DevOps

Day – 4

Assignment

Name:Debehaa J

Roll No:22CSR037

1.Namespace

A Namespace is a logical partition within a Kubernetes cluster.

It allows you to divide resources like Pods, Services, and Deployments into different environments (e.g., dev, test, prod).

Think of it as a virtual cluster inside the physical Kubernetes cluster.

Useful for managing large projects with multiple teams.

2. Replica

A Replica ensures that a specified number of identical Pods are running in your cluster.

If a Pod fails, Kubernetes automatically replaces it using replicas to maintain the desired state.

It provides scalability and fault tolerance.

3. Pod

A **Pod** is the smallest deployable unit in Kubernetes.

It contains one or more containers (e.g., Docker containers).

Containers in a Pod share the same network namespace, storage, and lifecycle.

4. Deployment

A Deployment manages the creation and scaling of Pods using ReplicaSets.

It provides automated rollouts and rollbacks.

It ensures your application is always available by managing its state.

POD

1. Create a pod using run

command

```
$ kubectl run <pod-
name> --image=<image-
name> --port=<container-
port>
```

$ kubectl run my-pod --

image=nginx --port=80

2. View all the pods

(In default namespace)

$ kubectl get pods

(In All namespace)

$ kubectl get pods -A

# For a specific

namespace

$ kubectl get pods -n

kube-system

# For a specific type

$ kubectl get pods <pod-

name>

$ kubectl get pods <pod-

name> -o wide

$ kubectl get pods <pod-

name> -o yaml

$ kubectl get pods <pod-

name> -o json

3. Describe a pod (View

Pod details)

$ kubectl describe pod

<pod-name>

$ kubectl describe pod

my-pod

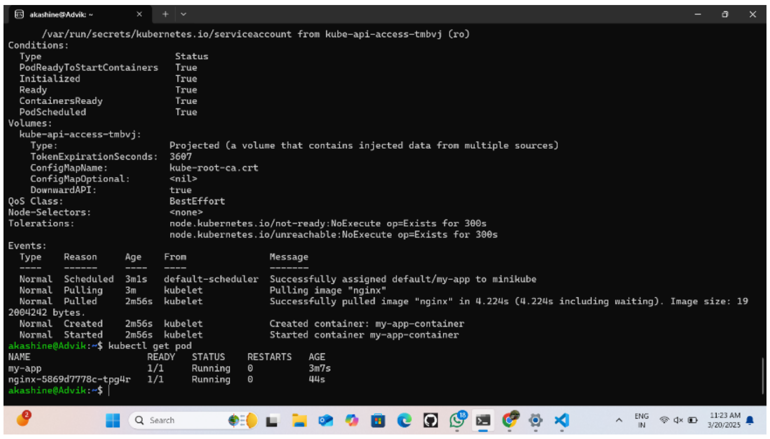
4. View Logs of a pod

```
$ kubectl logs <pod-
name>
$ kubectl logs my-pod
```

5. Execute any command inside Pod (Inside Pod OS)

```
$ kubectl exec <pod-
name> -- <command>
```

```
apiVersion: v1
kind: Pod
metadata:
  name: my-pod
  labels:
      app: my-web-app
type: backend
spec:
  containers:
    - name: nginx-container
      image: nginx
      ports:
        - containerPort: 80
```



```
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-tmbvj (ro)
Conditions:
  Type                        Status
  PodReadyToStartContainers   True
  Initialized                 True
  Ready                       True
  ContainersReady             True
  PodScheduled                True
Volumes:
  kube-api-access-tmbvj:
    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  3m1s   default-scheduler  Successfully assigned default/my-app to minikube
  Normal  Pulling    3m     kubelet            Pulling image "nginx"
  Normal  Pulled     2m56s  kubelet            Successfully pulled image "nginx" in 4.224s (4.224s including waiting). Image size: 19
2004242 bytes.
  Normal  Created    2m56s  kubelet            Created container: my-app-container
  Normal  Started    2m56s  kubelet            Started container my-app-container
akashine@Advik:~$ kubectl get pod
NAME                      READY   STATUS    RESTARTS   AGE
my-app                    1/1     Running   0          3m7s
nginx-5869d7778c-tpg4r    1/1     Running   0          44s
akashine@Advik:~$ |
```

Replica

1. Create ReplicaSet by

executing above YAML file

$ kubectl create -f rs-

test.yml

# Do necessary

modifications if exist, else

create new

$ kubectl apply -f rs-

test.yml

# Completely Modify Pod

Template

$ kubectl replace –f rs-

test.yml

2. View ReplicaSets

$ kubectl get replicasets

$ kubectl get rs

$ kubectl get rs –o wide

$ kubectl get rs <replica-

set-name> –o json

$ kubectl get rs <replica-

set-name> –o yaml

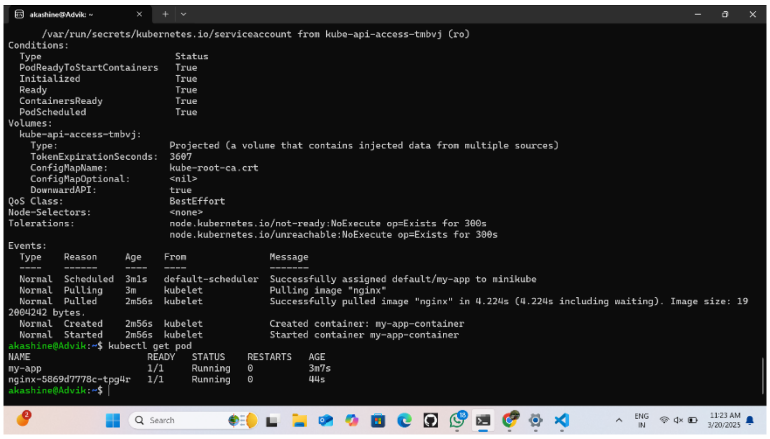
3. View ReplicaSet
Description
$ kubectl describe rs
<replica-set-name>
4. We can modify
generated/updated YAML
file
$ kubectl edit rs <replica-
set-name>
## change replicas: count
to any other value then
(ESC):wq

# We can modify our
YAML file and then
execute apply command
$ kubectl apply -f rs-
test.yml

## We can Even scale
using command also
$ kubectl scale replicaset
<replicaset-name> --
replicas=<desired-replica-
count>

5. Delete ReplicaSet
$ kubectl delete rs
<replica-set-name>
$ kubectl delete -f rs-
test.yml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-deploy
  labels:
    name: my-deploy
spec:
  replicas: 3
  selector:
    matchLabels:
      apptype: web-backend
  strategy:
    type: RollingUpdate
  template:
    metadata:
      labels:
        apptype: web-
backend
    spec:
      containers:
      - name: my-app
        image:  nginx
        ports:
              - containerPort:
7070
```



```
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-tmbvj (ro)
Conditions:
  Type                        Status
  PodReadyToStartContainers   True
  Initialized                 True
  Ready                       True
  ContainersReady             True
  PodScheduled                True
Volumes:
  kube-api-access-tmbvj:
    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  3m1s   default-scheduler  Successfully assigned default/my-app to minikube
  Normal  Pulling    3m     kubelet            Pulling image "nginx"
  Normal  Pulled     2m56s  kubelet            Successfully pulled image "nginx" in 4.224s (4.224s including waiting). Image size: 19
2004242 bytes.
  Normal  Created    2m56s  kubelet            Created container: my-app-container
  Normal  Started    2m56s  kubelet            Started container my-app-container
akashine@Advik:~$ kubectl get pod
NAME                     READY   STATUS    RESTARTS   AGE
my-app                   1/1     Running   0          3m7s
nginx-5869d7778c-tpg4r   1/1     Running   0          44s
akashine@Advik:~$ |
```

DEPLOY

1. Create Deployment by

executing above YAML file

$ kubectl create -f web-

deploy.yml

# Do necessary

modifications if exist, else

create new

$ kubectl create -f web-

deploy.yml

# Completely Modify Pod

Template

$ kubectl replace –f web-

deploy.yml

#Create deploy

kubectl create

deployment webnginx2 --

image=nginx:latest --

replicas=1

2. View Deployments

$ kubectl get

deployments

$ kubectl get deploy

$ kubectl get deploy -o
wide

$ kubectl get deploy
<deployment-name> -o
json

$ kubectl get deploy
<deployment-name> -o
yaml

3. View Deployment
Description

$ kubectl describe deploy
<deployment-name>

4. We can modify
generated/updated YAML
file

$ kubectl edit deploy
<deployment-name>

## change replicas: count
to any other value then
(ESC):wq

# We can modify our
YAML file and then
execute apply command

$ kubectl apply -f web-
deploy.yml

## We can Even scale
using command also

$ kubectl scale deploy
<deployment-name>   --

```
replicas=<desired-replica-
count>
```

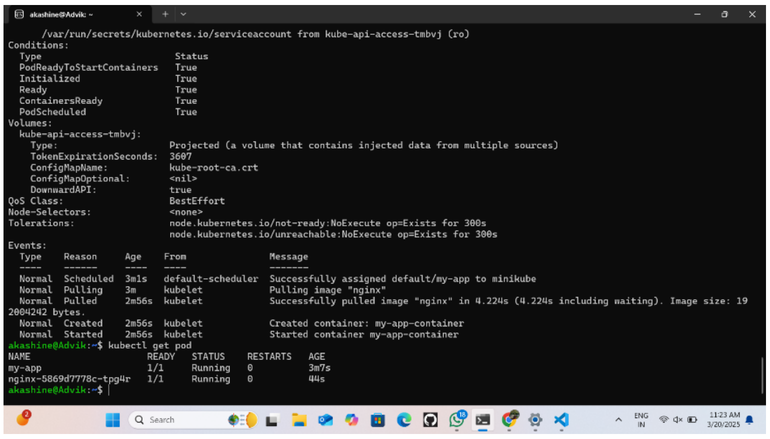
5. Delete Deployment

```
$ kubectl delete deploy
<deployment-name>
$ kubectl delete -f web-
deploy.yml
```

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-deploy
  labels:
    name: my-deploy
spec:
  replicas: 1
  selector:
    matchLabels:
      apptype: web-backend
  strategy:
    type: RollingUpdate
  template:
    metadata:
      labels:
        apptype: web-
backend
    spec:
      containers:
      - name: my-app
        image:
```

```
        ports:
        - containerPort: 7070
---

apiVersion: v1
kind: Service
metadata:
  name: my-service
  labels:
    app: my-service
    type: backend-app
spec:
  type: NodePort
  ports:
   - targetPort: 7070
     port: 7070
     nodePort: 30002
  selector:
    apptype: web-backend
```



```
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-tmbvj (ro)
Conditions:
  Type                        Status
  PodReadyToStartContainers   True
  Initialized                 True
  Ready                       True
  ContainersReady             True
  PodScheduled                True
Volumes:
  kube-api-access-tmbvj:
    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  3m1s   default-scheduler  Successfully assigned default/my-app to minikube
  Normal  Pulling    3m     kubelet            Pulling image "nginx"
  Normal  Pulled     2m56s  kubelet            Successfully pulled image "nginx" in 4.224s (4.224s including waiting). Image size: 19
2004242 bytes.
  Normal  Created    2m56s  kubelet            Created container: my-app-container
  Normal  Started    2m56s  kubelet            Started container my-app-container
akashine@Advik:~$ kubectl get pod
NAME                      READY   STATUS    RESTARTS   AGE
my-app                    1/1     Running   0          3m7s
nginx-5869d7778c-tpg4r    1/1     Running   0          44s
akashine@Advik:~$ 
```

Minikube service

Minikube service

```
#need to create a yml file
sudo nano
deployment.yml

apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-deploy
  labels:
    name: my-deploy
spec:
  replicas: 1
  selector:
    matchLabels:
      apptype: web-backend
  strategy:
    type: RollingUpdate
  template:
    metadata:
      labels:
        apptype: web-
backend
    spec:
      containers:
      - name: my-app
        image:
        ports:
        - containerPort: 9000
---

apiVersion: v1
kind: Service
```

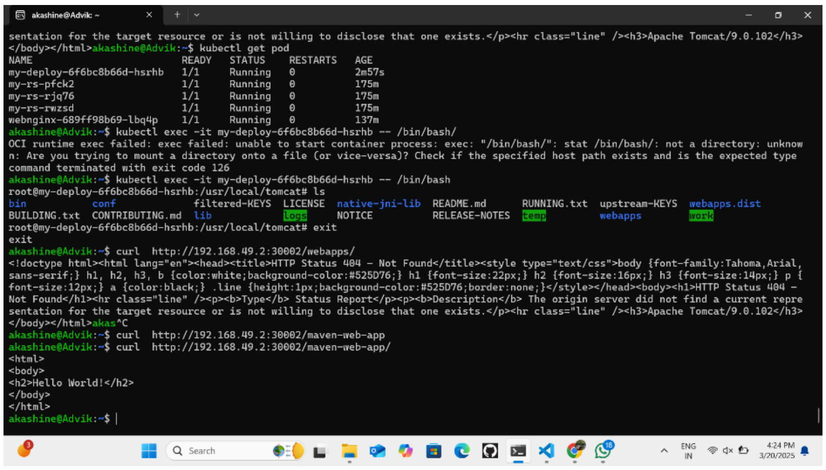
```
metadata:
  name: my-service
  labels:
    app: my-service
spec:
  type: NodePort
  ports:
    - port: 9000
      targetPort: 8080
      nodePort: 30002
  selector:
    apptype: web-backend
```

```
#Apply the deployment
kubectl apply -f
deployment.yml

#replace the deployment
kubectl replace -f
deployment.yml

#Run the service
minikube service my-
service

#curl the url
curl <url>/<file_name>/
```



```
sentation for the target resource or is not willing to disclose that one exists.</p><hr class="line" /><h3>Apache Tomcat/9.0.102</h3>
</body></html>akashine@Advik:~$ kubectl get pod
NAME                         READY   STATUS    RESTARTS   AGE
my-deploy-6f6bc8b66d-hsrhb   1/1     Running   0          2m57s
my-rs-pfck2                  1/1     Running   0          175m
my-rs-rjq76                  1/1     Running   0          175m
my-rs-rwzsd                  1/1     Running   0          175m
webnginx-689ff98b69-lbq4p    1/1     Running   0          137m
akashine@Advik:~$ kubectl exec -it my-deploy-6f6bc8b66d-hsrhb -- /bin/bash/
OCI runtime exec failed: exec failed: unable to start container process: exec: "/bin/bash/": stat /bin/bash/: not a directory: unknow
n: Are you trying to mount a directory onto a file (or vice-versa)? Check if the specified host path exists and is the expected type
command terminated with exit code 126
akashine@Advik:~$ kubectl exec -it my-deploy-6f6bc8b66d-hsrhb -- /bin/bash
root@my-deploy-6f6bc8b66d-hsrhb:/usr/local/tomcat# ls
bin           conf             filtered-KEYS  LICENSE  native-jni-lib  README.md      RUNNING.txt  upstream-KEYS  webapps.dist
BUILDING.txt  CONTRIBUTING.md  lib            logs     NOTICE          RELEASE-NOTES  temp         webapps        work
root@my-deploy-6f6bc8b66d-hsrhb:/usr/local/tomcat# exit
exit
akashine@Advik:~$ curl  http://192.168.49.2:30002/webapps/
<!doctype html><html lang="en"><head><title>HTTP Status 404 – Not Found</title><style type="text/css">body {font-family:Tahoma,Arial,
sans-serif;} h1, h2, h3, b {color:white;background-color:#525D76;} h1 {font-size:22px;} h2 {font-size:16px;} h3 {font-size:14px;} p {
font-size:12px;} a {color:black;} .line {height:1px;background-color:#525D76;border:none;}</style></head><body><h1>HTTP Status 404 –
Not Found</h1><hr class="line" /><p><b>Type</b> Status Report</p><p><b>Description</b> The origin server did not find a current repre
sentation for the target resource or is not willing to disclose that one exists.</p><hr class="line" /><h3>Apache Tomcat/9.0.102</h3>
</body></html>akas^C
akashine@Advik:~$ curl  http://192.168.49.2:30002/maven-web-app
akashine@Advik:~$ curl  http://192.168.49.2:30002/maven-web-app/
<html>
<body>
<h2>Hello World!</h2>
</body>
</html>
akashine@Advik:~$ |
```

Namespace

# To create a namespace:

$ kubectl create

namespace <namespace-

name>

$ kubectl create ns my-

bank

# To switch to a specific

namespace: (make this as

default type)

$ kubectl config set-

context --current --

namespace=<namespace-

name>

# To list all namespaces:

$ kubectl get namespaces

# To get resources within

a specific namespace:

$ kubectl get <resource-

type> -n <namespace-

name>

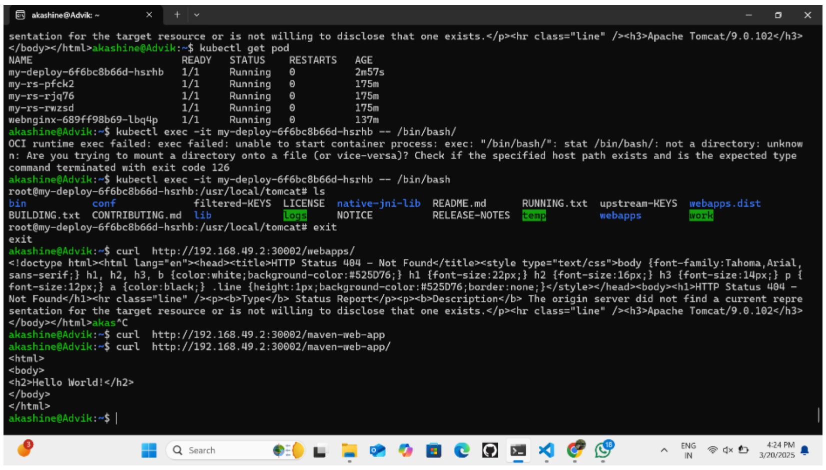
```
$ kubectl get deploy -n
my-bank
$ kubectl get deploy --
namespace my-bank
$ kubectl get all --
namespace my-bank
# To delete a namespace
and all associated
resources:
$ kubectl delete
namespace <namespace-
name>
$ kubectl delete ns my-
bank
```

```
kubectl create ns my-
deploy
kubectl apply -f
deploy.yml -n mydeploy
```

```
apiVersion: v1
kind: Namespace
metadata:
  name: my-demo-ns
```

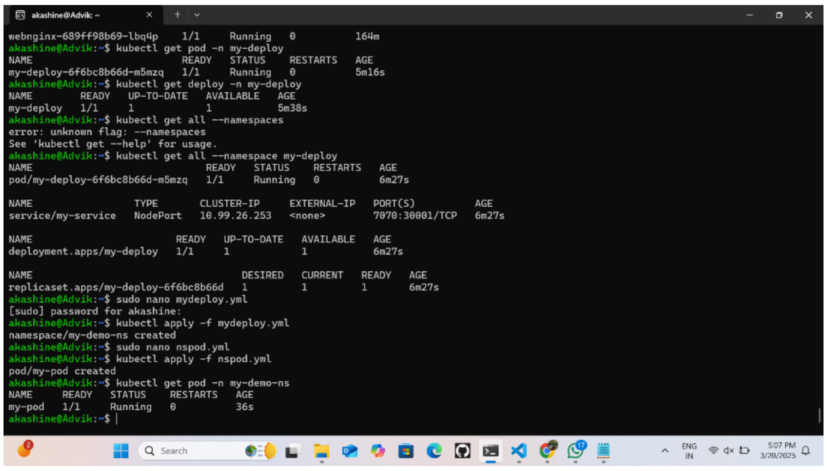
```
apiVersion: v1
kind: Pod
metadata:
  name: my-pod
  namespace: my-demo-ns
```

```yaml
spec:
  containers:
  - name: my-container
    image: nginx:latest
```



```
sentation for the target resource or is not willing to disclose that one exists.</p><hr class="line" /><h3>Apache Tomcat/9.0.102</h3>
</body></html>akashine@Advik:~$ kubectl get pod
NAME                          READY   STATUS    RESTARTS   AGE
my-deploy-6f6bc8b66d-hsrhb    1/1     Running   0          2m57s
my-rs-pfck2                   1/1     Running   0          175m
my-rs-rjq76                   1/1     Running   0          175m
my-rs-rwzsd                   1/1     Running   0          175m
webnginx-689ff98b69-lbq4p     1/1     Running   0          137m
akashine@Advik:~$ kubectl exec -it my-deploy-6f6bc8b66d-hsrhb -- /bin/bash/
OCI runtime exec failed: exec failed: unable to start container process: exec: "/bin/bash/": stat /bin/bash/: not a directory: unknow
n: Are you trying to mount a directory onto a file (or vice-versa)? Check if the specified host path exists and is the expected type
command terminated with exit code 126
akashine@Advik:~$ kubectl exec -it my-deploy-6f6bc8b66d-hsrhb -- /bin/bash
root@my-deploy-6f6bc8b66d-hsrhb:/usr/local/tomcat# ls
bin           conf             filtered-KEYS  LICENSE  native-jni-lib  README.md      RUNNING.txt  upstream-KEYS  webapps.dist
BUILDING.txt  CONTRIBUTING.md  lib            logs     NOTICE          RELEASE-NOTES  temp         webapps        work
root@my-deploy-6f6bc8b66d-hsrhb:/usr/local/tomcat# exit
exit
akashine@Advik:~$ curl  http://192.168.49.2:30002/webapps/
<!doctype html><html lang="en"><head><title>HTTP Status 404 – Not Found</title><style type="text/css">body {font-family:Tahoma,Arial,
sans-serif;} h1, h2, h3, b {color:white;background-color:#525D76;} h1 {font-size:22px;} h2 {font-size:16px;} h3 {font-size:14px;} p {
font-size:12px;} a {color:black;} .line {height:1px;background-color:#525D76;border:none;}</style></head><body><h1>HTTP Status 404 –
Not Found</h1><hr class="line" /><p><b>Type</b> Status Report</p><p><b>Description</b> The origin server did not find a current repre
sentation for the target resource or is not willing to disclose that one exists.</p><hr class="line" /><h3>Apache Tomcat/9.0.102</h3>
</body></html>akas^C
akashine@Advik:~$ curl  http://192.168.49.2:30002/maven-web-app
akashine@Advik:~$ curl  http://192.168.49.2:30002/maven-web-app/
<html>
<body>
<h2>Hello World!</h2>
</body>
</html>
akashine@Advik:~$ |
```

Namespace yml



```
webnginx-689ff98b69-lbq4p    1/1     Running   0          164m
akashine@Advik:~$ kubectl get pod -n my-deploy
NAME                          READY   STATUS    RESTARTS   AGE
my-deploy-6f6bc8b66d-m5mzq    1/1     Running   0          5m16s
akashine@Advik:~$ kubectl get deploy -n my-deploy
NAME        READY   UP-TO-DATE   AVAILABLE   AGE
my-deploy   1/1     1            1           5m38s
akashine@Advik:~$ kubectl get all --namespaces
error: unknown flag: --namespaces
See 'kubectl get --help' for usage.
akashine@Advik:~$ kubectl get all --namespace my-deploy
NAME                             READY   STATUS    RESTARTS   AGE
pod/my-deploy-6f6bc8b66d-m5mzq   1/1     Running   0          6m27s

NAME                 TYPE       CLUSTER-IP    EXTERNAL-IP   PORT(S)          AGE
service/my-service   NodePort   10.99.26.253  <none>        7070:30001/TCP   6m27s

NAME                        READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/my-deploy   1/1     1            1           6m27s

NAME                                   DESIRED   CURRENT   READY   AGE
replicaset.apps/my-deploy-6f6bc8b66d   1         1         1       6m27s
akashine@Advik:~$ sudo nano mydeploy.yml
[sudo] password for akashine:
akashine@Advik:~$ kubectl apply -f mydeploy.yml
namespace/my-demo-ns created
akashine@Advik:~$ sudo nano nspod.yml
akashine@Advik:~$ kubectl apply -f nspod.yml
pod/my-pod created
akashine@Advik:~$ kubectl get pod -n my-demo-ns
NAME     READY   STATUS    RESTARTS   AGE
my-pod   1/1     Running   0          36s
akashine@Advik:~$ |
```