

Cloud Data Centres

Lab 3

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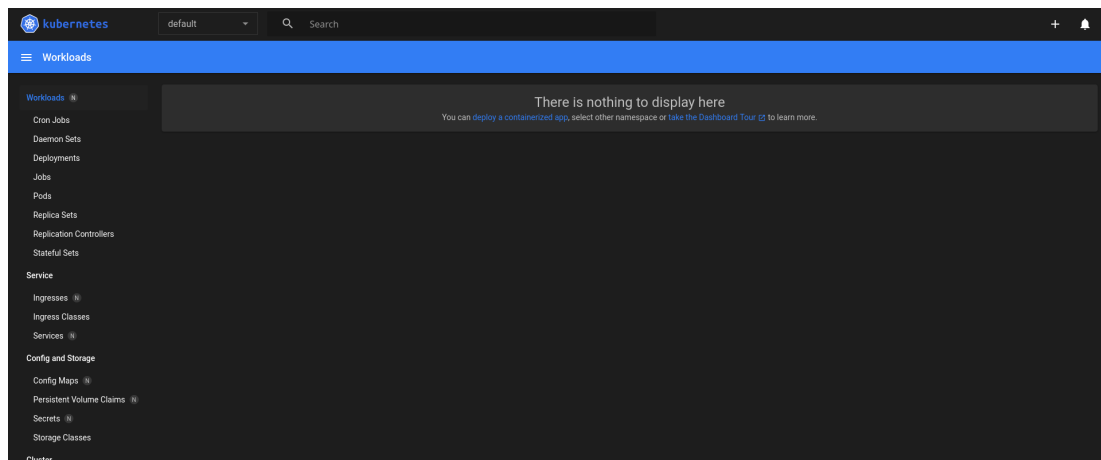
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1 Using Minikube to Create a Cluster

```
~ minikube start
minikube v1.35.0 on Debian 12.9
+ Automatically selected the docker driver. Other choices: qemu2, ssh
+ Using Docker driver with root privileges
! For an improved experience it's recommended to use Docker Engine instead of Docker Desktop.
Docker Engine installation instructions: https://docs.docker.com/engine/install/#server
Starting "minikube" primary control-plane node in "minikube" cluster
Pulling base image v0.0.46 ...
Downloading Kubernetes v1.32.0 preload ...
> gcr.io/k8s-minikube/kicbase...: 500.31 MiB / 500.31 MiB 100.00% 5.37 Mi
> preloaded-images-k8s-v18-v1...: 333.57 MiB / 333.57 MiB 100.00% 3.14 Mi
Creating docker container (CPUs=2, Memory=5657MB) ...
Preparing Kubernetes v1.32.0 on Docker 27.4.1 ...
• Generating certificates and keys ...
• Booting up control plane ...
• Configuring RBAC rules ...
Configuring bridge CNI (Container Networking Interface) ...
Verifying Kubernetes components...
• Using image gcr.io/k8s-minikube/storage-provisioner:v5
Enabled addons: storage-provisioner, default-storageclass
kubectrl not found. If you need it, try: 'minikube kubectrl -- get pods -A'
Done! kubectrl is now configured to use "minikube" cluster and "default" namespace by default
~ minikube dashboard
Enabling dashboard ...
• Using image docker.io/kubernetesui/dashboard:v2.7.0
• Using image docker.io/kubernetesui/metrics-scraper:v1.0.8
Some dashboard features require the metrics-server addon. To enable all features please run:

  Cluster minikube addons enable metrics-server

~ minikube dashboard
Verifying dashboard health ...
Launching proxy ...
> kubectrl sha256: 64 B / 64 B [-----] 100.00% ? p/s 0s
> kubectrl: 54.67 MiB / 54.67 MiB [-----] 100.00% 8.06 MiB p/s 7.0s
Verifying proxy health ...
Opening http://127.0.0.1:41855/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard:/proxy/ in your default browser...
```



2 Running Pod and Viewing Logs

```
~$ kubectl version --client
Client Version: v1.32.3
Kubernetes Version: v3.5.0
~$ kubectl create deployment hello-node --image=registry.k8s.io/e2e-test-images/agnhost:2.39 -- /agnhost netexec --http-port=8080
deployment.apps/hello-node created
~$ kubectl get deployments
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
hello-node    0/1     1             0            4s
~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
hello-node-c74958b5d-2r8hf          0/1     ContainerCreating   0           8s
~$ kubectl get events
LAST SEEN   TYPE      REASON              OBJECT                                          MESSAGE
12s        Normal    Scheduled            pod/hello-node-c74958b5d-2r8hf                Successfully assigned default/hello-node-c74958b5d-2r8hf to minikube
12s        Normal    Pulling              pod/hello-node-c74958b5d-2r8hf                Pulling image "registry.k8s.io/e2e-test-images/agnhost:2.39"
1s         Normal    Pulled               pod/hello-node-c74958b5d-2r8hf                Successfully pulled image "registry.k8s.io/e2e-test-images/agnhost:2.39" in 10.489s (10.489s including waiting). Image size 126872991 bytes.
1s         Normal    Created             pod/hello-node-c74958b5d-2r8hf                Created container: agnhost
1s         Normal    Started             pod/hello-node-c74958b5d-2r8hf                Started container: agnhost
12s        Normal    SuccessfulCreate     replicaset/hello-node-c74958b5d              Scaled up replica set hello-node-c74958b5d from 0 to 1
2m46s     Normal    NodeHasSufficientMemory node/minikube                                Node minikube status is now: NodeHasSufficientMemory
2m46s     Normal    NodeHasNoDiskPressure node/minikube                                Node minikube status is now: NodeHasNoDiskPressure
2m42s     Normal    NodeHasSufficientPID node/minikube                                Node minikube status is now: NodeHasSufficientPID
2m42s     Warning   PossibleMemoryBackedVolumesOnDisk node/minikube                                The tmpfs noswap option is not supported. Memory-backed volumes (e.g. secrets, emptyDir, etc.) might be swapped to disk and should no longer be considered secure.
2m42s     Normal    Starting            node/minikube                                Starting kubelet.
2m42s     Normal    NodeAllocatableEnforced node/minikube                                Updated Node Allocatable limit across pods
2m42s     Normal    NodeHasSufficientMemory node/minikube                                Node minikube status is now: NodeHasSufficientMemory
2m42s     Normal    NodeHasNoDiskPressure node/minikube                                Node minikube status is now: NodeHasNoDiskPressure
2m42s     Normal    NodeHasSufficientPID node/minikube                                Node minikube status is now: NodeHasSufficientPID
2m38s     Normal    RegisteredNode       node/minikube                                1 log-go Node minikube event: Registered Node minikube in Controller
2m36s     Normal    Starting            node/minikube                                1 log-go Node minikube event: Registered Node minikube in Controller
~$ kubectl logs hello-node-5f76cf6ccf-br9b5
Error from server (NotFound): pods "hello-node-5f76cf6ccf-br9b5" not found in namespace "default"
~$ kubectl logs hello-node-c74958b5d-2r8hf
10310 11:10:13.392327       1 log-go-195] Started HTTP server on port 8080
10319 11:10:13.392652       1 log-go-195] Started UDP server on port 8081
~$
```

3 Creating a Service

```
~$ kubectl expose deployment hello-node --type=LoadBalancer --port=8080
Error from server (AlreadyExists): services "hello-node" already exists
~$ kubectl get services
NAME          TYPE          CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
hello-node    LoadBalancer 10.106.212.55    <pending>         8080:31189/TCP   76s
kubernetes    ClusterIP     10.96.0.1        <none>            443/TCP          5m47s
~$ minikube service hello-node
|-----|-----|-----|-----|
| NAMESPACE | NAME      | TARGET PORT | URL              |
|-----|-----|-----|-----|
| default   | hello-node | 8080        | http://192.168.49.2:31189 |
|-----|-----|-----|-----|
Opening service default/hello-node in default browser...
~$
```

4 Enabling Addons

```

~ minikube addons list

```

ADDON NAME	PROFILE	STATUS	MAINTAINER	Documentation	Kubernetes Blog	Tr
ambassador	minikube	disabled	3rd party (Ambassador)			
amd-gpu-device-plugin	minikube	disabled	3rd party (AMD)			
auto-pause	minikube	disabled	minikube			
cloud-spanner	minikube	disabled	Google			
csi-hostpath-driver	minikube	disabled	Kubernetes			
dashboard	minikube	enabled	Kubernetes			
default-storageclass	minikube	enabled	Kubernetes			
efk	minikube	disabled	3rd party (Elastic)			
freshpod	minikube	disabled	Google			
gcp-auth	minikube	disabled	Google			
gvisor	minikube	disabled	minikube			
headlamp	minikube	disabled	3rd party (kinvolk.io)			
inacel	minikube	disabled	3rd party (InAcce			
ingress	minikube	disabled	Kubernetes			
ingress-dns	minikube	disabled	minikube			
inspektor-gadget	minikube	disabled	3rd party			
istio	minikube	disabled	3rd party (Istio)			
istio-provisioner	minikube	disabled	3rd party (Istio)			
kong	minikube	disabled	3rd party (Kong HQ)			
kubeflow	minikube	disabled	3rd party			
kubewirt	minikube	disabled	3rd party (KubeVirt)			
logviewer	minikube	disabled	3rd party (unknown)			
metallb	minikube	disabled	3rd party (MetalLB)			
metrics-server	minikube	disabled	Kubernetes			
nvidia-device-plugin	minikube	disabled	3rd party (NVIDIA)			
nvidia-driver-installer	minikube	disabled	3rd party (NVIDIA)			
nvidia-gpu-device-plugin	minikube	disabled	3rd party (NVIDIA)			
olm	minikube	disabled	3rd party (Operator Framework)			
pod-security-policy	minikube	disabled	3rd party (unknown)			
portainer	minikube	disabled	3rd party (Portainer.io)			
registry	minikube	disabled	minikube			
registry-aliases	minikube	disabled	3rd party (unknown)			
registry-creds	minikube	disabled	3rd party (UPMC Enterprises)			
storage-provisioner	minikube	enabled	minikube			
storage-provisioner-gluster	minikube	disabled	3rd party (Gluster)			
storage-provisioner-rancher	minikube	disabled	3rd party (Rancher)			
volcano	minikube	disabled	third-party (volcano)			
volumesnapshots	minikube	disabled	Kubernetes			
yakd	minikube	disabled	3rd party (marcnuri.com)			

```

~ minikube addons enable metrics-server

```

metrics-server is an addon maintained by Kubernetes. For any concerns contact minikube on GitHub.

You can view the list of minikube maintainers at: <https://github.com/kubernetes/minikube/blob/master/OWNERS>

- Using image registry.k8s.io/metrics-server/metrics-server:v0.7.2

The 'metrics-server' addon is enabled

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP
pod/kube-proxy-rn1ps			
pod/kube-controller-manager-minikube			
pod/kube-scheduler-minikube			
pod/kube-apiserver-minikube			
pod/metrics-server-67fb648c5			
pod/registry-aliases			
pod/registry-creds			
pod/registry			
pod/ambassador			
pod/istio-provisioner			
pod/istio			
pod/ingress-dns			
pod/ingress			
pod/efk			
pod/freshpod			
pod/gcp-auth			
pod/gvisor			
pod/headlamp			
pod/inacel			
pod/inspektor-gadget			
pod/kong			
pod/kubeflow			
pod/kubewirt			
pod/logviewer			
pod/metallb			
pod/nvidia-device-plugin			
pod/nvidia-driver-installer			
pod/nvidia-gpu-device-plugin			
pod/olm			
pod/pod-security-policy			
pod/portainer			
pod/registry-aliases			
pod/registry-creds			
pod/registry			
pod/storage-provisioner			
pod/storage-provisioner-gluster			
pod/storage-provisioner-rancher			
pod/volcano			
pod/volumesnapshots			
pod/yakd			

```

➔ ~ kubectl get pod,svc -n kube-system
NAME Reference READY STATUS NAME RESTARTS AGE CPU(cores) MEMORY
pod/coredns-668d6bf9bc-g66fc 1/1 Running hello-node 0 7m8s 6M1
pod/coredns-668d6bf9bc-tcqs 1/1 Running
pod/etcd-minikube 1/1 Running
pod/kube-apiserver-minikube 1/1 Running
pod/kube-controller-manager-minikube 1/1 Running
pod/kube-proxy-ckq4l 1/1 Running
pod/kube-scheduler-minikube 1/1 Running
pod/metrics-server-7fbb699795-xjhb2 0/1 ContainerCreating
pod/storage-provisioner 1/1 Running

NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S) AGE
service/kube-dns ClusterIP 10.96.0.10 <none> 53/UDP,53/TCP,9153/TCP 7m14s
service/metrics-server ClusterIP 10.106.87.243 <none> 443/TCP 5s

➔ ~ kubectl top pods
error: Metrics API not available

➔ ~ kubectl top pods
error: Metrics API not available

➔ ~ kubectl top pods
error: Metrics API not available

➔ ~ minikube addons disable metrics-server
"The 'metrics-server' addon is disabled"

➔ ~

```

Was unable to get metrics running.

5 Clean Up

```

➔ ~ kubectl delete service hello-node
kubectl delete deployment hello-node
service "hello-node" deleted
deployment.apps "hello-node" deleted

➔ ~ minikube stop
Stopping node "minikube" ...
Powering off "minikube" via SSH
1 node stopped.

➔ ~

```

6 Using kubectl to Create a Deployment

```
➔ ~ kubectl create deployment kubernetes-bootcamp --image=gcr.io/google-samples/kubernetes-bootcamp:v1
deployment.apps/kubernetes-bootcamp created
➔ ~ |
```

```
➔ ~ kubectl get deployments
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
kubernetes-bootcamp 1/1     1            1           78s
➔ ~ export POD_NAME=$(kubectl get pods -o go-template --template '{{range .items}}{{.metadata.name}}{{"\n"}}{{end}}')
echo Name of the Pod: $POD_NAME
Name of the Pod: kubernetes-bootcamp-9bc58d867-n8bsh
```

```
➔ ~ curl http://localhost:8001/api/v1/namespaces/default/pods/$POD_NAME:8080/proxy/
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-n8bsh | v=1
➔ ~ |
```

7 Viewing Pods and Nodes

```
➔ ~ kubectl get pods
NAME                STATUS    RESTARTS   AGE
kubernetes-bootcamp-9bc58d867-n8bsh 1/1       0           4m26s
➔ ~ kubectl proxy
Starting to serve on 127.0.0.1:8001
➔ ~ |
```

```

$ kubectl describe pods
Name:          kubernet-es-bootcamp-9bc58d867-n8bsh
Namespace:     default
Priority:       0
Service Account: default
Node:          minikube/192.168.49.2
Start Time:    Wed, 19 Mar 2025 11:21:15 +0000
Labels:        app=kubernet-es-bootcamp
               pod-template-hash=9bc58d867
Annotations:   <none>
Status:        Running
IP:            10.244.0.13
IPs:           10.244.0.13
Controlled By: ReplicaSet/kubernet-es-bootcamp-9bc58d867
Containers:
  kubernet-es-bootcamp:
    Container ID:  docker://15fc4dd5afeb8254a78b82b6528d280c1047868caabfb48b5fdb3c0802871e97
    Image:          gcr.io/google-samples/kubernet-es-bootcamp:v1
    Image ID:       docker-pullable://gcr.io/google-samples/kubernet-es-bootcamp@sha256:0d6b8ee63bb57c5f5b6156f446b3b3c143d233037f3a2f08e279c8fcc64af
    Port:          <none>
    Host Port:     <none>
    State:         Running
      Started:      Wed, 19 Mar 2025 11:21:28 +0000
    Ready:         True
    Restart Count:  0
    Environment:   <none>
    Mounts:         /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-mmk2j (ro)
Conditions:
  Type              Status
  PodReadyToStartContainers  True
  Initialized         True
  Ready               True
  ContainersReady     True
  PodScheduled        True
Volumes:
  kube-api-access-mmk2j:
    Type:              Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds: 3607
    ConfigMapName:       kube-root-ca.crt
    ConfigMapOptional:    <nil>
    DownwardAPI:         true
  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   5m15s  default-scheduler  Successfully assigned default/kubernet-es-bootcamp-9bc58d867-n8bsh to minikube
  Normal  Pulling     5m15s  kubelet        Pulling image "gcr.io/google-samples/kubernet-es-bootcamp:v1"
  Normal  Pulled      5m33s  kubelet        Successfully pulled image "gcr.io/google-samples/kubernet-es-bootcamp:v1" in 12.339s (12.339s including waiting). Image size: 211336459 bytes.
  Normal  Created     5m33s  kubelet        Created container: kubernet-es-bootcamp
  Normal  Started     5m33s  kubelet        Started container kubernet-es-bootcamp

```

6 Using kubectl to Create a Deployment

Before creating a deployment, you need to create a pod template. This pod template will be used to create a deployment.

```

cat > pod-template.yaml
apiVersion: v1
kind: Pod
metadata:
  name: kubernet-es-bootcamp
spec:
  containers:
  - name: kubernet-es-bootcamp
    image: gcr.io/google-samples/kubernet-es-bootcamp:v1

```

7 Viewing Pods and Nodes

```

$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
kubernet-es-bootcamp-9bc58d867-n8bsh 1/1     Running   0           4m28s

```

```

$ export POD_NAME=$(kubectl get pods -o go-template --template '{{range .items}}{{.metadata.name}}{{"\n"}}{{end}}')
$ echo Name of the Pod: $POD_NAME
Name of the Pod: kubernet-es-bootcamp-9bc58d867-n8bsh
$ curl http://localhost:8001/api/v1/namespaces/default/pods/$POD_NAME/8080/proxy/
Hello Kubernetes bootcamp! | Running on: kubernet-es-bootcamp-9bc58d867-n8bsh | v=1
$ kubectl logs $POD_NAME
Kubernetes Deployment Instructions
Kubernetes Bootcamp App Started At: 2025-03-19T11:21:28.659Z | Running On: kubernet-es-bootcamp-9bc58d867-n8bsh

Running On: kubernet-es-bootcamp-9bc58d867-n8bsh | Total Requests: 1 | App Uptime: 135.168 seconds | Log Time: 2025-03-19T11:23:43.828Z
Running On: kubernet-es-bootcamp-9bc58d867-n8bsh | Total Requests: 2 | App Uptime: 345.978 seconds | Log Time: 2025-03-19T11:27:14.637Z
$ kubectl exec $POD_NAME -- env
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
HOSTNAME=kubernet-es-bootcamp-9bc58d867-n8bsh
KUBERNETES_SERVICE_PORT_HTTPS=443
KUBERNETES_PORT=tcp://10.96.0.1:443
KUBERNETES_PORT_443_TCP=tcp://10.96.0.1:443
KUBERNETES_PORT_443_TCP_PROTO=tcp
KUBERNETES_PORT_443_TCP_PORT=443
KUBERNETES_PORT_443_TCP_ADDR=10.96.0.1
KUBERNETES_SERVICE_HOST=10.96.0.1
KUBERNETES_SERVICE_PORT=443
NPM_CONFIG_LOGLEVEL=info
NODE_VERSION=6.3.1
HOME=/root
$ kubectl exec -ti $POD_NAME -- bash
root@kubernet-es-bootcamp-9bc58d867-n8bsh:/# echo 'hello!'
hello!
root@kubernet-es-bootcamp-9bc58d867-n8bsh:/# exit
exit
$

```

Replace "\$POD_NAME" with the actual name of your Pod (or use the environment variable you set in the previous step). This will show the output from

8 Exposing App via Service

```
+ ~ kubectl get pods
NAME                                READY STATUS RESTARTS AGE
kubernetes-bootcamp-9bc58d867-n8bsh 1/1    Running 0      9m9s

+ ~ kubectl get services
NAME      TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
kubernetes ClusterIP  10.96.0.1     <none>        443/TCP      23m

+ ~ kubectl expose deployment/kubernetes-bootcamp --type="NodePort" --port 8080
service/kubernetes-bootcamp exposed

+ ~ kubectl describe services/kubernetes-bootcamp
Name:      kubernetes-bootcamp
Namespace: default
Labels:    app=kubernetes-bootcamp
Annotations: <none>
Selector:  app=kubernetes-bootcamp
Type:      NodePort
IP Family Policy: SingleStack
IP Families: IPv4
IP: 10.110.173.49
IPs: 10.110.173.49
Port: 8080/TCP
TargetPort: 8080/TCP
NodePort: 31537/TCP
Endpoints: 10.244.0.13:8080
Session Affinity: None
External Traffic Policy: Cluster
Internal Traffic Policy: Cluster
Events: <none>

+ ~ export NODE_PORT=$(kubectl get services/kubernetes-bootcamp -o go-template='{{(index .spec.ports 0).nodePort}}')
echo "NODE_PORT=$NODE_PORT"
NODE_PORT=31537

+ ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-n8bsh | v=1
```

```

+ ~ kubectl describe deployment
Name:      kubernetes-bootcamp google.com/prompts/1nm3rljMKUJ1r95IHQHHU12mQGIm0S
Namespace: default
CreationTimestamp: Wed, 19 Mar 2025 11:21:15 +0000
Labels:    app=kubernetes-bootcamp
Annotations: deployment.kubernetes.io/revision: 1
Selector:  app=kubernetes-bootcamp
Replicas:  1 desired | 1 updated | 1 total | 1 available | 0 unavailable
StrategyType: RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels: app=kubernetes-bootcamp
  Containers:
    kubernetes-bootcamp:
      Image: gcr.io/google-samples/kubernetes-bootcamp:v1 app=kubernetes-bootcamp
      Port: <none>
      Host Port: <none>
      Environment: <none>
      Mounts: <none>
      Volumes: <none>
  Node-Selectors: <none>
  Tolerations: <none>
Conditions:
  Type             Status  Reason
  ----             -
  Available        True    MinimumReplicasAvailable
  Progressing      True    NewReplicaSetAvailable
OldReplicaSets: <none>
NewReplicaSet: kubernetes-bootcamp-9bc58d867 (1/1 replicas created)
Events:
  Type     Reason      Age    From          Message
  ----     -
  Normal   ScalingReplicaSet   10m    deployment-controller   Scaled up replica set kubernetes-bootcamp-9bc58d867 from 0 to 1
+ ~ kubectl get pods -l app=kubernetes-bootcamp
NAME                                READY   STATUS    RESTARTS   AGE
kubernetes-bootcamp-9bc58d867-n8bsh  1/1     Running   0           10m
+ ~ kubectl get services -l app=kubernetes-bootcamp
NAME                                TYPE        CLUSTER-IP    EXTERNAL-IP    PORT(S)    AGE
kubernetes-bootcamp                 NodePort    10.110.173.49  <none>         8080:31537/TCP  90s
+ ~ export POD_NAME="$(kubectl get pods -o go-template --template '{{range .items}}{{.metadata.name}}{{"\n"}}{{end}}')"
echo "Name of the Pod: $POD_NAME"
Name of the Pod: kubernetes-bootcamp-9bc58d867-n8bsh
+ ~ kubectl label pods "$POD_NAME" version=v1

```

```

~ kubect describe pods "POD_NAME
Name:      kubernet-bootcamp-9bc58d867-n8bsh
Namespace: default
Priority:   default
Service Account: default
Node:      minikube/192.168.49.2
Start Time: Wed, 19 Mar 2025 11:21:15 +0000
Labels:    app=kubernetes-bootcamp
           pod-template-hash=9bc58d867
Annotations:
  Status:   Running
  IP:       10.244.0.13
  IPs:      10.244.0.13
Controlled By: ReplicaSet/kubernet-bootcamp-9bc58d867
Containers:
  kubernet-bootcamp:
    Container ID: docker://15fc4dd5afeb8254a78b82b6520d200c1047868caabfb48b8fb3c0802871e97
    Image:        gcr.io/google-samples/kubernet-bootcamp:v1
    Image ID:     docker-pullable://gcr.io/google-samples/kubernet-bootcamp@sha256:0d6b8ee63bb57c5f5b6156f446b3bc3b3c143d233037f3a2f00e279c8fcc64af
    Port:        <none>
    Host Port:   <none>
    State:       Running
      Started:   Wed, 19 Mar 2025 11:21:20 +0000
    Ready:       True
    Restart Count: 0
    Environment: <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-mmk2j (ro)
Conditions:
  Type              Status
  PodReadyToStartContainers True
  Initialized        True
  Ready              True
  ContainersReady    True
  PodScheduled       True
Volumes:
  kube-api-access-mmk2j:
    Type:      Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds: 3607
    ConfigMapName: kube-root-ca.crt
    ConfigMapOptional: <nil>
    DownwardAPI:      True
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   11m      default-scheduler    Successfully assigned default/kubernet-bootcamp-9bc58d867-n8bsh to minikube
  Normal    Pulling     11m      kubelet    Pulling image "gcr.io/google-samples/kubernet-bootcamp:v1"
  Normal    Pulled      11m      kubelet    Successfully pulled image "gcr.io/google-samples/kubernet-bootcamp:v1" in 12.339s (12.339s including waiting). Image size: 211336459 bytes.
  Normal    Created     11m      kubelet    Created container: kubernet-bootcamp
  Normal    Started     11m      kubelet    Started container kubernet-bootcamp

```

```

~ kubect get pods -l version=v1
NAME                                READY STATUS RESTARTS AGE
kubernet-bootcamp-9bc58d867-n8bsh  1/1   Running   0       12m

~ kubect delete service kubernet-bootcamp
service "kubernet-bootcamp" deleted

~ kubect delete service -l app=kubernet-bootcamp
No resources found

~ kubect get services
NAME      TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
kubernet ClusterIP  10.96.0.1    <none>        443/TCP     26m

~ curl http://"$ (minikube ip):$NODE_PORT"
curl: (7) Failed to connect to 192.168.49.2 port 31537 after 0 ms: Couldn't connect to server

~ kubect exec -ti $POD_NAME -- curl http://localhost:8080
Hello Kubernetes bootcamp! | Running on: kubernet-bootcamp-9bc58d867-n8bsh | v=1

```

9 Running Multiple Instances

```
+ ~ kubectl expose deployment/kubernetes-bootcamp --type="LoadBalancer" --port 8080
service/kubernetes-bootcamp exposed
+ ~ kubectl get deployments
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
kubernetes-bootcamp 1/1     1            1          14m
+ ~ kubectl get rs
NAME          DESIRED   CURRENT   READY   AGE
kubernetes-bootcamp-9bc58d867 1          1          1      14m
+ ~ kubectl scale deployments/kubernetes-bootcamp --replicas=4
deployment.apps/kubernetes-bootcamp scaled
+ ~ kubectl get deployments
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
kubernetes-bootcamp 4/4     4            4          14m
+ ~ kubectl get pods -o wide
NAME                                READY   STATUS    RESTARTS   AGE   IP            NODE          NOMINATED NODE   READINESS GATES
kubernetes-bootcamp-9bc58d867-2jck1 1/1     Running   0          8s    10.244.0.15   minikube     <none>           <none>
kubernetes-bootcamp-9bc58d867-7gzbn 1/1     Running   0          8s    10.244.0.14   minikube     <none>           <none>
kubernetes-bootcamp-9bc58d867-krc7m 1/1     Running   0          8s    10.244.0.16   minikube     <none>           <none>
kubernetes-bootcamp-9bc58d867-n8bsh 1/1     Running   0          15m   10.244.0.13   minikube     <none>           <none>
```

```
+ ~ kubectl describe deployments/kubernetes-bootcamp
Name:          kubernetes-bootcamp
Namespace:     default
CreationTimestamp: Wed, 19 Mar 2025 11:21:15 +0000
Labels:        app=kubernetes-bootcamp
Annotations:   deployment.kubernetes.io/revision: 1
Selector:      app=kubernetes-bootcamp
Replicas:      4 desired | 4 updated | 4 total | 4 available | 0 unavailable
StrategyType:  RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=kubernetes-bootcamp
  Containers:
    kubernetes-bootcamp:
      Image:   gcr.io/google-samples/kubernetes-bootcamp:v1
      Port:   8080
      Host Port: 8080
      Environment:
      Mounts:
      Volumes:
      Node-Selectors:
      Tolerations:
Conditions:
  Type          Status  Reason
  ----          -
Progressing    True    NewReplicaSetAvailable
Available      True    MinimumReplicasAvailable
OldReplicaSets: <none>
NewReplicaSet: kubernetes-bootcamp-9bc58d867 (4/4 replicas created)
Events:
  Type      Reason      Age    From          Message
  ----      -
Normal     ScalingReplicaSet  16m    deployment-controller    Scaled up replica set kubernetes-bootcamp-9bc58d867 from 0 to 1
Normal     ScalingReplicaSet  72s    deployment-controller    Scaled up replica set kubernetes-bootcamp-9bc58d867 from 1 to 4
```

```

* ~ kubectl describe services/kubernetes-bootcamp
Name:      kubernetes-bootcamp
Namespace: default
Labels:    app=kubernetes-bootcamp
Annotations: <none>
Selector:  app=kubernetes-bootcamp
Type:      LoadBalancer
IP Family Policy: SingleStack
IP Families: IPv4
IP: 10.108.27.209
IPs:       10.108.27.209
Port:      <unset> 8080/TCP
TargetPort: 8080/TCP
NodePort:   31681/TCP
Endpoints:  10.244.0.13:8080,10.244.0.14:8080,10.244.0.15:8080 + 1 more...
Session Affinity: None
External Traffic Policy: Cluster
Internal Traffic Policy: Cluster
Events:      <none>

* ~ export NODE_PORT=$(kubectl get services/kubernetes-bootcamp -o go-template='{{(index .spec.ports 0).nodePort}}')
echo NODE_PORT=$NODE_PORT
NODE_PORT=31681

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-krc7m | v=1

* ~ minikube service kubernetes-bootcamp --url
http://192.168.49.2:31681

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-7gzbn | v=1

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-krc7m | v=1

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-2jck1 | v=1

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-2jck1 | v=1

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-7gzbn | v=1

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-n8bsh | v=1

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-9bc58d867-2jck1 | v=1

* ~ kubectl scale deployments/kubernetes-bootcamp --replicas=2
deployment.apps/kubernetes-bootcamp scaled

* ~ kubectl get deployments
NAME                 READY   UP-TO-DATE   AVAILABLE   AGE
kubernetes-bootcamp  2/2     2             2           17m

* ~ kubectl get pods -o wide
NAME                                READY   STATUS    RESTARTS   AGE   IP              NODE             NOMINATED NODE   READINESS GATES
kubernetes-bootcamp-9bc58d867-2jck1  1/1     Terminating   0         3m11s  10.244.0.15     minikube         <none>            <none>
kubernetes-bootcamp-9bc58d867-7gzbn  1/1     Terminating   0         3m11s  10.244.0.14     minikube         <none>            <none>
kubernetes-bootcamp-9bc58d867-krc7m  1/1     Running       0         3m11s  10.244.0.16     minikube         <none>            <none>
kubernetes-bootcamp-9bc58d867-n8bsh  1/1     Running       0         18m    10.244.0.13     minikube         <none>            <none>

```

10 Performing a Rollout Update

```

* ~ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE   IP              NODE             NOMINATED NODE   READINESS GATES
kubernetes-bootcamp-5c4f7cb664-27vx2 1/1     Running   0          33s   10.244.0.15     minikube         <none>            <none>
kubernetes-bootcamp-5c4f7cb664-jknr8 1/1     Running   0          30s   10.244.0.14     minikube         <none>            <none>
kubernetes-bootcamp-9bc58d867-krc7m  1/1     Terminating   0         5m6s   10.244.0.16     minikube         <none>            <none>
kubernetes-bootcamp-9bc58d867-n8bsh  1/1     Terminating   0         19m    10.244.0.13     minikube         <none>            <none>

* ~ export NODE_PORT=$(kubectl get services/kubernetes-bootcamp -o go-template='{{(index .spec.ports 0).nodePort}}')
echo "NODE_PORT=$NODE_PORT"
NODE_PORT=31681

* ~ curl http://$(minikube ip):$NODE_PORT
Hello Kubernetes bootcamp! | Running on: kubernetes-bootcamp-5c4f7cb664-27vx2 | v=2

* ~ kubectl rollout status deployments/kubernetes-bootcamp
deployment "kubernetes-bootcamp" successfully rolled out

```

```

+ ~ kubectl set image deployments/kubernetes-bootcamp kubernetes-bootcamp=gcr.io/google-samples/kubernetes-bootcamp:v10
deployment.apps/kubernetes-bootcamp image updated
+ ~ kubectl get deployments
NAME                 READY   UP-TO-DATE   AVAILABLE   AGE
kubernetes-bootcamp  2/2     1            2           21m
+ ~ kubectl get pods
NAME                 READY   STATUS    RESTARTS   AGE
kubernetes-bootcamp-5c4f7cb664-27vx2  1/1     Running   0          2m10s
kubernetes-bootcamp-5c4f7cb664-jknr8  1/1     Running   0          2m7s
kubernetes-bootcamp-75bd5fd495-wdp7h  0/1     ImagePull 0          10s
+ ~ kubectl rollout undo deployments/kubernetes-bootcamp
deployment.apps/kubernetes-bootcamp rolled back
+ ~ kubectl get pods
NAME                 READY   STATUS    RESTARTS   AGE
kubernetes-bootcamp-5c4f7cb664-27vx2  1/1     Running   0          2m19s
kubernetes-bootcamp-5c4f7cb664-jknr8  1/1     Running   0          2m16s
+ ~ kubectl delete deployments/kubernetes-bootcamp services/kubernetes-bootcamp
deployment.apps "kubernetes-bootcamp" deleted
service "kubernetes-bootcamp" deleted
+ ~ 5;4u

```