K8s Interview Questions and Answers

1. Can you please explain the architecture of Kubernetes.

Ans: According to the Architecture of kubernetes, there are some components that exist on master and worker node as well. Such as **Kube Controller Manager, Kube API Server, Kube-Scheduler and ETCD on master node.** And there are three components on worker node which is **Container Engine, such as Docker, Kubelet** and **Kube Proxy.**

So If we want to give a brief about each of the component. The first one **Kube Controller.** It make sure that if your pod has some problem it has been failed due to some reason or if your node goes down. So to control those kind of things kube controller will be used.

1. **KubeAPI Server –** that exposes the Kubernetes API. So this is the API server where your worker nodes will be communicating with. So whenever you run.
   Kubectl get nodes
   Kubectl get pods

   All of those commands first reach the KubeAPI server. So this is like a gateway or the entrypoint for the entire kubernetes cluster.

2. **ETCD –** It is a key value pair which is used to store cluster related information. **Such as What nodes exist in the cluster, what pods should be running, which nodes they are running on.**

   So whenever you create something with **kubectl create / kubectl run** will create an entry in the **ETCD**.

3. **Kube Scheduler –** That watches newly created pods that have no node assigned, and it selects nodes for them to run.

ON Worker Node

1. **Kubelet –** It is like an agent that runs on each node in the cluster. It makes sure that containers are running in a pod.
2. **Kube Proxy –** It is basically to have communication like, for example if you have multiple machines and you will have some networking solutions installed right such as **Calico or Flannel**. So to have proper communications between pods **kube-proxy** is responsible.
3. **Container Engine –** Which is responsible for running containers.
   Such as **Docker.**

What is Ingress?

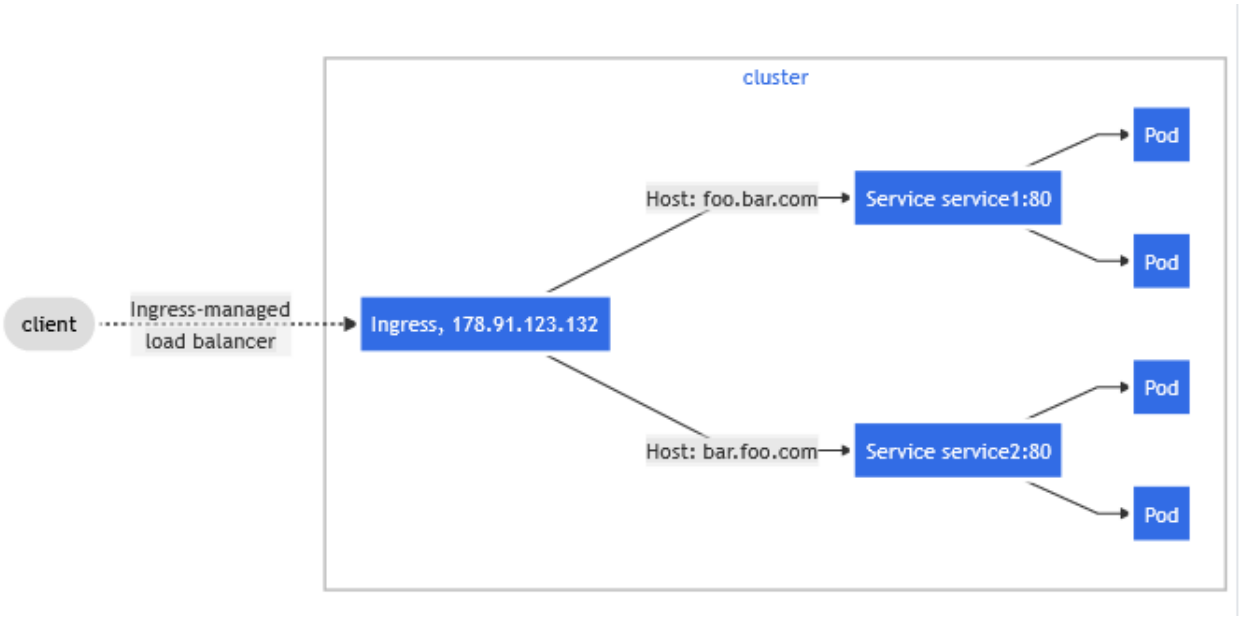
Ans:

Ingress is a resource of kubernetes, it allows us to access the multiple services from over the internet using single load balancer.

Let's say if you deployed 10 services and you are going to exposed 10 services as LoadBalancer so what will happen it will create 10 load balancer in cloud environment so it would be very costly, but if you have deployed ingress controller on kubernetes, so you can create ingress resource and access multiple services using single load balancer.

Ingress can provide features like **Load Balancing, SSL Termination, Namebased virtual hosting,**

1. **Name based virtual hosting –** it is used to access multiple services or websites at the same IP Address.



You must have an ingress controller to satisfy an Ingress. Only creating an Ingress resource has no effect.

The following Ingress tells the backing load balancer to route requests based on the Host header.

```yaml
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: name-virtual-host-ingress
spec:
  rules:
  - host: foo.bar.com
    http:
      paths:
      - pathType: Prefix
        path: "/"
        backend:
          service:
            name: service1
            port:
              number: 80
  - host: bar.foo.com
    http:
      paths:
      - pathType: Prefix
        path: "/"
        backend:
          service:
            name: service2
            port:
              number: 80
```

For example: If you specify the **website01.example.com**, so the request should forwarded to **service1**.

And if you specify the **website02.example.com** then request should be forwarded to **service2**.

2. **SSL Termination –** you can secure your ingress controller by implementing **SSL termination** from **HTTP to HTTPs.** If you want to implement it on ingress resource then you need to first create the **secret** with **TLS keys**. And that secret you will specify in **ingress resource**, where you will write the parameters like **tls, hosts, host header name** for example **: https://website01.example.com**
   And **secret name** that you have created using **TLS certificate**.

```yaml
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: tls-example-ingress
spec:
  tls:
  - hosts:
      - https-example.foo.com
    secretName: testsecret-tls
  rules:
  - host: https-example.foo.com
    http:
      paths:
      - path: /
        pathType: Prefix
        backend:
          service:
            name: service1
            port:
              number: 80
```

3. **Explain kubeconfig file of Kubernetes?**

Ans: In the kubeconfig file there are three primary fields.

1. **Cluster field –** In the Cluster Field has details related to the URL of your Kubernetes Cluster and it's associated information. In the first section of the cluster has information of your kubernetes master and name of the cluster. There can be two fields also. **Certificate-authority-data, OR insecure-skip-tls-verify:true** which means the **TLS certificate** for this cluster will not be verify.

2. **Context Field – Context basically groups all the information together**
3. **Users Field –** User field contains authentication specific information like **username, passwords.**
   There can be different type of authentication mechanism such as username, password, certificates and tokens.
   So in order for your kubectl to connect to your cluster it will need to authenticate to it. So your kubectl takes the information associated with the cluster. Takes the information related to the authentication. And then authenticates with one of the cluster.

What is the difference between Readyness probe and Liveness probe.

Readyness Probe – is used to determine whether pod is ready to accept the traffic or not

Liveness probe checks the status of the container (whether it is running or not). If the liveness probe **fails**, then automatically container move on with its **restart** policy.

```yaml
apiVersion: v1
kind: Pod
metadata:
  labels:
    test: liveness
  name: liveness-http
spec:
  containers:
  - name: liveness
    image: k8s.gcr.io/liveness
    args:
    - /server
    livenessProbe:
      httpGet:
        path: /healthz
        port: 8080
        httpHeaders:
        - name: Custom-Header
          value: Awesome
      initialDelaySeconds: 3
      periodSeconds: 3
```

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: goproxy
  labels:
    app: goproxy
spec:
  containers:
  - name: goproxy
    image: k8s.gcr.io/goproxy:0.1
    ports:
    - containerPort: 8080
    readinessProbe:
      tcpSocket:
        port: 8080
      initialDelaySeconds: 5
      periodSeconds: 10
    livenessProbe:
      tcpSocket:
        port: 8080
      initialDelaySeconds: 15
      periodSeconds: 20
```

What is the difference between Deployments and StatefulSets.

Statefulsets is used for Stateful applications such as databases MongoDB, MySQL, each replica of the pod will be using its own Volume, If you are deleting the statefulsets it will not delete the volumes associated with the Statefulsets. Basically it is used when an application need a stable pod hostname (instead of podname-randomstring).

For Example: podname-0, podname-1, podname-2. (And when a pod gets rescheduled it will keep that identity).

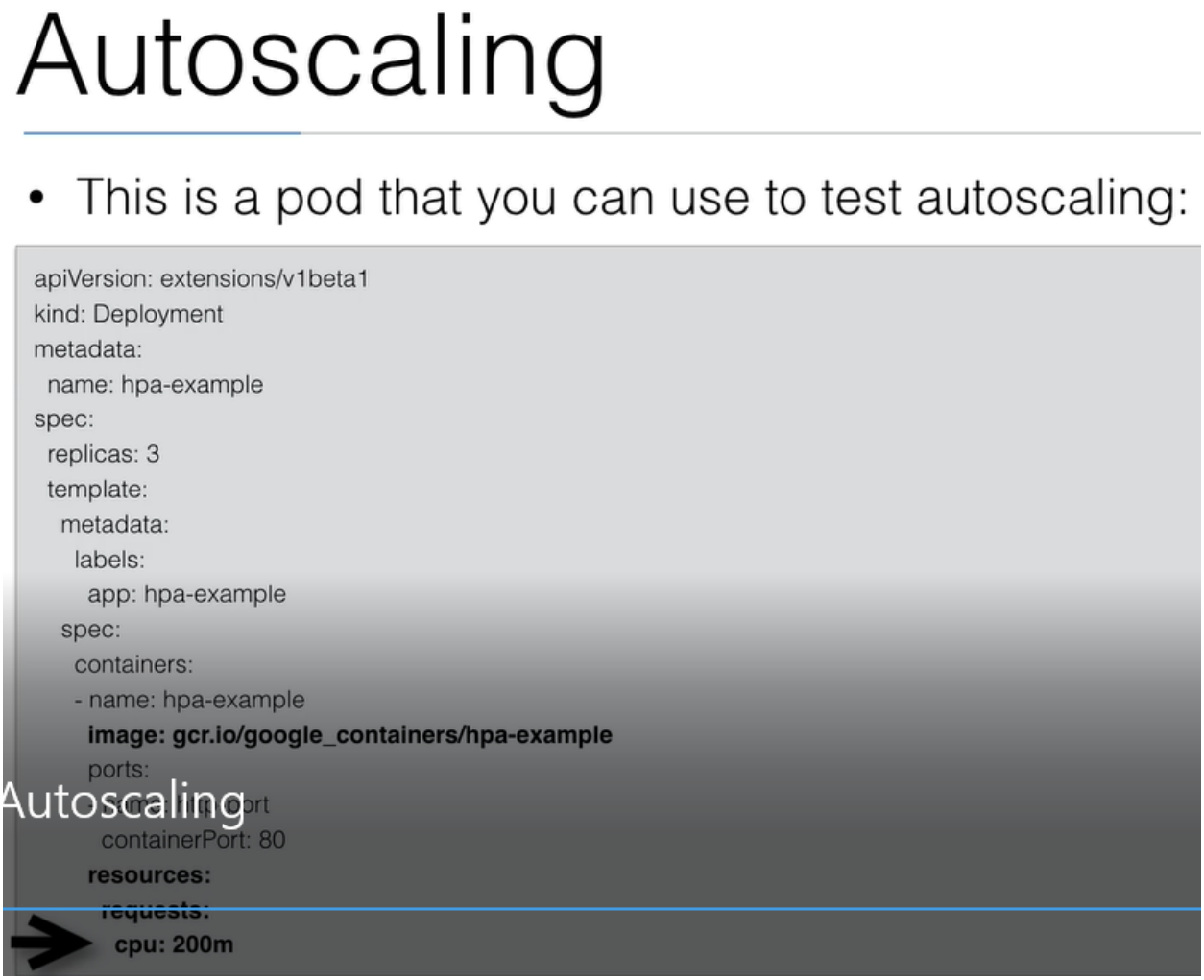
Deployment is a resource to deploy a stateless application like frontend, backend, if using a PVC, all replicas will be using the same Volume.

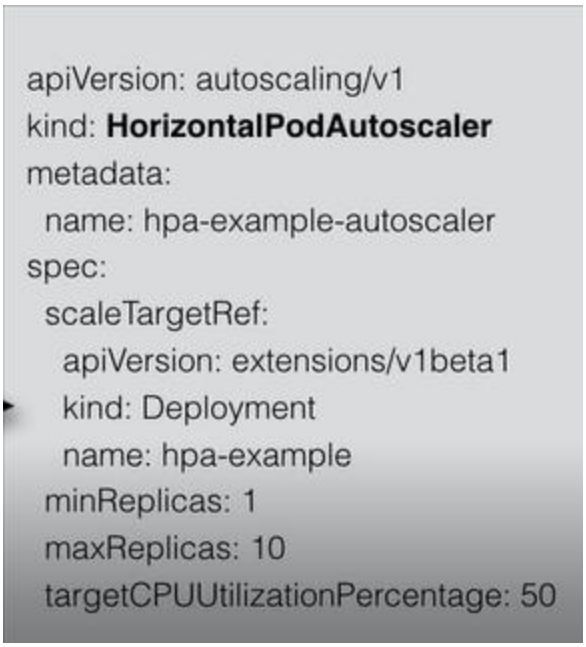
What is Daemon Sets?

DaemonSet is a controller similar to ReplicaSet that ensures that the pod runs on all the nodes of the cluster. If a node is added/removed from a cluster, DaemonSet automatically adds/deletes the pod.

What is Autoscaling?

The Horizontal Pod Autoscaler automatically scales the number of Pods in replica set or based on observed CPU utilization.





Explain EndPoints?

Endpoint tracks the IP Address of the pod, so that service can send traffic to the pod. When we create the service the endpoints will also be created automatically. When a service selector matches a pod label, that IP Address is added to your endpoints.

```yaml
apiVersion: v1
kind: Endpoints
metadata:
  name: my-service
subsets:
  - addresses:
      - ip: 192.0.2.42
    ports:
      - port: 9376
```

What is the difference between ConfigMaps and Secrets.

Confimaps is used to store application configuration like environment variables, configuration files. We can mount configmaps as volume.

Below is the command to create configmap from literal.

```
C:\Users\Zeal Vora\Desktop\k8s\Storage>kubectl create configmap dev-config --from-literal=app.mem=2048m
configmap/dev-config created

C:\Users\Zeal Vora\Desktop\k8s\Storage>
```

Create a file as per below and create configmap of this files.

File name: dev.properties

app.env=dev

app.mem=2048m

app.properties=dev.env.url

```
C:\Users\Zeal Vora\Desktop\k8s\Storage>kubectl create configmap dev-properties --from-file=dev.properties
configmap/dev-properties created

C:\Users\Zeal Vora\Desktop\k8s\Storage>
```

How to mount configmaps as volume.

```
C:\Users\Zeal Vora\Desktop\k8s\Storage>kubectl apply -f pod-configmap.yaml
pod/configmap-pod created

C:\Users\Zeal Vora\Desktop\k8s\Storage>kubectl get pods
NAME            READY   STATUS    RESTARTS   AGE
configmap-pod   1/1     Running   0          17s

C:\Users\Zeal Vora\Desktop\k8s\Storage>kubectl exec -it configmap-pod bash
root@configmap-pod:/# cd /etc/config
root@configmap-pod:/etc/config# ls
dev.properties
root@configmap-pod:/etc/config# cat dev.properties
app.env=dev
app.mem=2048m
app.properties=dev.env.url
root@configmap-pod:/etc/config#
```

What is Secrets?

Secret is used to store sensitive information in an encrypted format. like password, token, keys.

What are the types of secrets we can create?

1. Generic
   !) File (--from-file)
   !!) Directory
   !!!) Literal Value
2. Docker Registry
3. TLS

Create generic secrets.

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl get secret
NAME                  TYPE                                  DATA   AGE
default-token-nlmkm   kubernetes.io/service-account-token   3      14d

C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl create secret generic firstsecret --from-literal=dbpass=mypassword123
secret/firstsecret created

C:\Users\Zeal Vora\Desktop\k8s\Security>
```

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl get secret
NAME                  TYPE                                  DATA   AGE
default-token-nlmkm   kubernetes.io/service-account-token   3      14d
firstsecret           Opaque                                1      11s

C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl describe secret firstsecret
Name:         firstsecret
Namespace:    default
Labels:       <none>
Annotations:  <none>

Type:  Opaque

Data
====
dbpass:  13 bytes

C:\Users\Zeal Vora\Desktop\k8s\Security>
```

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl get secret firstsecret -o yaml
apiVersion: v1
data:
  dbpass: bXlwYXNzd29yZDEyMw==
kind: Secret
metadata:
  creationTimestamp: "2019-09-04T18:55:18Z"
  name: firstsecret
  namespace: default
  resourceVersion: "1835505"
  selfLink: /api/v1/namespaces/default/secrets/firstsecret
  uid: f107584d-9a68-4478-8667-733030bdc7d3
type: Opaque

C:\Users\Zeal Vora\Desktop\k8s\Security>
```

Create secrets from file.

Create a file credentials.txt and write the db password into this file.

echo “dbpassword” > credentials.txt

Now create secrets from this file.

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl create secret generic secondsecret --from-file=./credentials.txt
secret/secondsecret created

C:\Users\Zeal Vora\Desktop\k8s\Security>
```

Create a secret using yaml file.

secret-data.yaml

```yaml
apiVersion: v1
kind: Secret
metadata:
  name: thirdsecret
type: Opaque
data:
  username: ZGJhZG1pbg==
  password: bXlwYXNzd29yZDEyMw==
```

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl apply -f secret-data.yaml
secret/thirdsecret created

C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl get secret
NAME                  TYPE                                  DATA   AGE
default-token-nlmkm   kubernetes.io/service-account-token   3      14d
firstsecret           Opaque                                1      7m42s
secondsecret          Opaque                                1      3m
thirdsecret           Opaque                                2      9s

C:\Users\Zeal Vora\Desktop\k8s\Security>
```

Create secrets using string data, if you create secrets using stringdata the value of username and password will be encoded automatically you don't need to encode it and put in yaml.

secret-data.yaml | secret-stringdata.yaml

```yaml
apiVersion: v1
kind: Secret
metadata:
  name: stringdata
type: Opaque
stringData:
 config.yaml: |-
   username: dbadmin
   password: mypassword
```

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl apply -f secret-stringdata.yaml
secret/stringdata created

C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl get secret
NAME                  TYPE                                  DATA   AGE
default-token-nlmkm   kubernetes.io/service-account-token   3      14d
firstsecret           Opaque                                1      9m28s
secondsecret          Opaque                                1      4m46s
stringdata            Opaque                                1      10s
thirdsecret           Opaque                                2      115s

C:\Users\Zeal Vora\Desktop\k8s\Security>
```

What is Taint and Tolerations?

Taints are used to repel the pods from a specific node. If you applied taints on a node you cannot schedule pods on that node unless it has a matching toleration.

kubectl taint nodes node1 mysize=large:NoSchedule → to apply the taints.

kubectl taint nodes node1 mysize=large:NoSchedule- → to remove the taints.

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: pod5
spec:
  containers:
    - image: coolgourav147/nginx-custom
      name: firstcontainer
      imagePullPolicy: Never
  tolerations:
    - effect: "NoSchedule"
      key: "mysize"
      operator: "Equal"
      value: "large"


# kubectl taint node worker01 mysize=large:NoSchedule
```

```
gaurav@manager:~$ kubectl apply -f pod.yml
pod/pod5 created
gaurav@manager:~$ kubectl  get pods -o wide
NAME   READY   STATUS    RESTARTS   AGE     IP             NODE       NOMINATED NODE   READINESS GATES
pod1   1/1     Running   0          7m48s   10.244.2.14    worker02   <none>           <none>
pod2   1/1     Running   0          6m52s   10.244.2.15    worker02   <none>           <none>
pod3   1/1     Running   0          6m42s   10.244.2.16    worker02   <none>           <none>
pod4   1/1     Running   0          6m33s   10.244.2.17    worker02   <none>           <none>
pod5   1/1     Running   0          8s      10.244.1.13    worker01   <none>           <none>
gaurav@manager:~$
```

You can see here pod5 has been deployed on worker01, because it has matching tolerations.

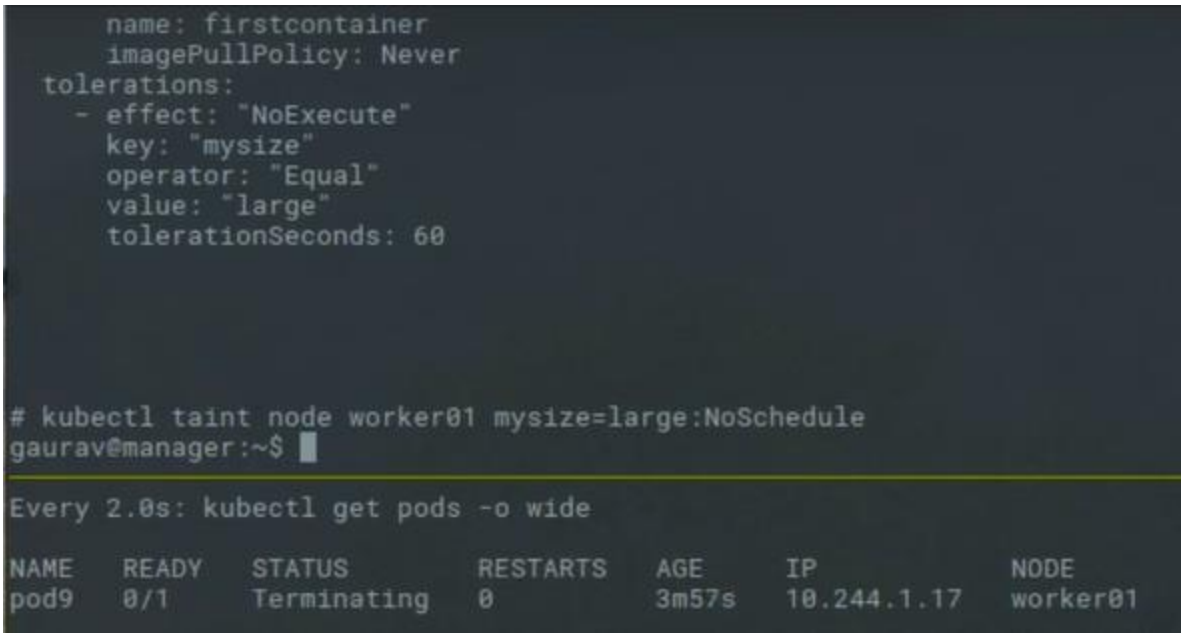
What is NoExecute in Taint and Tolerations?

When you apply the taint **NoExecute,** on node, pods those are already running on that node will be terminated. And you can not schedule pods on that node.

kubectl taint nodes worker02 mysize=small:NoExecute → to apply the taints.

```
gaurav@manager:~$ kubectl  taint node worker02 mysize=small:NoExecute
node/worker02 tainted
gaurav@manager:~$ kubectl  get pods -o wide
NAME   READY   STATUS        RESTARTS   AGE   IP             NODE       NOMINATED NODE   READINESS GATES
pod1   0/1     Terminating   0          27m   <none>         worker02   <none>           <none>
pod2   0/1     Terminating   0          26m   10.244.2.15    worker02   <none>           <none>
pod4   0/1     Terminating   0          26m   10.244.2.17    worker02   <none>           <none>
pod5   1/1     Running       0          20m   10.244.1.13    worker01   <none>           <none>
```

When you apply the below configurations, pod will tolerate the node till 60 seconds only, after 60 seconds it will be in terminated.



Which are the deployment strategies available in Kubernetes?

1) Recreate

2) Rolling Update

3) Blue/Green

4) Canary

Recreate: In the Recreate Strategy, if you are deploying version2 application, it will delete version1 pods first, then it will create pods of version2.

RollingUpdate: Rolling update is used when you want to deploy your new version without having downtime to your application.

For example: When we deploy new instance of the applications, a new pod will be created and the existing pod will be destroyed, after the new pod up and running and this happens for every **ReplicaSet**.

maxUnavailable: 0 (How many pods you want to unavailable of the version1 while deploying version2.

What is Role?

Role is used to grant access to resources within a single namespace.

What is Role Binding?

And role binding is used to grant the permissions defined in a role to a user or set of users.

Practicle:

```
bash-4.2# kubectl --context=zeal-context get pods
NAME                     READY   STATUS    RESTARTS   AGE
nginx-7bb7cd8db5-5lnf7   1/1     Running   0          20h
nginx2                   1/1     Running   0          3h25m
bash-4.2# kubectl --context=zeal-context get pods --namespace teama
Error from server (Forbidden): pods is forbidden: User "zeal" cannot list resource "pods" in API group "" in the names
pace "teama"
bash-4.2#
```

We can see in above screenshot that user zeal not able to get the pods in teama namespace.

So let's create the role that will grant access to user zeal to create pods in teama namespace.

```yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  namespace: teama
  name: pod-reader
rules:
- apiGroups: [""]
  resources: ["pods"]
  verbs: ["get", "watch", "list", "create"]
```

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl apply -f teama-role.yaml
role.rbac.authorization.k8s.io/pod-reader created

C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl get role --namespace teama
NAME         AGE
pod-reader   12s

C:\Users\Zeal Vora\Desktop\k8s\Security>
```

```yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: read-pods
  namespace: teama
subjects:
- kind: User
  name: zeal
  apiGroup: rbac.authorization.k8s.io
roleRef:
  kind: Role
  name: pod-reader
  apiGroup: rbac.authorization.k8s.io
```

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl apply -f teama-rolebinding.yaml
rolebinding.rbac.authorization.k8s.io/read-pods created

C:\Users\Zeal Vora\Desktop\k8s\Security>
```

Now try to access the pods using zeal user.

```
bash-4.2# kubectl --context=zeal-context get pods --namespace teama
NAME                     READY   STATUS    RESTARTS   AGE
nginx-7bb7cd8db5-fgkjc   1/1     Running   0          148m
bash-4.2#
```

Cluster Role and Cluster Role Binding

What is Cluster Role?

Cluster Role and ClusterRoleBinding is used to grant permssions at the cluster level resources like pods, secrets, service, and in all the namespaces.

Practicle:

Try to access pods at cluster level using zeal user you will get forbidden.

```
bash-4.2# kubectl --context=zeal-context get pods

Error from server (Forbidden): pods is forbidden: User "zeal" cannot list resource "pods" in API group "" in the names
pace "default"
bash-4.2#
```

Now create clusterrole and clusterrolebinding to access pods in all the namespaces of cluster.

 # vim clusterrole.yaml

```yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  # "namespace" omitted since ClusterRoles are not namespaced
  name: cluster-pod-reader
rules:
- apiGroups: [""]
  resources: ["pods"]
  verbs: ["get", "watch", "list"]
```

 # kubectl apply –f clusterrole.yaml

 # vim clusterrolebinding.yaml

```yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: read-secrets-global
subjects:
- kind: User
  name: zeal
  apiGroup: rbac.authorization.k8s.io
roleRef:
  kind: ClusterRole
  name: cluster-pod-reader
  apiGroup: rbac.authorization.k8s.io
```

 # kubectl apply –f clusterrolebinding.yaml

Now try to access pods in all the namespace.

```
bash-4.2# kubectl --context=zeal-context get pods
NAME                     READY   STATUS    RESTARTS   AGE
nginx-7bb7cd8db5-5lnf7   1/1     Running   0          20h
nginx2                   1/1     Running   0          3h48m
bash-4.2# kubectl --context=zeal-context get pods --namespace teama
NAME                     READY   STATUS    RESTARTS   AGE
nginx-7bb7cd8db5-fgkjc   1/1     Running   0          167m
```

You can see above zeal user can access the pods in all the namespaces.

What is Resource Quota?

There are two types of Resource Quota.

1. Compute Resources
2. Object Count

Compute Resources quota is used to set limit of CPU and memory on a namespace level.

Object Count is used to set limit of objects to be deploy within a namespace.

Practicle:

```
kubectl create namespace myspace
```

```
cat <<EOF > compute-resources.yaml
apiVersion: v1
kind: ResourceQuota
metadata:
  name: compute-resources
spec:
  hard:
    requests.cpu: "1"
    requests.memory: 1Gi
    limits.cpu: "2"
    limits.memory: 2Gi
    requests.nvidia.com/gpu: 4
EOF
```

```
kubectl create -f ./compute-resources.yaml --namespace=myspace
```

```
cat <<EOF > object-counts.yaml
apiVersion: v1
kind: ResourceQuota
metadata:
  name: object-counts
spec:
  hard:
    configmaps: "10"
    persistentvolumeclaims: "4"
    pods: "4"
    replicationcontrollers: "20"
    secrets: "10"
    services: "10"
    services.loadbalancers: "2"
EOF
```

```
kubectl create -f ./object-counts.yaml --namespace=myspace
```

```
kubectl get quota --namespace=myspace
```

```
NAME                   AGE
compute-resources      30s
object-counts          32s
```

```
kubectl describe quota compute-resources --namespace=myspace
```

```
Name:                   compute-resources
Namespace:              myspace
Resource                Used  Hard
--------                ----  ----
limits.cpu              0     2
limits.memory           0     2Gi
requests.cpu            0     1
requests.memory         0     1Gi
requests.nvidia.com/gpu 0     4
```

```
kubectl describe quota object-counts --namespace=myspace
```

```
Name:                   object-counts
Namespace:              myspace
Resource                Used    Hard
--------                ----    ----
configmaps              0       10
persistentvolumeclaims  0       4
pods                    0       4
replicationcontrollers  0       20
secrets                 1       10
services                0       10
services.loadbalancers  0       2
```

What is Resource Limit?

Resource Limit is used to set cpu and memory limit to pods. When we create a pod by default it uses the whole cpu and memory, so to apply limit on pod we can use resource limit.

Practicle:

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: quota-mem-cpu-demo
spec:
  containers:
  - name: quota-mem-cpu-demo-ctr
    image: nginx
    resources:
      limits:
        memory: "800Mi"
        cpu: "800m"
      requests:
        memory: "600Mi"
        cpu: "400m"
```

What is the difference between PV and PVC.

PersistentVolume (PV) is a piece of storage and it is also a cluster resource that has been provisioned by an administrator or dynamically provisioned using storage class.

PersistentVolumeClaim (PVC) is a request for storage by a user for the application to use 10GB.

In real life scenario, PV is whole cake and PVC is piece of cake (But you can have a whole cake if there are no other people to eat (just like if there are no other application to use you can use whole PV)).

```yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: block-pv
spec:
  capacity:
    storage: 10Gi
  accessModes:
    - ReadWriteOnce
  volumeMode: Block
  persistentVolumeReclaimPolicy: Retain
  fc:
    targetWWNs: ["50060e801049cfd1"]
    lun: 0
    readOnly: false
```

```yaml
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: block-pvc
spec:
  accessModes:
    - ReadWriteOnce
  volumeMode: Block
  resources:
    requests:
      storage: 10Gi
```

What are the different types of Volumes?

EBS

OpenEBS

NFS

GlusterFS

Cinder

What is Storage Class?

Storageclass is a Kubernetes object that stores information about creating a persistent volume for your pod. With a storageclass, we don't need to create a persistent volume separately before claiming it.

Below are the storage classes available.

AWS EBS

Azure Disk

OpenStack Cinder

GCE PD

NFS

OpenEBS

Local

What is Security Context?

When you run a container, it runs with the UID 0, means root user, In-case of container breakouts, attacker can get root privileges to your entire system. So to avoid this we can use security context which allows us to run container as non-root user.

pod-securitycontext.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: pod-context
spec:
  securityContext:
      runAsUser: 1000
      runAsGroup: 3000
  containers:
  - name: sec-ctx-demo
    image: busybox
    command: [ "sh", "-c", "sleep 1h" ]
```

```
C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl apply -f pod-securitycontext.yaml
pod/pod-context created

C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl get pods
NAME                       READY   STATUS    RESTARTS   AGE
busybox-5d847dfc85-87lcg   1/1     Running   1          2m45s
pod-context                1/1     Running   0          9s

C:\Users\Zeal Vora\Desktop\k8s\Security>kubectl exec -it pod-context sh
/ $ ps
PID   USER     TIME  COMMAND
    1 1000      0:00 sleep 1h
    6 1000      0:00 sh
   11 1000      0:00 ps
/ $ cd /tmp
/tmp $ touch test.txt
/tmp $ ls -l
total 0
-rw-r--r--    1 1000     3000             0 Oct 19 08:32 test.txt
/tmp $
```

KUBERNETES TROUBLESHOOTING

1. OOMKilled

If you run ***kubectl get pods*** and see that some pods are being restarted, the next thing to do is to check the reason. You can do this by using the following command:

kubectl describe pod myPodName -n myNamespace

You may see a message that looks something like this:

```
State:          Running
 Started:       Sun, 16 Feb 2020 10:20:09 +0000
Last State:     Terminated
 Reason:        OOMKilled
 Exit Code:     137
 Started:       Sun, 16 Feb 2019 09:27:39 +0000
 Finished:      Sun, 16 Feb 2019 10:20:08 +0000
Restart Count:  7
```

When a pod reaches its memory limit it restarts. You can see the restart count when you run the *describe* command. The obvious solution is to increase the memory setting. This can be done by running *kubectl edit deployment myDeployment -n mynamespace* and **editing the memory limit**.

2. Sudden Jumps in Load / Scale

If the application traffic is suddenly increases. You can scale your replicas by executing a command.

kubectl scale deployment myDeployment –replicas=5

If you use an autoscaler (e.g. Horizontal Pod Autoscaler) then this process can be automated.

3. Rollbacks

If you deployed a version 2 on cluster, and there is issue with version2 and you want to rollback to previous version that time you can rollback your deployment.

You can check the history of deployment by executing.

kubectl rollout history deployment myDeployment

The output will look similar to this:

```
kubectl rollout history deployment myDeployment
deployment.extensions/myDeployment
REVISION  CHANGE-CAUSE
1         <none>
2         <none>
3         <none>
4         <none>
```

The most recent deployment has the highest number. You can do rollback using a command like this:

kubectl rollout undo deployment myDeployment –to-revision=3

4. Logs

You can check the logs of pod.

CrashloopBackoff

When the problem is CrashLoopBackOff (your pod is starting, crashing, starting again, and then crashing again)

There can be many reasons for this error.

1. Your **Dockerfile** doesn't have a **Command** (CMD), so your pod will immediately exit after starting.
2. You have used the same port for two containers inside the same pod. All containers inside the same pod have the same ip address; they are not permitted to use the same ports. You need a separate port for every container within your pod.
3. Kubernetes **can't pull the image** you have specified, and therefore keeps crashing.
4. Run ***kubectl logs podName*** to get more information about what caused the error.

Issues

I have deployed Jenkins on cluster, container was trying to create a file in /var/Jenkins_home/ copy_reference_file.log. And it is getting permission denied.

[mohammed@db-test-k8master ~]$ kubectl logs -f jenkins-5cdc87888f-988ws -n corestack-test

touch: cannot touch '/var/jenkins_home/copy_reference_file.log': Permission denied

Can not write to /var/jenkins_home/copy_reference_file.log. Wrong volume permissions?

[mohammed@db-test-k8master ~]$

I am getting this issue because of Jenkins is running as Jenkins user when I change the user from Jenkins to root in deployment file issues has been fixed. I added the below parameters in deployment file.

```
securityContext:
  runAsUser: 0
  runAsGroup: 0
  fsGroup: 0
```

Worker Node Failure Reason.

OutOfDisk -> You can check the Disk size if it full please increase.

MemoryPressure -> You can check the memory if it is full.

DiskPressure -> You can check the disk space

PIDPressure

You can check the kubelet service by executing.

Journalctl –u kubelet

Also you can check the certitficates of worker node if it is expired by executing below command.

Openssl x509 –in /var/lib/kubelet/worker-1.crt -text