXdJdUI2VjJJQTh2VS8reLM4Cm4yTnZJcENrUTlpM0tNbnhBcG1zL2Nwb1M2Y3pVZX
NLQTB1eVVGWEtjbUpTS2pzdW5aeGFM0Gh4Y3ZjCHFLmUKM3BPRnR4eEcrdnNjN0pIL0xtD2ZGS0R0NXB0QnIz
NVRrNzBoUllpMuLlNjQrVkvKrkJ2bLziYUNJaGpDQW5KNQpiaTbkNmxaMTZ6VnJtSnfJR21DNVA2RCs5eLRKem
1tMzkxUmI50U9pc2pzRTZFdS9pVky2N1AzZVFWTnVhazVrCnJ1UGlkaTcwZnZTRjB3TE5qc2NjS1LLZg0Ukp5
dmRJSVFTdwotLS0tLUVORCBDRVJUSUZJQ0FURS0tLS0tCg==

server": open

LS0tLS1CRudJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSUM1ekNDQWMrZ0F3SUJBZ0lCQURBTkNa3Foa2lHOXcwQk
FRc0ZBREFTVjN0dVRWURWUVFERXdwcmRXSmwKY201bGRHVnpNQjRYFRFJeE1EVXhNekEwTkRBMU9G6b1hEVE14
TURVeE1UQTBOREExT0Zvd0ZURVRNqkVHQTFVRQpBeE1LYTNwaVpYSnVaWFJsY3pDQ0FTSXdEUVlKS29aSWh2Y0
5BUUVCQ1FBRGdnRVB0RENDQVfVQ2dnRUJBT3lpClQrdkxtVk1jeGQwT2xNU3VVbGRrRWFaQjNsUm1uRDRSL29S
cjVHeFZ5Mksra2VzQ1R3SC9ld2I2ZXp1d3dqQ0UKRUdYR0V1d1JSWWhzBW5lbndzdEJjQmJTR055Vm5DRFRwa1
VaTXy3K2dxdS91V0FyUTdTWWc3UmZZdmI2dVl5Vwp3aFA5S1N2RXlaTGNWditSaLRscI9oQ3LYNm1PQlpEeXgz
ek9hZFNtcDFZbXI4eS9YdENNAjRUekxWWDdxZnR0ClJ4ZUtNMkFMb0NkS1d2cWEExSTBHckQ5cWdZTHFGVmxGRW
hLM1dlejZPeHhtc0ZpbmVPMDFoZFdkWEpTTWdJM0cKRm11VUhpREtQYTg1VFVXSFlYRlVBZFPjbTFqbXfXmkZp
dHVIYXAremxnZ2FXcmg5bFNocmd0Q1IvTUZndzBBNgpsNDhCMXYrN3dZU1VSMElsdm5zQ0F3RUFBU5DTUVBd0
RnWURWUjBQVFILOjBUURBZ0trTUE4R0ExVWRfD0VCCi93UUZNQU1CQWY4d0hRWURWUjBPQkJZRUZNMis0SkdN
RnNCSUVDZEpZSm1RejBjUCtGMTBNQTBHQ1NxR1NJYjMKRFFFQkN3VUFBNElCQVFDL0s40GtVakk4V1NZUDBNAG
FzN1LTbXZzVnMvL3F5K0JHODRkQTdnUHR4Zi90SUR1agpQSkxLd0hMU1F4eDZvZ2L1S3VKY21jK0LOZFF1dXRE
dUphUmh3WkLZaitS9GMXdJdUI2VjJJQTh2VS8reLM4Cm4yTnZJcENrUTlpM0tNbnhBcG1zL2Nwb1M2Y3pVZX
NLQTB1eVVGWEtjbUpTS2pzdW5aeGFM0Gh4Y3ZjCHFLmUKM3BPRnR4eEcrdnNjN0pIL0xtD2ZGS0R0NXB0QnIz
NVRrNzBoUllpMuLlNjQrVkvKrkJ2bLziYUNJaGpDQW5KNQpiaTbkNmxaMTZ6VnJtSnfJR21DNVA2RCs5eLRKem
1tMzkxUmI50U9pc2pzRTZFdS9pVky2N1AzZVFWTnVhazVrCnJ1UGlkaTcwZnZTRjB3TE5qc2NjS1LLZg0Ukp5
dmRJSVFTdwotLS0tLUVORCBDRVJUSUZJQ0FURS0tLS0tCg==

server: file name too long

error loading config file "

LS0tLS1CRudJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSURFekNDQWZ1Z0F3SUJBZ0lJYktHMQ3cHJRZ2N3RFFZSk
tvWklodmNOQVFFTEJRQXdGVEVUTUJFR0ExVUUKQXhNS2EzVmIaWEp1WlhSbGN6QWVGdzb5TVRBMU1UTXdORFF3
TlRoYUZZ3Mh1NakExTVRNd05EUXhNREZhTURReApGekFWQmdOVk1JBB1REbk41YzNSbGJGUHRZWE4wWlhhKek1Sa3
dGd1LEVlFRREV4QnJkV0psY201bGRHVnpMV0ZrCmJXbHVNSU1CSWpBTkNa3Foa2lHOXcwQkFRUjZBQU9DQVE4
QU1JSUJDZ0tDQVFFQTVQU5NYjBCa0NYd1hRVTYKWEROV2V5ams1c1IxNndvNFlnD2NYM3lnbE94WjdmMjZBb3
IveTI2TktMTJib1VqY2cybG0vVWF1QU10RGVdQgpGL1Q2cy9Tdmd9S0GnUa0Jya3hNZnZyChpNZlY4SXRpWDVR
R0c2eWd0YnFjaVJ10FdRM21NNVhScVZudnVNRUE2Cl1LM2RWK2dQNGdpSGtiVjkveLJSQjdCYlBqd1NPUGJqak
FhZW5GR0R5UmV3K1lQZWZMTjFSMzBTNjFSQ0NJK1oKd3VoQ293VFVWR1E2RzNST2dFbzVDOERQdzAxSitsenFL
Sut0L3htcGE2cGVuUEUyOU5Va2JnbXN2bHczbjNMcgovaytBaGLHm1hJNEVPV0pNaDMzR2srUkYjSFF0amJvRk
xBUWxYRUQ3NDlnT0ftdT0RHViTkNwUUR2WDVtSGhUCj14QXdwU1EQVFBQm8wZ3dSakFPQmdOVkhROEJBZjhF
QkFNQ0JhQXdFd1LEVlIwBEJBd3dDZ1LJS3dZQkJRVUgKQXhJd0h3WURWUjBqQkJnd0ZvQVY6Yjdna1l3V3dFZ1
FKMGxnbVpEUfJ3LzRYWFF3RFFZSkTVWklodmNOQVFFTApcUUEFEZ2dFQkFLUXNaNXy5NHJlV1NmDMZGWLBEbkh1
dmF4Tmc4WkZU3RVdzNmbHdtd2cySTZHZ0kvQVFhND1lCmMxMkNyL2pUcDBuZ3RFRWlJ4WGD0cVVDWnQ3RWxLZn
VwQzAxeUZtRwXqR2sxMy9rbWp2Vk93VlpjTGpZSxJ1dW8KQ0JGdTJvWnRHU1DaXA4Q1EraTIZaW5QKy9udWJs
UGswZzJGZmZQNHRWsg5mbzVGQzEyQ0xvTXV1Q2JNk0tSZQovQ1L2NHN5N3JqdGJHTVkrZ2dFRU5CcWFrZDhsL1
BEQVM5dG9YQTRYdjJvTDY5OFZMRzBhQVJaTUlIKzJJT291Ci9MeEQ2aXmZTzJHQUFJQUJKQVg2dDhraG0yaU4v
L1B6WnhjUmpik3VaTW1uR1lvVWRVODkzSzJPZ3ZGcUowemkKcWlsZmVLR0NhRXlqbWk5K0VocHU3bE1QOE1VVj
NLWT0KLS0tLS1FtkQgQ0VSVElGSUNBVEUtLS0tLQo=

client-key-data": open

LS0tLS1CRudJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSURFekNDQWZ1Z0F3SUJBZ0lJYktHMQ3cHJRZ2N3RFFZSk
tvWklodmNOQVFFTEJRQXdGVEVUTUJFR0ExVUUKQXhNS2EzVmIaWEp1WlhSbGN6QWVGdzb5TVRBMU1UTXdORFF3
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IveTI2TkptMTJib1VqY2cybG0vVWFiQU10RGVDQgpGL1Q2cy9Tdm9S0GnUa0Jya3hNZnZYcHpNZ1Y4SXRpWDVR
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NLWT0KLS0tLS1FTkQgQ0VSVE1GSUNBVEUtlS0tLQo=

client-key-data: file name too long

error loading config file "

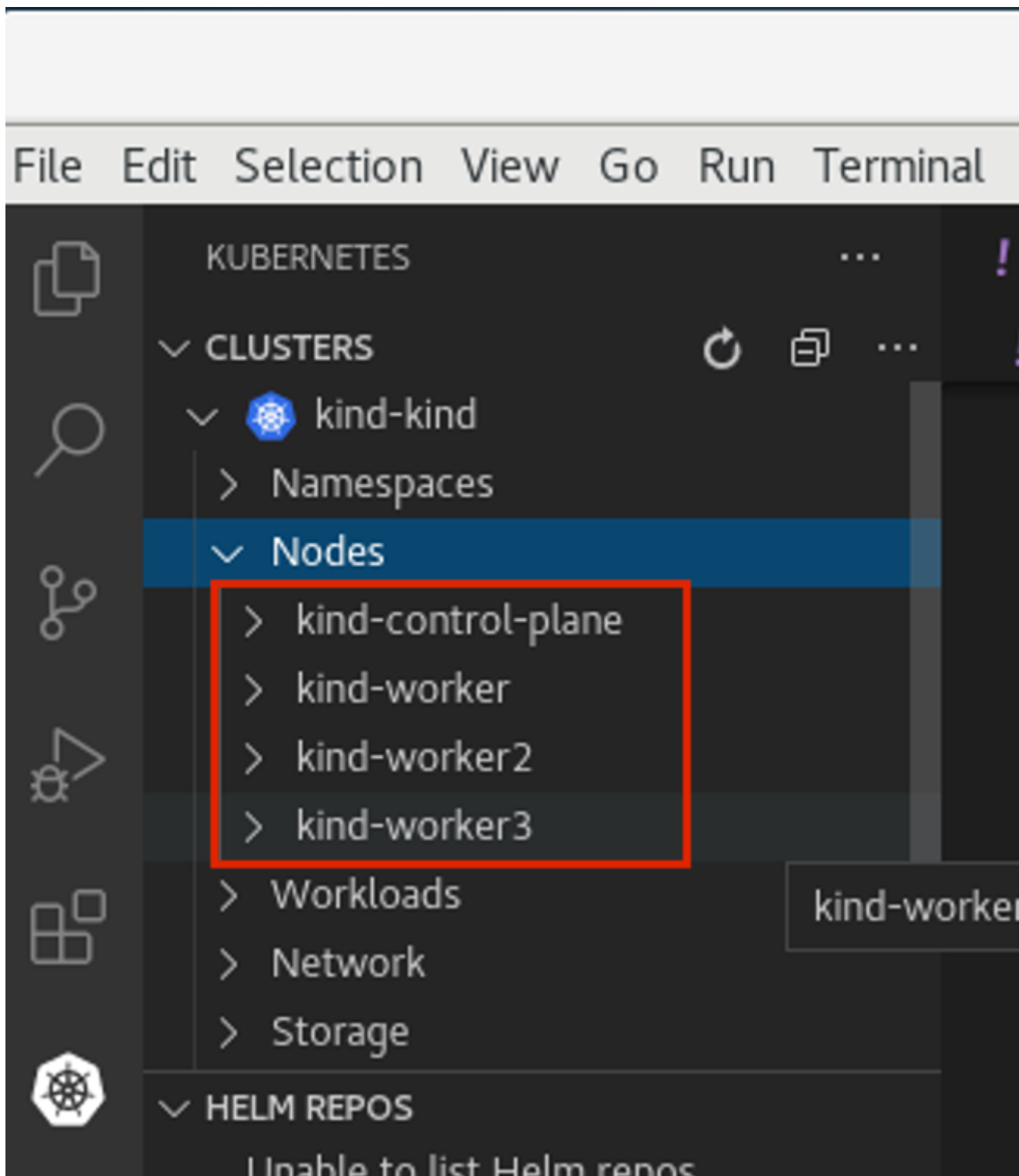
LS0tLS1CRudJTtBSU0EgUFJJVkfURSBLRVktLS0tLQpNSU1Fb3dJQkFBS0NBUUVBM1VBTk1iMEJrQ1h3WFFVN1
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": open

LS0tLS1CRudJTtBSU0EgUFJJVkfURSBLRVktLS0tLQpNSU1Fb3dJQkFBS0NBUUVBM1VBTk1iMEJrQ1h3WFFVN1
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```
JiT0lNUlNvRFJJU0h3Z0NGbjYrUGpFd0dYQXlBMmo4bWdFcQpmNnQ0Z1hSZm93SlN4cTc3cm5tS3pET2VpTi9N
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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.

First we make a dir/folder

```
mkdir k8folder
```

We will cd into the folder k8folder before we do the next steps.

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   Speed
 100   178    100   178     0     0    2022       0 --:--:-- --:--:-- --:--:--   2000
 100  1278    100  1278     0     0   7139       0 --:--:-- --:--:-- --:--:--   7139
```

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)
AGE
default        kubernetes          ClusterIP      10.96.0.1        <none>           443/TCP
22h
default        wordpress           LoadBalancer  10.96.212.79    <pending>
80:30782/TCP   12m
default        wordpress-mysql     ClusterIP      None             <none>           3306/TCP
12m
kube-system    kube-dns            ClusterIP      10.96.0.10      <none>
53/UDP,53/TCP,9153/TCP 22h

```

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 it's 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
  -----
-----
-----

```

```

default      wordpress-mysql-dd6c4c7c9-mkxfp    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-mkxfp

```



```

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 goyaml 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 golang 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-542x1	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