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Lab 3

minikube start --nodes 2 -p multinode-demo

```
rohangandhi@Rohan-laptop:~$ minikube start --nodes 2 -p multinode-demo
😄  [multinode-demo] minikube v1.32.0 on Ubuntu 22.04 (amd64)
✨  Automatically selected the docker driver. Other choices: none, 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 control plane node multinode-demo in cluster multinode-demo
🚜  Pulling base image ...
💾  Downloading Kubernetes v1.28.3 preload ...
    > preloaded-images-k8s-v18-v1...:  403.35 MiB / 403.35 MiB  100.00% 6.56 Mi
🔥  Creating docker container (CPUs=2, Memory=2200MB) ...
❗  Executing "docker ps -a --format {{.Names}}" took an unusually long time: 3.131064409s
💡  Restarting the docker service may improve performance.
🐳  Preparing Kubernetes v1.28.3 on Docker 24.0.7 ...
    ▪ Generating certificates and keys ...
    ▪ Booting up control plane ...
    ▪ Configuring RBAC rules ...
🔗  Configuring CNI (Container Networking Interface) ...
🔎  Verifying Kubernetes components...
    ▪ Using image gcr.io/k8s-minikube/storage-provisioner:v5
🌟  Enabled addons: storage-provisioner, default-storageclass

👍  Starting worker node multinode-demo-m02 in cluster multinode-demo
🚜  Pulling base image ...
🔥  Creating docker container (CPUs=2, Memory=2200MB) ...
🌐  Found network options:
    ▪ NO_PROXY=192.168.58.2
🐳  Preparing Kubernetes v1.28.3 on Docker 24.0.7 ...
    ▪ env NO_PROXY=192.168.58.2
🔎  Verifying Kubernetes components...
🏄  Done! kubectl is now configured to use "multinode-demo" cluster and "default" namespace by default
```

kubectl get nodes

```
rohangandhi@Rohan-laptop:~$ kubectl get nodes
NAME                STATUS   ROLES           AGE   VERSION
multinode-demo      Ready    control-plane   48s   v1.28.3
multinode-demo-m02  Ready    <none>          22s   v1.28.3
```

minikube status -p multinode-demo

```
rohangandhi@Rohan-laptop:~$ minikube status -p multinode-demo
multinode-demo
type: Control Plane
host: Running
kubelet: Running
apiserver: Running
kubeconfig: Configured

multinode-demo-m02
type: Worker
host: Running
kubelet: Running
```

minikube dashboard -p multinode-demo
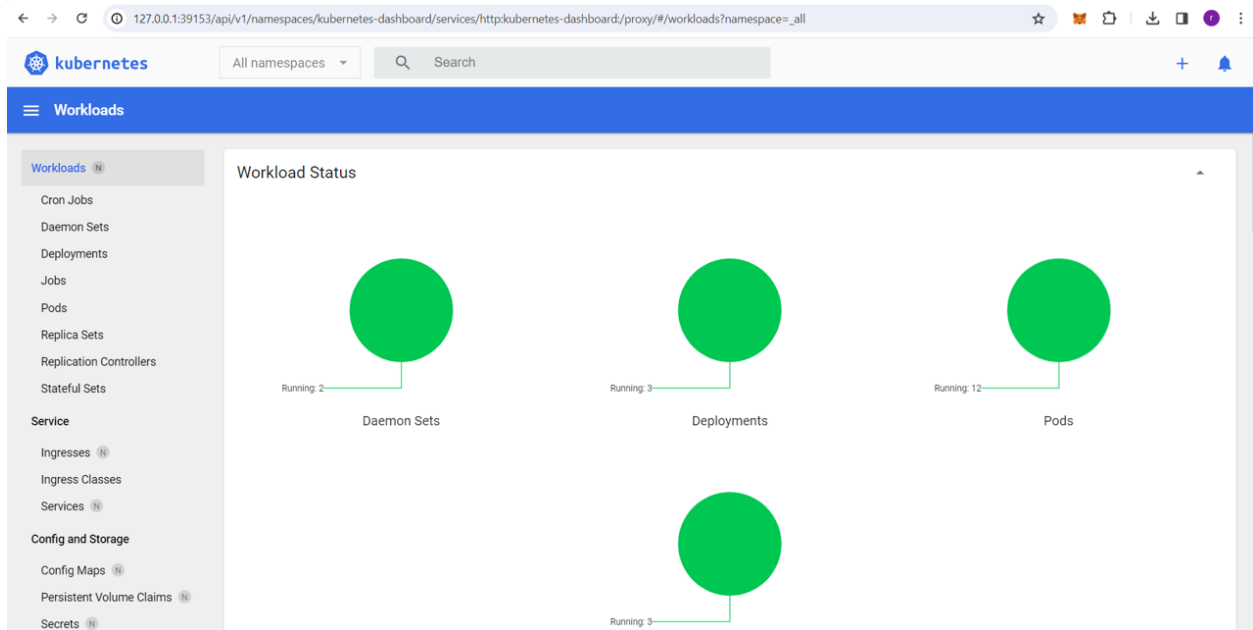
minikube stop -p multinode-demo

minikube delete --all

Replicaset.yaml

```yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: nginx
  labels:
    app: nginx
    tier: lb
spec:
  replicas: 3
  selector:
    matchLabels:
      tier: lb
  template:
    metadata:
      labels:
        tier: lb
    spec:
      containers:
        - name: nginx-replicaset
          image: nginx
```

kubectl apply -f replicaset.yaml

kubectl get pods

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl apply -f replicaset.yaml
replicaset.apps/nginx created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl get pods
NAME          READY   STATUS             RESTARTS   AGE
nginx-7csmf   0/1     ContainerCreating  0          28s
nginx-j8wjm   0/1     ContainerCreating  0          28s
nginx-kb2sl   0/1     ContainerCreating  0          28s
```

kubectl delete pod nginx-7csmf

kubectl get pods

kubectl get replicasets

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl delete pod nginx-7csmf
pod "nginx-7csmf" deleted
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl get pods
NAME            READY   STATUS    RESTARTS   AGE
nginx-5cz9k     1/1     Running   0          16s
nginx-j8wjm     1/1     Running   0          2m28s
nginx-kb2sl     1/1     Running   0          2m28s
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl get replicasets
NAME      DESIRED   CURRENT   READY   AGE
nginx     3         3         3       2m46s
```

Nginx.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
        - name: nginx
          image: nginx:1.14.2
          ports:
            - containerPort: 80
```

Kubectl apply -f nginx.yaml

kubectl get deployments

kubectl rollout status deployment nginx-deployment

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl apply -f nginx.yaml
deployment.apps/nginx-deployment unchanged
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl get deployments
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   3/3     3            3           2m54s
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl rollout status deployment nginx-deployment
deployment "nginx-deployment" successfully rolled out
```

Stateful-nginx.yaml

```yaml
apiVersion: v1
kind: Service
metadata:
  name: nginx
  labels:
    app: nginx
spec:
  ports:
    - port: 80
      name: web
  clusterIP: None
  selector:
    app: nginx
```

```yaml
apiVersion: apps/v1
kind: StatefulSet
metadata:
  name: web
spec:
  selector:
    matchLabels:
      app: nginx # has to match .spec.template.metadata.labels
  serviceName: "nginx"
  replicas: 3 # by default is 1
  template:
    metadata:
      labels:
        app: nginx # has to match .spec.selector.matchLabels
    spec:
      terminationGracePeriodSeconds: 10
      containers:
        - name: nginx
          image: k8s.gcr.io/nginx-slim:0.8
          ports:
            - containerPort: 80
              name: web
          volumeMounts:
            - name: www
              mountPath: /usr/share/nginx/html
  volumeClaimTemplates:
    - metadata:
        name: www
      spec:
        accessModes: ["ReadWriteOnce"]
        storageClassName: "my-storage-class"
        resources:
          requests:
            storage: 1Gi
```

kubectl apply -f stateful-nginx.yaml

kubectl get statefulsets

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl apply -f stateful-nginx.yaml
service/nginx created
statefulset.apps/web created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl get statefulsets
NAME   READY   AGE
web    0/3     18s
```

daemonSet-nginx.yaml

```yaml
apiVersion: apps/v1
kind: DaemonSet
metadata:
  name: nginx
spec:
  selector:
    matchLabels:
      name: nginx-lb
  template:
    metadata:
      labels:
        name: nginx-lb
    spec:
      containers:
        - name: nginx
          image: nginx
```

kubectl apply -f daemonSet-nginx.yaml

kubectl get daemonset

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl apply -f daemonSet-nginx.yaml
daemonset.apps/nginx created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl get daemonset
NAME    DESIRED   CURRENT   READY   UP-TO-DATE   AVAILABLE   NODE SELECTOR   AGE
nginx   2         2         2       2            2           <none>          13s
```

nginx-deployment-resourcelimit.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
        - name: nginx
          image: nginx:1.14.2
          ports:
            - containerPort: 80
          resources:
            limits:
              memory: "256Mi"
              cpu: "200m"
            requests:
              memory: "128Mi"
              cpu: "100m"
```

kubectl apply -f nginx-deployment-resourcelimit.yaml

kubectl get deployments

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl apply -f nginx-deployment-resourcelimit.yaml
deployment.apps/nginx-deployment configured
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl get deployments
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   3/3     3            3           10m
```

nginx-deployment-healthcheck.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
        - name: nginx
          image: nginx:1.14.2
          ports:
            - containerPort: 80
          livenessProbe:
            httpGet:
              path: /
              port: 80
            initialDelaySeconds: 15
            periodSeconds: 10
          readinessProbe:
            httpGet:
              path: /
              port: 80
            initialDelaySeconds: 5
            periodSeconds: 5
```

Kubectl apply -f nginx-deployment-healthcheck.yaml

Kubectl get deployments

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl apply -f nginx-deployment-healthcheck.yaml
deployment.apps/nginx-deployment configured
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo$ kubectl get deployments
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   3/3     2            3           13m
```

Full stack application

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl apply -f secrets/mongodb-secret.yml
secret/mongodb-secret created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl apply -f stateful-sets/mongodb-stateful-set.yml
statefulset.apps/mongodb-stateful-set created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl apply -f services/mongodb-service.yml
service/mongodb-service created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl apply -f deployments/note-server-depl.yml
deployment.apps/note-server-deployment created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl apply -f services/note-server-service.yml
service/note-server-service created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl apply -f deployments/note-depl.yml
deployment.apps/note-deployment created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl apply -f services/note-service.yml
service/note-service created
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ minikube service note-service
|-----------|--------------|--------------|----------------------------|
| NAMESPACE |     NAME     | TARGET PORT  |            URL             |
|-----------|--------------|--------------|----------------------------|
|  default  | note-service |         3000 | http://192.168.49.2:32218  |
|-----------|--------------|--------------|----------------------------|
🏃  Starting tunnel for service note-service.
|-----------|--------------|--------------|----------------------|
| NAMESPACE |     NAME     | TARGET PORT  |         URL          |
|-----------|--------------|--------------|----------------------|
|  default  | note-service |              | http://127.0.0.1:36803 |
|-----------|--------------|--------------|----------------------|
🎉  Opening service default/note-service in default browser...
👉  http://127.0.0.1:36803
❗  Because you are using a Docker driver on linux, the terminal needs to be open to run it.
```

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl get services
NAME                    TYPE           CLUSTER-IP       EXTERNAL-IP    PORT(S)           AGE
kubernetes              ClusterIP      10.96.0.1        <none>         443/TCP           9m
mongodb-service         ClusterIP      10.97.114.76     <none>         27017/TCP         4m31s
note-server-service     ClusterIP      10.101.185.240   <none>         5000/TCP          4m8s
note-service            LoadBalancer   10.103.17.42     <pending>      3000:32218/TCP    3m34s
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ minikube status
minikube
type: Control Plane
host: Running
kubelet: Running
apiserver: Running
kubeconfig: Configured
```

← → C ⓘ 127.0.0.1:36803   ⎗ ☆ ☒ ⎙ | ▢ ⓡ ⋮

note.   Assignments   Add Assignment   Notes   Add Note   ☾

<h2 align="center">Important Assignments 📄</h2>

○

Delete one pod

```
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl get pods
NAME                                     READY   STATUS    RESTARTS   AGE
mongodb-stateful-set-0                   1/1     Running   0          5m47s
mongodb-stateful-set-1                   1/1     Running   0          5m18s
note-deployment-74cc946cd8-n9hfq         1/1     Running   0          4m55s
note-deployment-74cc946cd8-x94qk         1/1     Running   0          4m55s
note-server-deployment-6fb5fcb67f-5t6l9  1/1     Running   0          5m26s
note-server-deployment-6fb5fcb67f-zjmmt  1/1     Running   0          5m26s
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl delete pod note-deployment-74cc946cd8-n9hfq
pod "note-deployment-74cc946cd8-n9hfq" deleted
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$ kubectl get pods
NAME                                     READY   STATUS    RESTARTS   AGE
mongodb-stateful-set-0                   1/1     Running   0          6m42s
mongodb-stateful-set-1                   1/1     Running   0          6m13s
note-deployment-74cc946cd8-vvdgc         1/1     Running   0          11s
note-deployment-74cc946cd8-x94qk         1/1     Running   0          5m50s
note-server-deployment-6fb5fcb67f-5t6l9  1/1     Running   0          6m21s
note-server-deployment-6fb5fcb67f-zjmmt  1/1     Running   0          6m21s
rohangandhi@Rohan-laptop:/mnt/c/Users/rohan/kubernetes-demo/kubernetes$
```