

Kubernetes 07

Task 1: Execute all yaml files shown in video.

Task 2: Taint a Node and Schedule a Tolerant Pod
Taint a node with special=true:NoSchedule. Create a pod with a toleration that matches the taint, allowing it to be scheduled on the tainted node.

- Write a firstpod.yaml file
- Write file
- apiVersion: v1
- kind: Pod
- metadata:
- name: firstpod
- spec:
- containers:
- - name: firstcontainer
- image: nginx
- imagePullPolicy: Never
- tolerations:
- - key: "special"
- operator: "Equal"
- value: "true"
- effect: "NoSchedule"
- Taint it
- kubectl taint nodes ip-172-31-1-236.us-west-1.compute.internal special=true:NoSchedule

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl taint nodes ip-172-31-1-236.us-west-1.compute.internal special=true:NoSchedule
node/ip-172-31-1-236.us-west-1.compute.internal tainted
[ec2-user@ip-172-31-4-234 ~]$ kubectl describe node ip-172-31-1-236.us-west-1.compute.internal | grep -i taint
Taints:           special=true:NoSchedule
[ec2-user@ip-172-31-4-234 ~]$ █
```

-
- Now deploy it
- Kubectl apply -f firstpod.yml

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl apply -f firstpod.yml
pod/firstpod created
[ec2-user@ip-172-31-4-234 ~]$ █
```

-
- kubectl describe pod firstpod

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl describe pod firstpod
Name:           firstpod
Namespace:      default
Priority:       0
Service Account: default
Node:          ip-172-31-15-92.us-west-1.compute.internal/172.31.15.92
Start Time:    Tue, 06 Jan 2026 09:26:27 +0000
Labels:         <none>
Annotations:   <none>
Status:        Running
IP:            10.244.1.61
IPs:
  IP:  10.244.1.61
Containers:
  firstcontainer:
    Container ID:  containerd://47e99ea426fa68abd1fb78b90ac6fcfd6eb25ec7bfce92d902eb883038c6dc49
    Image:        nginx
    Image ID:    docker.io/library/nginx@sha256:ad85427e8c7147e2bfb485f7829e46316495695d7936a6d4459cfcd351535cc
    Port:         <none>
    Host Port:   <none>
    State:       Running
      Started:   Tue, 06 Jan 2026 09:26:27 +0000
    Ready:        True
    Restart Count: 0
●
```

- Kubectl get nodes
- Sudo yum install docker -y
- Docker pull nginx

```
[ec2-user@ip-172-31-4-234 ~]$ sudo docker pull nginx
Using default tag: latest
latest: Pulling from library/nginx
02d7611c4eae: Pull complete
dcea87ab9c4a: Pull complete
35df28ad1026: Pull complete
99ae2d6d05ef: Pull complete
a2b008488679: Pull complete
d03ca78f31fe: Pull complete
d6799cf0ce70: Pull complete
Digest: sha256:ca871a86d45a3ec6864dc45f014b11fe626145569ef0e74deaffc95a3b15b430
Status: Downloaded newer image for nginx:latest
docker.io/library/nginx:latest
```

- [ec2-user@ip-172-31-4-234 ~]\$ kubectl apply -f firstpod.yml

● Kubectl get pods -o wide

```
pod/firstpod configured
[ec2-user@ip-172-31-4-234 ~]$ kubectl get pods -o wide
NAME                      READY   STATUS    RESTARTS   AGE      IP          NOMINATED NODE   READINESS
S GATES
configmap-env-pod          1/1     Running   0          3h       10.        <none>
244.2.63 ip-172-31-1-236.us-west-1.compute.internal 1/1     Running   0          <none>
configmap-secret-pod       1/1     Running   0          153m     10.        <none>
244.2.65 ip-172-31-1-236.us-west-1.compute.internal 1/1     Running   0          <none>
configmap-volume-pod       1/1     Running   0          172m     10.        <none>
244.1.59 ip-172-31-15-92.us-west-1.compute.internal 1/1     Running   0          <none>
exclude-backend-rs-dsp8p    1/1     Running   2 (3h15m ago) 7d22h   10.        <none>
244.1.51 ip-172-31-15-92.us-west-1.compute.internal 1/1     Running   0          <none>
exclude-backend-rs-qnczm   1/1     Running   2 (3h15m ago) 7d22h   10.        <none>
244.1.58 ip-172-31-15-92.us-west-1.compute.internal 1/1     Running   0          <none>
firstpod                   1/1     Running   0          8m36s   10.        <none>
244.1.61 ip-172-31-15-92.us-west-1.compute.internal 1/1     Running   0          <none>
myapp-deployment-74fbb89fbb-4lbs4 1/1     Running   2 (3h15m ago) 7d2h    10.        <none>
244.2.60 ip-172-31-1-236.us-west-1.compute.internal 1/1     Running   0          <none>
myapp-deployment-74fbb89fbb-fhqfl 1/1     Running   2 (3h15m ago) 7d2h    10.        <none>
244.1.52 ip-172-31-15-92.us-west-1.compute.internal 1/1     Running   0          <none>
myapp-deployment-74fbb89fbb-ftf5d 1/1     Running   2 (3h15m ago) 7d2h    10.
```

- kubectl get nodes --show-labels

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl get nodes --show-labels
NAME           STATUS  ROLES      AGE   VERSION  LABELS
ip-172-31-1-236.us-west-1.compute.internal Ready   <none>    11d   v1.29.15 beta.kubernetes.io/arch=amd64,beta.kuberne
64,kubernetes.io/hostname=ip-172-31-1-236.us-west-1.compute.internal,kubernetes.io/os=linux,node-name=worker-01
ip-172-31-15-92.us-west-1.compute.internal Ready   <none>    11d   v1.29.15 beta.kubernetes.io/arch=amd64,beta.kuberne
64,kubernetes.io/hostname=ip-172-31-15-92.us-west-1.compute.internal,kubernetes.io/os=linux,node-name=worker-02
ip-172-31-4-234.us-west-1.compute.internal Ready   control-plane 11d   v1.29.15 beta.kubernetes.io/arch=amd64,beta.kuberne
64,kubernetes.io/hostname=ip-172-31-4-234.us-west-1.compute.internal,kubernetes.io/os=linux,node-role.kubernetes.io/control-plane
rnal-load-balancers=
[ec2-user@ip-172-31-4-234 ~]$
```

3 . Use NodeSelector to Schedule a Pod on a Specific Node

Label a node with env=dev. Create a pod with a nodeSelector that schedules it only on the node labeled env=dev.

- Kubectl get nodes

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl get nodes
NAME                               STATUS   ROLES      AGE   VERSION
ip-172-31-1-236.us-west-1.compute.internal   Ready    <none>    11d   v1.29
ip-172-31-15-92.us-west-1.compute.internal   Ready    <none>    11d   v1.29
ip-172-31-4-234.us-west-1.compute.internal   Ready    control-plane  11d   v1.29
[ec2-user@ip-172-31-4-234 ~]$
```

- `kubectl label node ip-172-31-1-236.us-west-1.compute.internal env=dev` change name

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl label node ip-172-31-1-236.us-west-1.compute.internal env=dev
[ec2-user@ip-172-31-4-234 ~]$ kubectl label node ip-172-31-1-236.us-west-1.compute.internal env=dev
node/ip-172-31-1-236.us-west-1.compute.internal labeled
[ec2-user@ip-172-31-4-234 ~]$
```

- `kubectl get nodes --show-labels | grep env`

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl get nodes --show-labels | grep env
node/ip-172-31-1-236.us-west-1.compute.internal labeled
[ec2-user@ip-172-31-4-234 ~]$ kubectl get nodes --show-labels | grep env
ip-172-31-1-236.us-west-1.compute.internal   Ready    <none>    11d   v1.29
.ip-15  beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=linux,env=dev,kubernetes.io/arch=amd64,kubernetes.io/hostname=ip-172-31-1-236.us-west-1.compute.internal
,kubernetes.io/os=linux,node-name=worker-01
[ec2-user@ip-172-31-4-234 ~]$
```

- `vi nodeselector-pod.yml`
- `apiVersion: v1`
- `kind: Pod`
- `metadata:`
- `name: dev-pod`
- `spec:`
- `nodeSelector:`
- `env: dev`
- `containers:`
- `- name: nginx`
- `image: nginx`

- Deploy it

```
s.io/arch=amd64, kubernetes.io/hostname=ip-172-31-1-236.us-west-1.co
, kubernetes.io/os=linux, node-name=worker-01
[ec2-user@ip-172-31-4-234 ~]$ vi nodeselector-pod.yml
[ec2-user@ip-172-31-4-234 ~]$ kubectl apply -f nodeselector-pod.yml
pod/dev-pod created
[ec2-user@ip-172-31-4-234 ~]$
```

-
- Verify
- `kubectl get pods -o wide`

244.1.59	ip-172-31-15-92.us-west-1.compute.internal	<none>	<none>	64s	<no
dev-pod		0/1	Pending	0	

4 , Use Node Affinity with Soft Scheduling Label a node with env=test. Create a pod with PreferredDuringSchedulingIgnoredDuringExecution node affinity, preferring to schedule it on a node labeled env=test. Remove the label and verify the pod continues to run.

- Change environment
- `kubectl label node ip-172-31-15-92.us-west-1.compute.internal env=test`

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl label node ip-172-31-15-92.us-west-1.comput
e.internal env=test
[ec2-user@ip-172-31-4-234 ~]$ kubectl label node ip-172-31-15-92.us-west-1.comput
e.internal env=test
[ec2-user@ip-172-31-4-234 ~]$ node/ip-172-31-15-92.us-west-1.compute.internal labeled
[ec2-user@ip-172-31-4-234 ~]$
```

- Create a pod with soft node
- `vi soft-affinity-pod.yml`
- `apiVersion: v1`
- `kind: Pod`
- `metadata:`
- `name: soft-affinity-pod`
- `spec:`

- affinity:
- nodeAffinity:
- preferredDuringSchedulingIgnoredDuringExecution:
 - weight: 100
- preference:
- matchExpressions:
- - key: env
- operator: In
- values:
- - test
- containers:
 - name: nginx
- Deploy it
- Kubectl apply -f soft-affinity-pod.yml

```
e.internal env=test
node/ip-172-31-15-92.us-west-1.compute.internal labeled
[ec2-user@ip-172-31-4-234 ~]$ vi soft-affinity-pod.yml
[ec2-user@ip-172-31-4-234 ~]$ kubectl apply -f soft-affinity-pod.yml
pod/soft-affinity-pod created
[ec2-user@ip-172-31-4-234 ~]$ 
```

```
244.1.60 ip-172-31-15-92.us-west-1.compute.internal <none> <none>
soft-affinity-pod 1/1 Running 0 51s 10.
244.1.62 ip-172-31-15-92.us-west-1.compute.internal <none> <none>
[ec2-user@ip-172-31-4-234 ~]$ \
```

- i-00bbf6e27330e6872 (master) X
 - PublicIPs: 52.53.164.13 PrivateIPs: 172.31.4.234
- Now
- kubectl label node ip-172-31-15-92.us-west-1.compute.internal env-
- name removed even though

- it is running

```
244.1.60  ip-172-31-15-92.us-west-1.compute.internal  <none>      <none>
soft-affinity-pod           1/1     Running   0          117s   10.
244.1.62  ip-172-31-15-92.us-west-1.compute.internal  <none>      <none>
[ec2-user@ip-172-31-4-234 ~]$
```

- i-00bbf6e27330e6872 (master) X
- PublicIPs: 52.53.164.13 PrivateIPs: 172.31.4.234
 - Label removed X
 - Pod continues running ✓

5 . Implement Node Affinity with Hard Scheduling Create a pod with RequiredDuringSchedulingIgnoredDuringExecution node affinity, ensuring it will only be scheduled on a node labeled env=prod. Verify the pod cannot be scheduled if no node has the env=prod label.

- Pod **only** schedules on nodes with env=prod
- If **no node** has env=prod → Pod stays **Pending**
- **Kubectl get nodes**

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl get nodes --show-labels
NAME          STATUS    ROLES      AGE   VERSION
ip-172-31-1-236.us-west-1.compute.internal  Ready    <none>      11d   v1.29
.15  beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=linux,env=dev,kubernetes.io/arch=amd64,kubernetes.io/hostname=ip-172-31-1-236.us-west-1.compute.internal,kubernetes.io/os=linux,node-name=worker-01
ip-172-31-15-92.us-west-1.compute.internal  Ready    <none>      11d   v1.29
.15  beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=linux,kubernetes.io/arch=amd64,kubernetes.io/hostname=ip-172-31-15-92.us-west-1.compute.internal,kubernetes.io/os=linux,node-name=worker-02
ip-172-31-4-234.us-west-1.compute.internal  Ready    control-plane  11d   v1.29
.15  beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=linux,kubernetes.io/arch=amd64,kubernetes.io/hostname=ip-172-31-4-234.us-west-1.compute.internal,kubernetes.io/os=linux,node-role.kubernetes.io/control-plane=,node.kubernetes.io/exclude-from-external-load-balancers=
[ec2-user@ip-172-31-4-234 ~]$
```

- vi hard-affinity-pod.yml

- apiVersion: v1
- kind: Pod
- metadata:
- name: hard-affinity-pod
- spec:
- affinity:
- nodeAffinity:
- requiredDuringSchedulingIgnoredDuringExecution:
- nodeSelectorTerms:
- - matchExpressions:
- - key: env
- operator: In
- values:
- - prod
- containers:
- - name: nginx
- image: nginx
- Deploy it
- Kubectl apply -f hard-affinity-pod.yml

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl apply -f hard-affinity-pod.yml
pod/hard-affinity-pod created
[ec2-user@ip-172-31-4-234 ~]$ 
```

-
- Verify
- Kubectl get pods

exclude-backend-rs-qnczm	1/1	Running	2 (3h38m ago)	7d23h
firstpod	1/1	Running	0	31m
hard-affinity-pod	0/1	Pending	0	43s
myapp-deployment-74fbb89fbb-4lbs4	1/1	Running	2 (3h38m ago)	7d3h
myapp-deployment-74fbb89fbb-fhqf1	1/1	Running	2 (3h38m ago)	7d3h
myapp-deployment-74fbb89fbb-ftf5d	1/1	Running	2 (3h38m ago)	7d3h

- `kubectl describe pod hard-affinity-pod`

```
[ec2-user@ip-172-31-4-234 ~]$ kubectl describe pod hard-affinity-pod
Name:           hard-affinity-pod
Namespace:      default
Priority:      0
Service Account: default
Node:          <none>
Labels:         <none>
Annotations:   <none>
Status:        Pending
IP:             <none>
IPs:            <none>
Containers:
  nginx:
    Image:        nginx
    Port:         <none>
    Host Port:   <none>
    Environment: <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-b7sls (r
o)
```

-

6 . Taint a Node and Use NoExecute with Toleration

Seconds Taint a node with `special=true:NoExecute`. Create a pod with a `tolerationSeconds` field (e.g., 60 seconds) and observe it gets evicted after 60 seconds on the tainted node.

- `kubectl describe node ip-172-31-1-236.us-west-1.compute.internal | grep -i taint`

```
Last login: Tue Jan  6 10:11:11 2026 from 13.52.6.115
[ec2-user@ip-172-31-4-234 ~]$ kubectl describe node ip-172-31-1-236.us-west-1.com
pute.internal | grep -i taint
Taints:           special=true:NoExecute
[ec2-user@ip-172-31-4-234 ~]$ 
```

-

- `vi noexecute-pod.yml`
- `apiVersion: v1`
- `kind: Pod`
- `metadata:`
- `name: noexecute-pod`
- `spec:`

- tolerations:
 - - key: "special"
 - operator: "Equal"
 - value: "true"
 - effect: "NoExecute"
 - tolerationSeconds: 60
 - containers:
 - - name: nginx
 - image: nginx
 - Deploy it
 - kubectl apply -f noexecute-pod.yml
 - kubectl get pods -o wide
- ```
nginx-15-x95pf 1/1 Running 2 (5m59m ago) 7d23h 10.
244.1.50 ip-172-31-15-92.us-west-1.compute.internal <none> <none>
● noexecute-pod 1/1 Running 0 10s 10.
```
- kubectl get pods
- ```
nginx-15-x95pf      1/1    Running   2 (4h ago)    7d23h
nginx-rs-x95pf      1/1    Running   2 (4h ago)    7d23h
noexecute-pod        1/1    Running   0           65s
recreate-app-dc74df859-d9b2p  1/1    Running   2 (4h ago)    7d3h
● recreate-app-dc74df859-d9b2p  1/1    Running   0           2m
```
- kubectl describe pod noexecute-pod

```
special=true:NoExecute for 60s
Events:
Type    Reason     Age   From          Message
----  ----
Normal  Scheduled  2m3s  default-scheduler  Successfully assigned default/noexecute-pod to ip-172-31-15-92.us-west-1.compute.internal
Normal  Pulling    2m3s  kubelet        Pulling image "nginx"
Normal  Pulled    2m2s  kubelet        Successfully pulled image "nginx" in 571ms (571ms including waiting)
Normal  Created    2m2s  kubelet        Created container: nginx
Normal  Started    2m2s  kubelet        Started container nginx
[ec2-user@ip-172-31-4-234 ~]$
```

- i-00bbf6e27330e6872 (master)