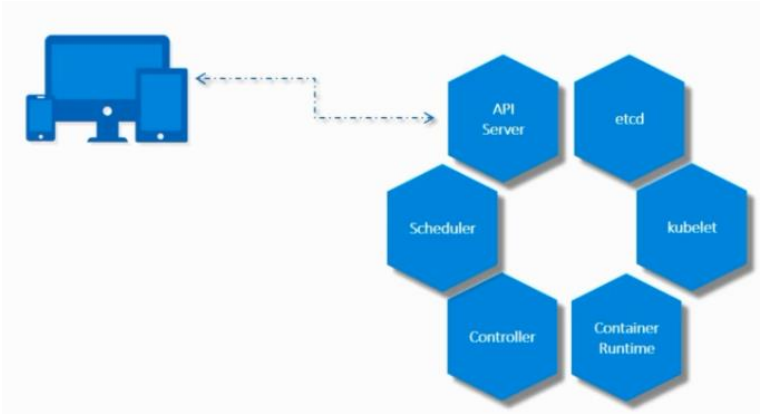
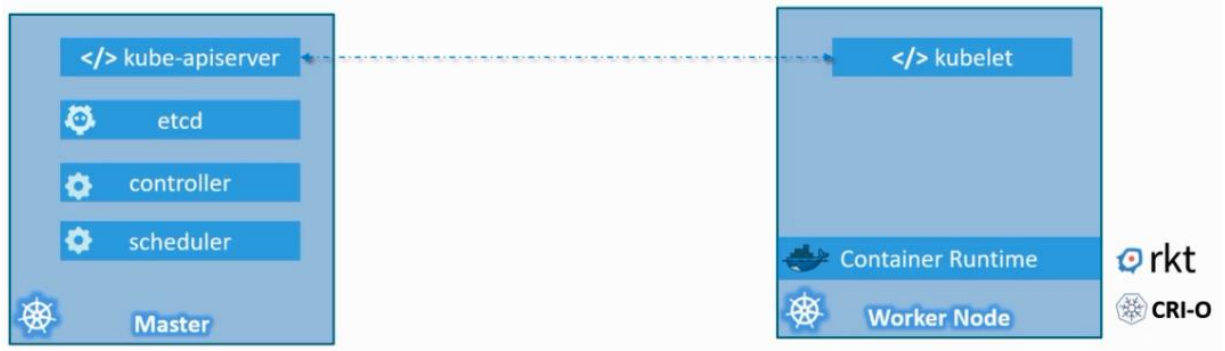
Core Concepts - 13%

1. Architecture





kubectl get nodes

kubectl cluster-info

2. Pod:

kubectl run --generator=run-pod/v1 nginx-pod --image=nginx

kubectl run --generator=run-pod/v1 nginx --image=nginx --port=8080 -l tier=db --env="DNS_DOMAIN=cluster" --dry-run -o yaml

kubectl run hazelcast --image=nginx --env="DNS_DOMAIN=cluster" --env="POD_NAMESPACE=default"

kubectl run hazelcast --image=nginx -l app=name,wf=ov

kubectl run --generator=run-pod/v1 nginx --image=nginx --port=8080 --command echo hi

kubectl create -f *.yaml

kubectl edit pod pod-name - edit already running pod // Need to verify

kubectl apply -f *.yaml

kubectl get pod <podname> -o wide

kubectl delete pod <podname>

kubectl describe pod <podname>

kubectl get pod podname –o yaml –export

kubectl set image pod/nginx nginx=nginx:1.7.1

kubectl exec podname -it bash **or** kubectl exec podname –it -- /bin/sh # get inside the pod

kubectl exec –it nginx – env # to display env variables

Pod deleted automatically when its completed ** use –restart=Never

3. ReplicationController/ ReplicaSet

kubectl run replicontrolr --generator=run/v1 --image=redis --replicas=2 --dry-run -o yaml // replicationcontroller

To generate file for replicaset -> generate deployment file and edit the file

kubectl create –f *.yaml

kubectl get replicationcontroller

kubectl get replicasets

kubectl delete replicaset <rp-name>

kubectl describe replicaset

kubectl edit replicaset replicaset-name - edit already running replicaset

4. Scale

---

1. update replicas number in the file

   kubectl replace -f file.yaml

2. kubectl scale --replicas=6 -f file.yaml

   or

   kubectl scale --replicas=6 replicaset replicaset-name

   kubectl scale –replicas=3 –f filename.yaml

   kubectl scale –current-replicas=1 –replicas=3 deployment/mydeploy

   kubectl scale –replicas=3 rc/rc1 rc/rc2 rc/rc3 # Multiple replication controller update

   <<this option wont update the replicas in the file>>

kubectl edit rs rs-name

5. Deployment

kubectl create -f *.yaml --record

kubectl run nginxx --image nginx

kubectl delete deployment dep-name

kubectl run --generator=deployment/v1beta1 nginx --image=nginx

Or

kubectl create deployment --image=nginx nginx

kubectl run --generator=deployment/v1beta1 nginx --image=nginx --dry-run -o yaml

Or

kubectl create deployment --image=nginx nginx --dry-run -o yaml

kubectl run --generator=deployment/v1beta1 nginx --image=nginx --dry-run --replicas=4 -o yaml

kubectl create deployment does not have a --replicas option. You could first create it and then scale it using the kubectl scale command.

kubectl run --generator=deployment/v1beta1 nginx --image=nginx --dry-run --replicas=4 -o yaml > nginx-deployment.yaml

Service:

kubectl create service clusterip ngservice --tcp=80:80 --dry-run -o yaml | after creating change the selector to required pod

kubectl create service nodeport nginx --tcp=80:8000 --node-port=30080 --dry-run -o yaml

kubectl expose deployment nginx --type=NodePort --port=80 --target-port=8000 --name=nginx-serv --dry-run -o yaml

kubectl expose deployment nginx –port=80 –target-port=8000

// need to check with docs

namespace:

kubectl get all --all-namespaces

kubectl exec -it app cat /log/app.log --namespace=elastic-stack

kubectl create namespace mynamespace

kubectl run nginx –image=nginx –n mynamespace

ResourceQuota: kubectl create quota myrq –hard=cpu=1,memory=1G,pods=2 –dry-run –o yaml

Multipod container: 10%

1. Many containers running in a single pod.
   Create a pod with 2 container and run commands in the second container
   kubectl exec –it pod-name -c container-name-2 -- /bin/sh

   It shares same network,volumes .
   Ex: App+Log agent
   Patterns : Side car , Adapter, ambassador

   Side car:

Before sending log to the central server, we like to convert to the common format. Fot this we use **adaptor** pattern

Ambassador pattern:

We have multiple kind of DB depends on the dev,test,prod environment.

we have container that proxy the apropriate DB

Though we have 3 patterns, implementing them is always the same.

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp
  labels:
    name: simple-webapp
spec:
  containers:
  - name: simple-webapp
    image: simple-webapp
    ports:
      - containerPort: 8080

  - name: log-agent
    image: log-agent
```

POD DESIGN – 20%

Labels and Slector

When we have multiple pods, inorder to classify , separate -> Labels are used

Kubectl get pods –selector app=App1

Kubectl get all –selector app=app1,tier=db

Kubectl get pod –show-labels // to display all labels

Kubectl get pod –L app

// capital L for only specifying Key .

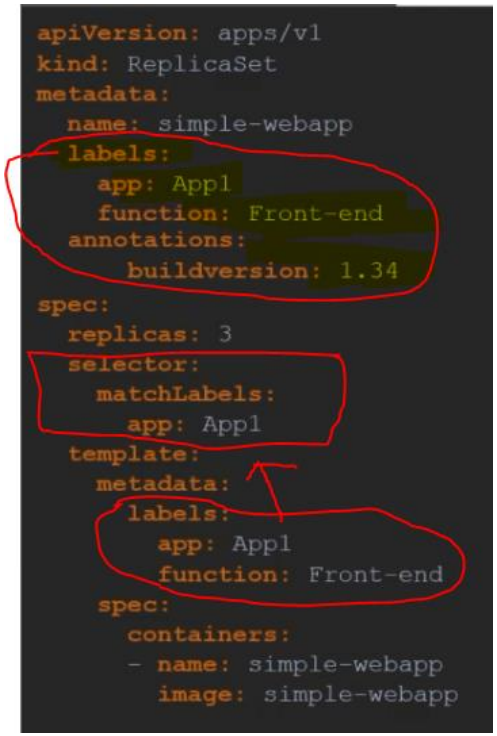
Kubectl get pod –l app=ov // small l for specify with key and value

```
kubectl label po nginx1 nginx2 nginx3 app-  // to remove app label from the pods
kubectl label po nginx2 app=v2 –overwrite  // Change the app label
kubectl annotate po nginx1 nginx2 nginx3 description='my description'
kubectl annotate po nginx1 nginx2 nginx3 description-
```

kubectl autoscale deploy nginx --min=5 --max=10 --cpu-percent=80 --dry-run -o yaml

Annotations:

Annotations under metadata is to mention build number, contact details, build version etc



Rolling Updates & Rollbacks in deployments

Rollout

Kubectl rollout status deployment/my-app-deployment

Kubectl rollout history deployment/my-app-deployment

When first creating deployment , following steps happen

1. New rollout

2. New revision

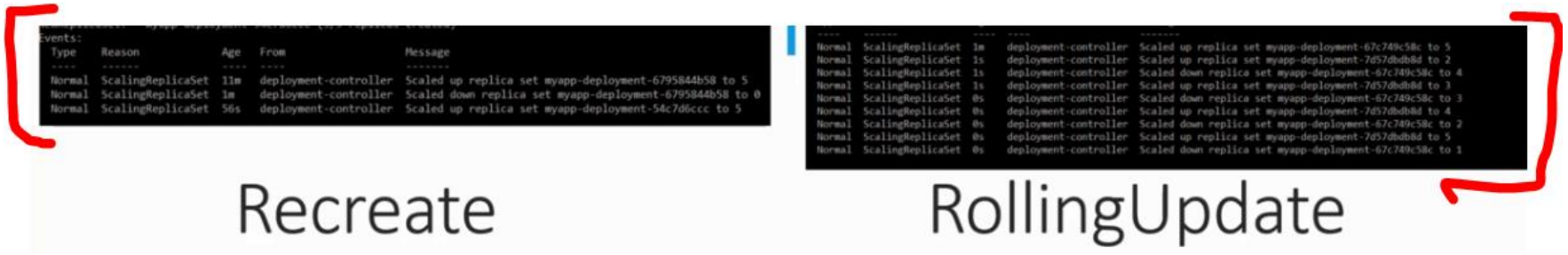
Update – change any config in the file and apply it

After changing deplymnt file , >>> kubectl apply –f deploy-file

Kubectl set image deployment/mydeploy nginx=nginx:1.9.1

Strategy -> Recreate and Rolling update / can be viewd from the below command

Kubectl describe deployment mydeploy



Rollback

To undo the change run :

kubectl rollout undo deployment/mydeploy

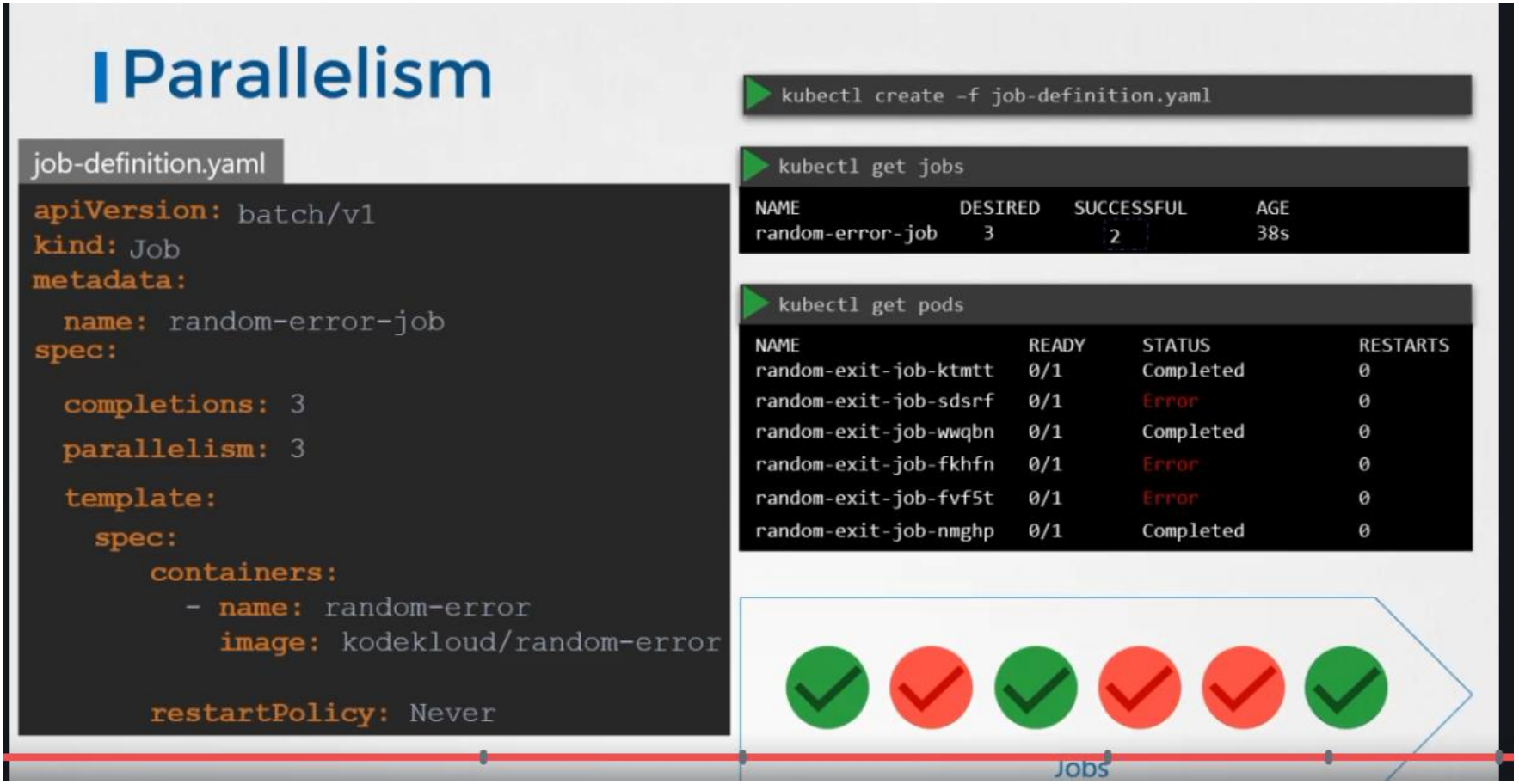
kubectl rollout undo deploy nginx --to-revision=2

```
kubectl rollout history deploy nginx --revision=3
kubectl rollout pause deploy nginx  // to pause the rollout
kubectl rollout resume deploy nginx
```

Jobs

pods are designed to run all the time by k8s.So if it has a small process/less time helping task, even it is finished the task,it l go to completed state.then replicaset restart the pod to make its always running. To stop restarting we have to set restartPolicy: Never

```
kubectl create job busybox --image=busybox -- /bin/sh -c 'echo hello;sleep 30;echo world'
```

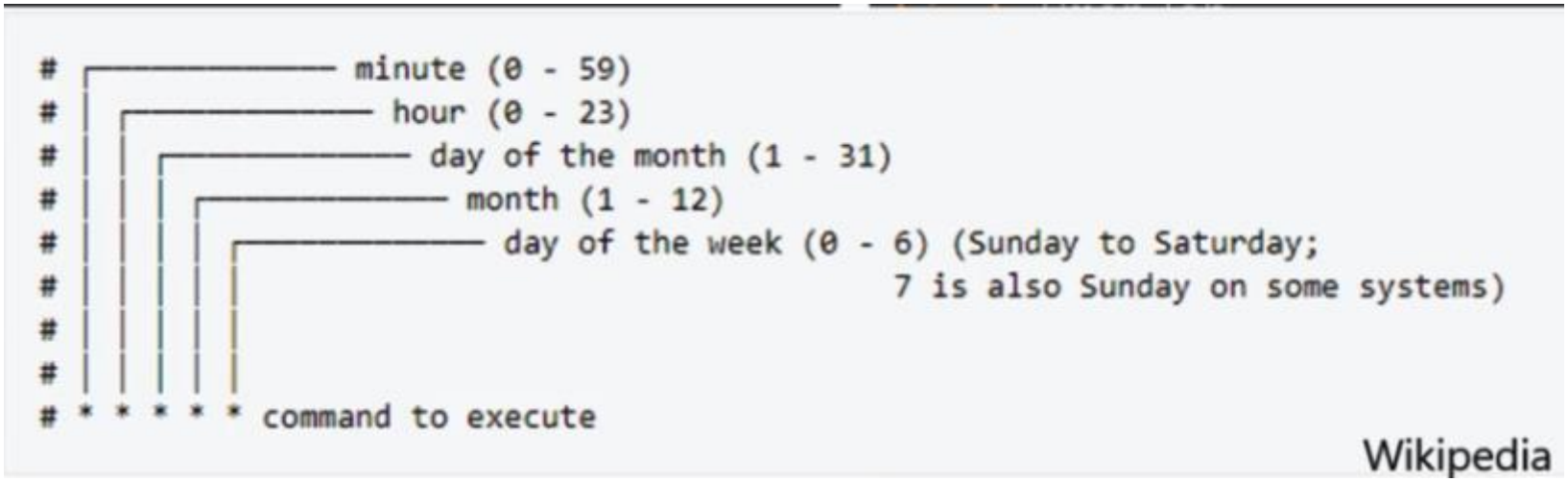


Kubectl get jobs

Kubectl delete job job-name // deleting the job always delete the pod that was created by job

Like replicas -> we have completions for job to make sure it will run the mentioned number of time. By default jobs create one after another. In order to create more jobs simultaneously use paralellism.

CronJob : it is a job which can be scheduled



kubectl run --generator=job/v1 --image=kodekloud/throw-dice throw-dice-job --restart=Neve

kubectl run --generator=cronjob/v1beta1 --image=kodekloud/throw-dice throw-dice-cron-job --restart=Never -o yaml --dry-run --schedule="30 21 * * *" > cjb.yaml

or kubectl run --generator=cronjob/v2alpha1

once job created, if we edit the job file -> its not working for some properties.

You have to type completions and parallalism

backoffLimit: 25 # This is so the job does not quit before it succeeds

```
kubectl create cronjob busybox --image=busybox --schedule="*/1 * * * *" -- /bin/sh -c 'date; echo Hello from the Kubernetes cluster'
```

Create CronJob

```
kubectl create -f cron-job-definition.yaml
```

```
kubectl get cronjob
```

```
NAME                SCHEDULE      SUSPEND   ACTIVE
reporting-cron-job  */1 * * * *   False     0
```

cron-job-definition.yaml

```
apiVersion: batch/v1beta1
kind: CronJob
metadata:
  name: reporting-cron-job
spec:
  schedule: "*/1 * * * *"
  jobTemplate:
    spec:
      completions: 3
      parallelism: 3
      template:
        spec:
          containers:
            - name: reporting-tool
              image: reporting-tool
          restartPolicy: Never
```

6 people bookmarked this moment.

Configurations- 18%

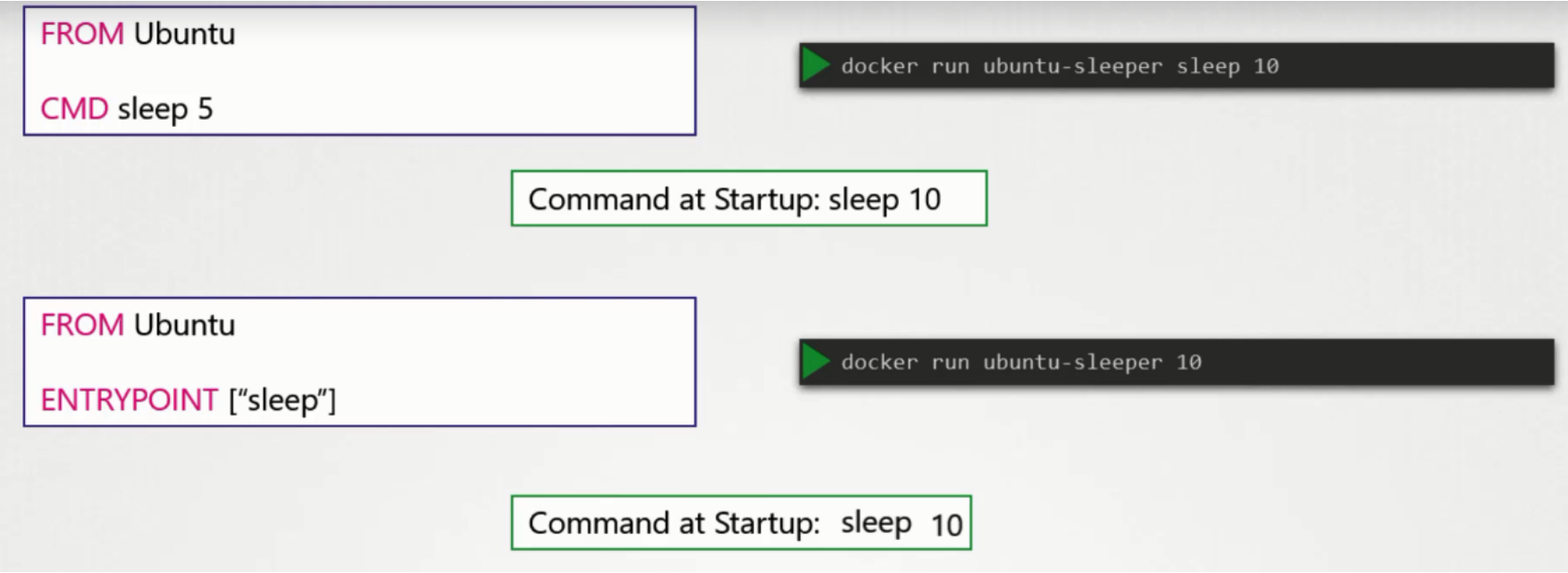
Command and arguments

Docker commands:

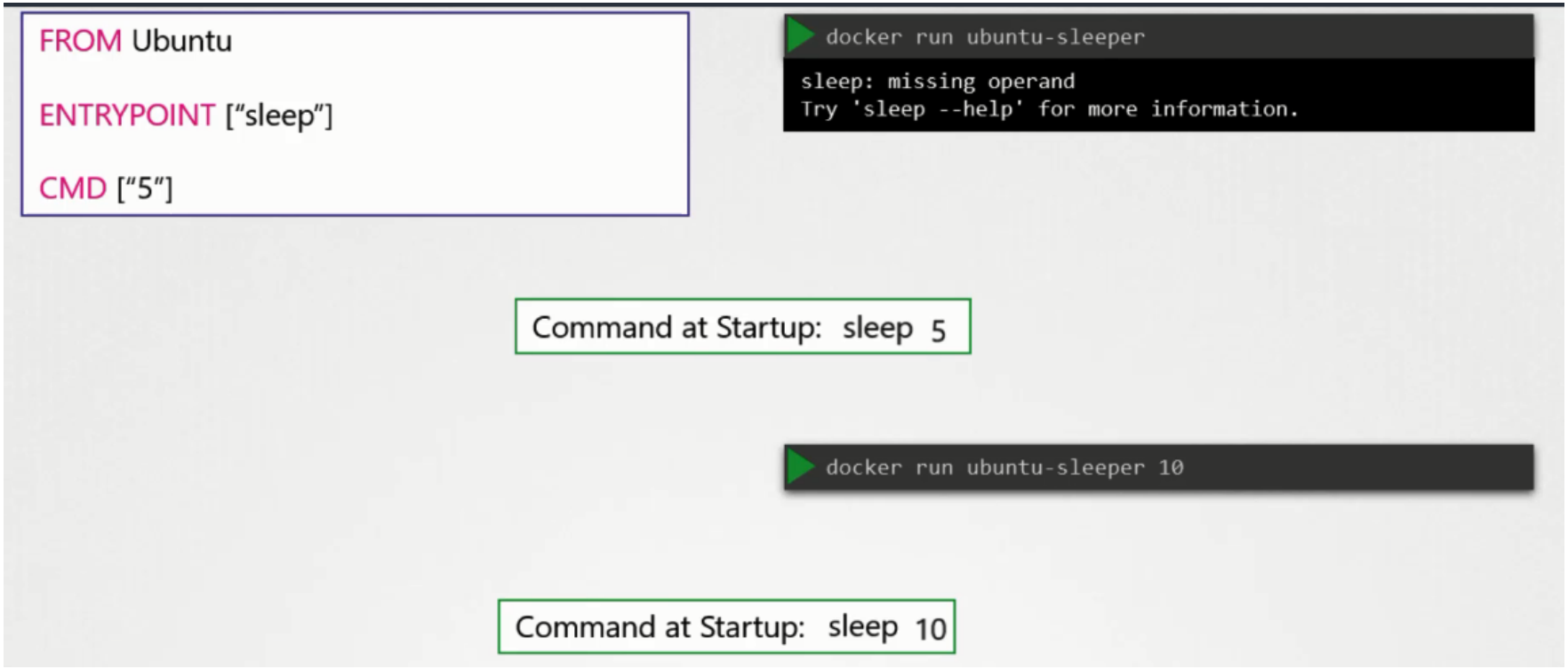
Docker containers only lives as long as process running.

Once process inside container stops,the container go to exited state

Inside Docker file -> CMD[] it runs when the container starts

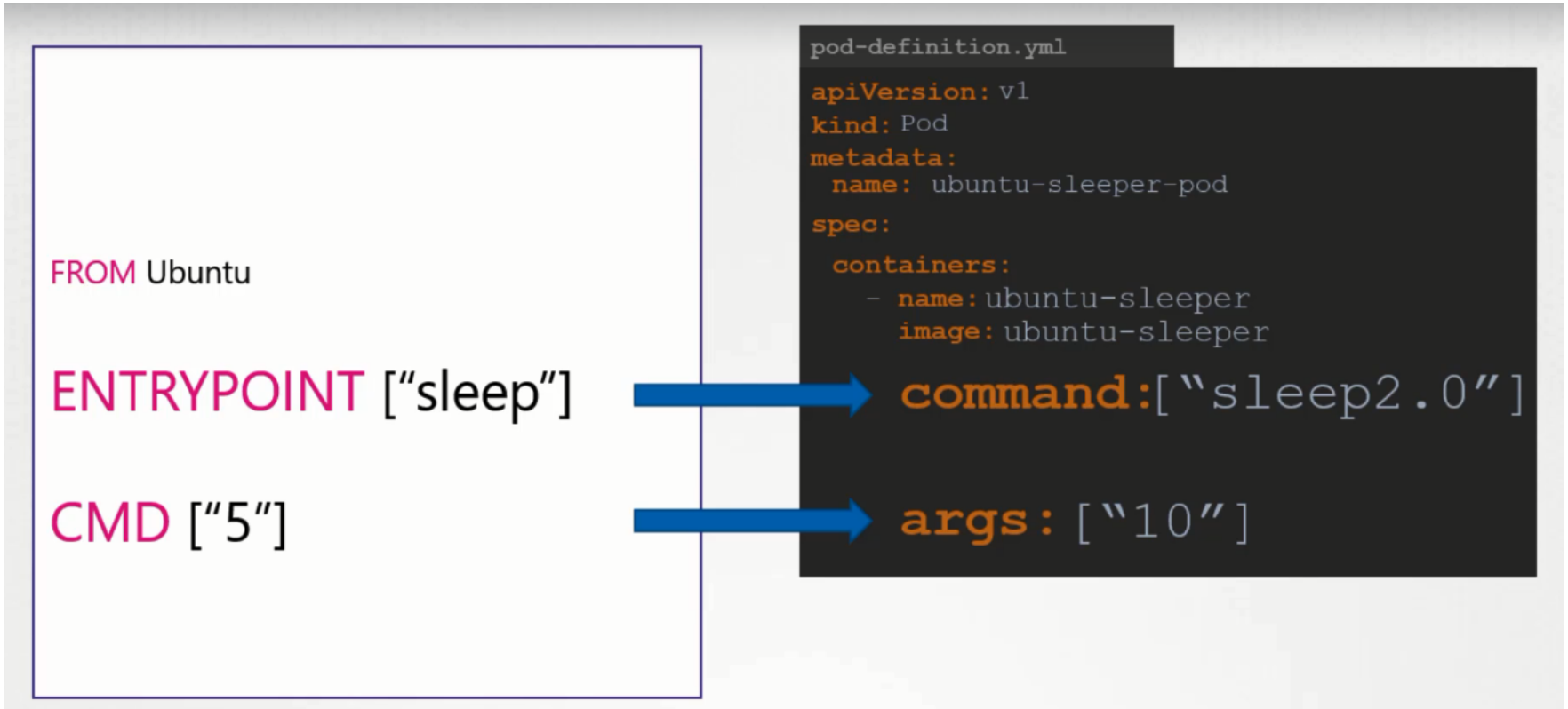


Command line arg over rides the command in the file. But if we use Entry point it appends the command and argument from the terminal
If user not sending 10 as arguments, then it ll fail at the startup. So inoder to give default value use CMD .



Use –entry-point when running docker command to over ride the entry point command.

K8s Command and arguments



Over ride the Entry point command in the docker file → use command in k8s

Override the default CMD in docker file → use args in k8s

ENV Variables in Kuber

```
docker run  -e APP_COLOR=pink simple-webapp-color
```

pod-definition.yaml

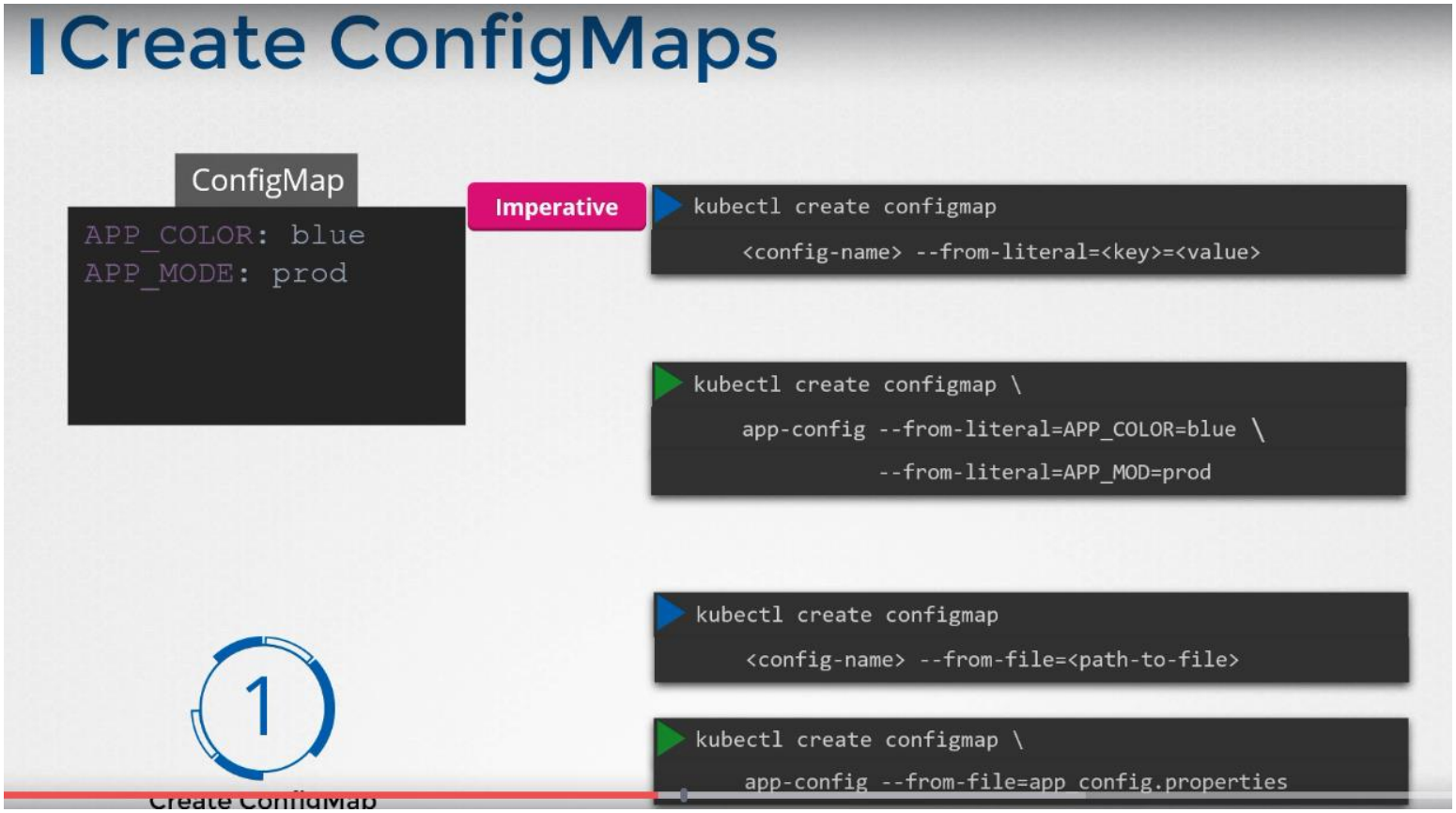
```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080
    env:
      - name: APP_COLOR
        value: pink
```

kubectl run --generator=run-pod/v1 nginx --image=nginx --port=8080 -l tier=db --env="DNS_DOMAIN=cluster" --dry-run -o yaml

ConfigMaps

When we have lot of pod files and difficult to manage environmental variable details. So Env variables can be taken out of the pod definition file and put it in a separate file called configmaps. Config maps are key value pair in k8s.

Kubectl create configmap app-config –from-literal=Name=ov --from-literal=Hname=karthi



Create ConfigMaps

ConfigMap

```
APP_COLOR: blue
APP_MODE: prod
```

Declarative

```
kubectl create -f
```

config-map.yaml

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: app-config
data:
  APP_COLOR: blue
  APP_MODE: prod
```

Create ConfigMap

```
kubectl create -f config-map.yaml
```

app-config

```
APP_COLOR: blue
APP_MODE: prod
```

mysql-config

```
port: 3306
max_allowed_packet: 128M
```

redis-config

```
port: 6379
rdb-compression: yes
```

Kubectl get configmaps -> cmd

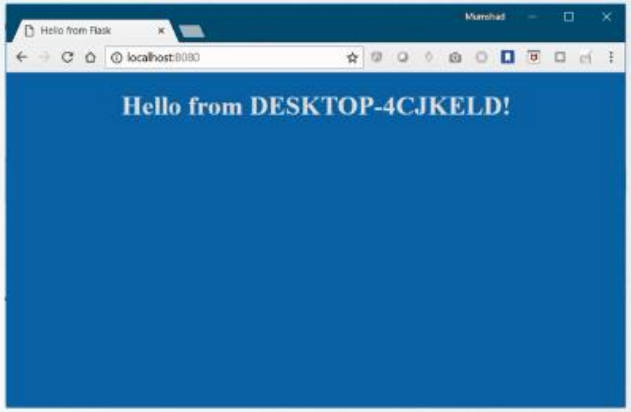
ConfigMap in Pods

pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
  labels:
    name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080
    envFrom:
      - configMapRef:
          name: app-config
```

config-map.yaml

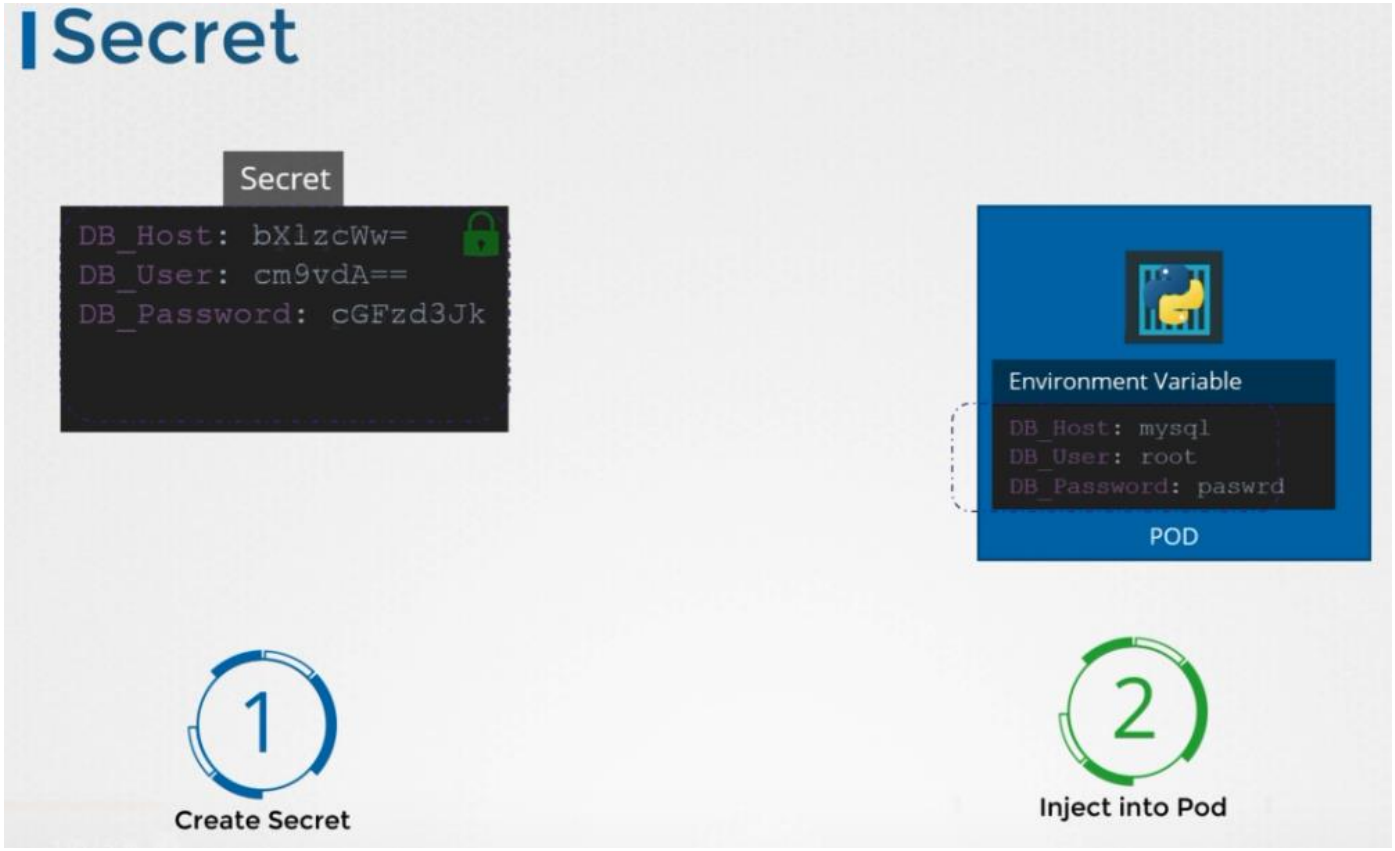
```yaml
apiVersion: v1
kind: ConfigMap
metadata:
  name: app-config
data:
  APP_COLOR: blue
  APP_MODE: prod
```

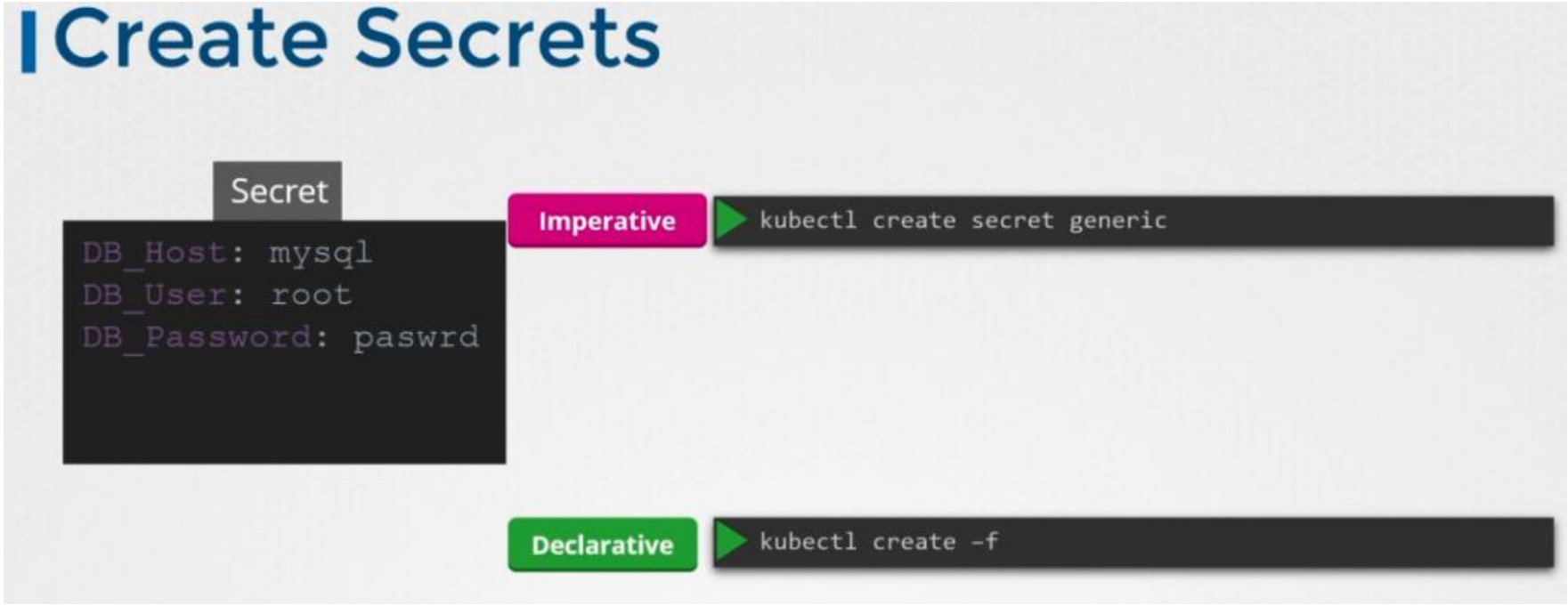



```
kubectl create -f pod-definition.yaml
```

Secrets:

Secrets are used to store the sensitive informations, like password






```
kubectl create secret generic \
    app-secret --from-literal=DB_Host=mysql
```

Kubectl create secret generic app-secret –from-literal=DB_HOST=mysql

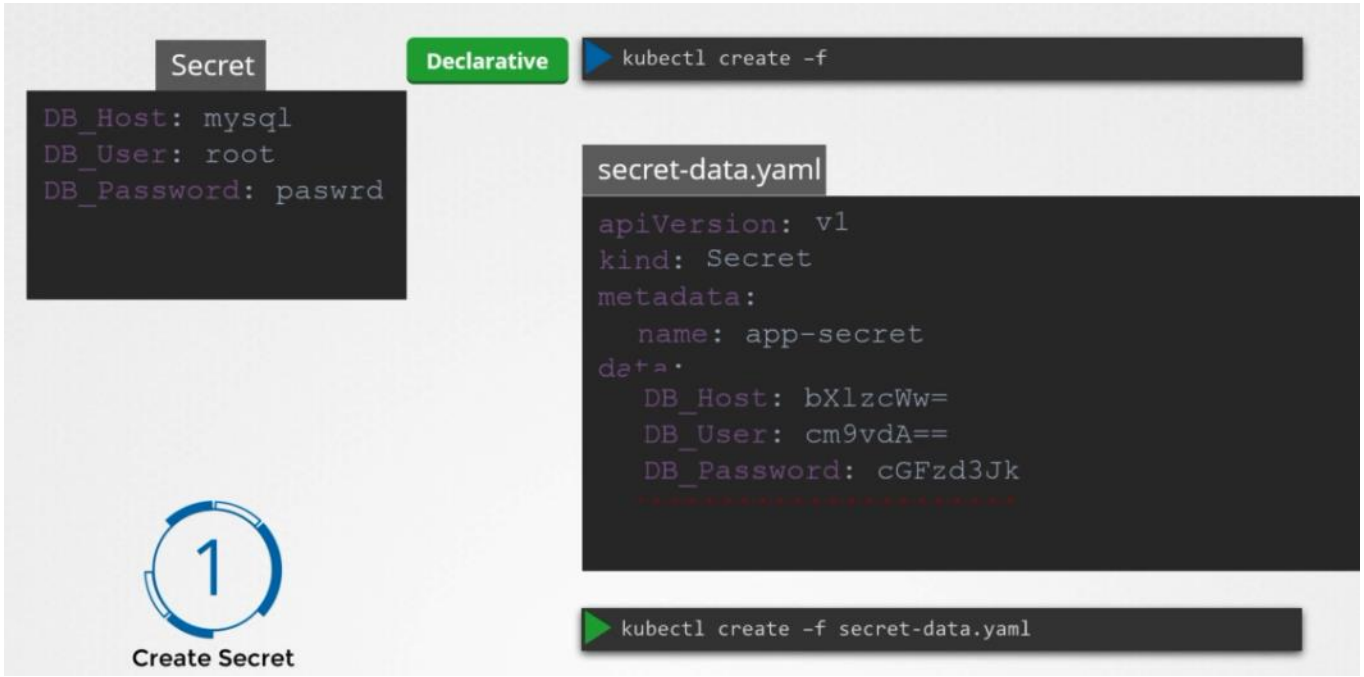
Imperative

```
kubectl create secret generic
    <secret-name> --from-literal=<key>=<value>
```

```
kubectl create secret generic \
    app-secret --from-literal=DB_Host=mysql      \
               --from-literal=DB_User=root
               --from-literal=DB_Password=paswrd
```

```
kubectl create secret generic
    <secret-name> --from-file=<path-to-file>
```

```
kubectl create secret generic \
    app-secret --from-file=app_secret.properties
```




```
echo -n 'mysql' | base64
bXlzcWw=
```

```
echo -n 'root' | base64
cm9vdA==
```

```
echo -n 'paswrd' | base64
cGFzd3Jk
```

```
kubectl get secrets
```

```
NAME                  TYPE                                  DATA      AGE
app-secret            Opaque                                3         10m
default-token-mvtkv   kubernetes.io/service-account-token   3         2h
```

```
kubectl describe secrets
```

```
Name:         app-secret
Namespace:    default
Labels:       <none>
Annotations:  <none>

Type:  Opaque

Data
====
DB_Host:      10 bytes
DB_Password:  6 bytes
DB_User:      4 bytes
```

```
kubectl get secret app-secret -o yaml
```

```
apiVersion: v1
data:
  DB_Host: bXlzcWw=
  DB_Password: cGFzd3Jk
  DB_User: cm9vdA==
kind: Secret
metadata:
  creationTimestamp: 2018-10-18T10:01:12Z
  labels:
    name: app-secret
  name: app-secret
  namespace: default
uid: be96e989-d2bc-11e8-a545-080027931072
type: Opaque
```

Decode the hash value

```
echo -n 'bXlzcWw=' | base64 --decode
```

```
mysql
```

Secrets in Pods

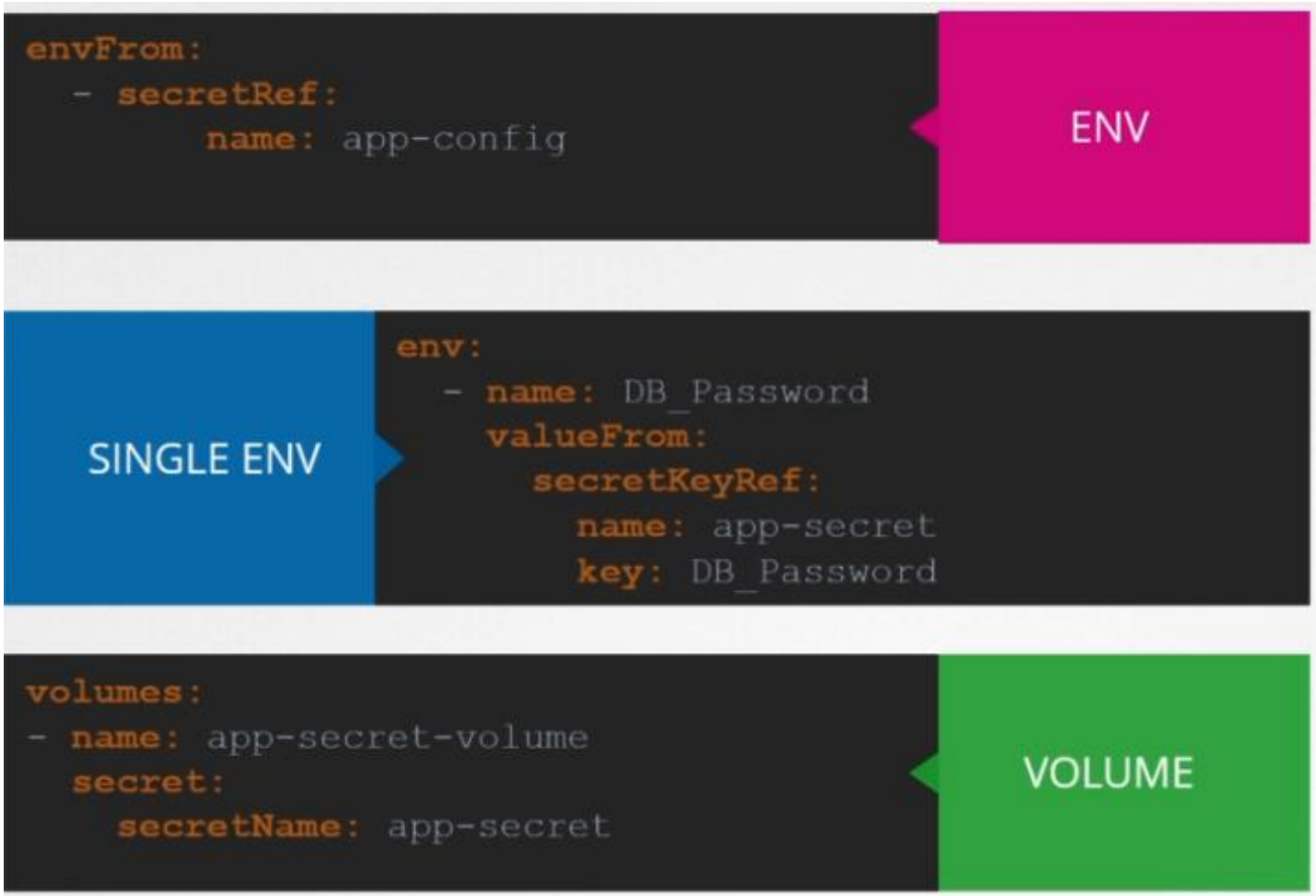
pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
  labels:
    name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080
    envFrom:
      - secretRef:
          name: app-secret
```

secret-data.yaml

```yaml
apiVersion: v1
kind: Secret
metadata:
  name: app-secret
data:
  DB_Host: bXlzcWw=
  DB_User: cm9vdA==
  DB_Password: cGFzd3Jk
```

Inject into Pod


envFrom:
- secretRef:
name: app-config
ENV
SINGLE ENV
env:
- name: DB_Password
valueFrom:
secretKeyRef:
name: app-secret
key: DB_Password
volumes:
- name: app-secret-volume
secret:
secretName: app-secret
VOLUME

Docker Security:

For a host -> root user || For a Docker container → root user

Security contexts

Pod level:

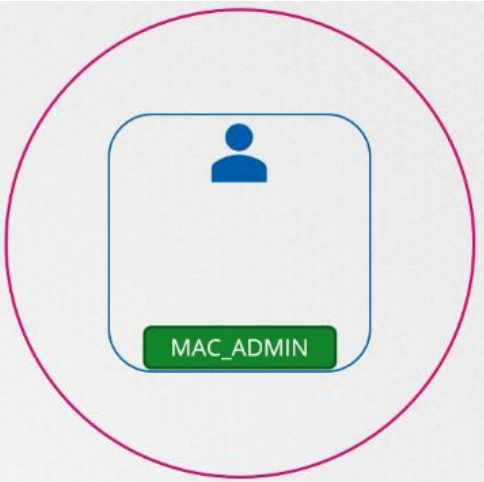
Security Context

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: web-pod
spec:
 securityContext:
   runAsUser: 1000


 containers:
      - name: ubuntu
        image: ubuntu
        command: ["sleep", "3600"]
```

Container level:

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: web-pod
spec:
 containers:
      - name: ubuntu
        image: ubuntu
        command: ["sleep", "3600"]
        securityContext:
          runAsUser: 1000
```

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: web-pod
spec:
  containers:
      - name: ubuntu
        image: ubuntu
        command: ["sleep", "3600"]
        securityContext:
          runAsUser: 1000
          capabilities:
              add: ["MAC_ADMIN"]
```



Note: Capabilities are only supported at the container level and not at the POD level

kubectl exec ubuntu-sleeper whoami

kubectl exec -it ubuntu-sleeper -- date -s '19 APR 2012 11:14:00'

Service Accounts:


```
kubectl create serviceaccount dashboard-sa
serviceaccount "dashboard-sa" created
```

```
kubectl get serviceaccount
NAME                 SECRETS   AGE
default              1         218d
dashboard-sa         1         4d
```

```
kubectl describe serviceaccount dashboard-sa
Name:                dashboard-sa
Namespace:           default
Labels:              <none>
Annotations:         <none>
Image pull secrets:  <none>
Mountable secrets:   dashboard-sa-token-kbbdm
Tokens:              dashboard-sa-token-kbbdm
Events:              <none>
```

```
kubectl describe secret dashboard-sa-token-kbbdm
```

```
Name:         dashboard-sa-token-kbbdm
Namespace:    default
Labels:       <none>

Type:  kubernetes.io/service-account-token

Data
====
ca.crt:     1025 bytes
namespace:  7 bytes
token:
eyJhbGciOiJSUzI1NiIsImtpZCI6IiJ9.eyJpc3MiOiJrdWJlcm5ldGVzL
3NlcnZpY2VhY2NvdW50Iiwia3ViZXJuZXRlcy5pby9zZXJ2aWNlYWNjb3V
```

```
kubectl exec -it my-kubernetes-dashboard ls /var/run/secrets/kubernetes.io/serviceaccount
```

```
ca.crt  namespace  token
```

```
kubectl get serviceaccount
```

```
NAME                  SECRETS   AGE
default               1         218d
dashboard-sa          1         4d
```

pod-definition.yml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: my-kubernetes-dashboard
spec:
  containers:
    - name: my-kubernetes-dashboard
      image: my-kubernetes-dashboard
  serviceAccount: dashboard-sa
```

pod-definition.yml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: my-kubernetes-dashboard
spec:
  containers:
    - name: my-kubernetes-dashboard
      image: my-kubernetes-dashboard
  automountServiceAccountToken: false
```

You can replace the POD type with Deployment, then add your **serviceAccountName: default** under

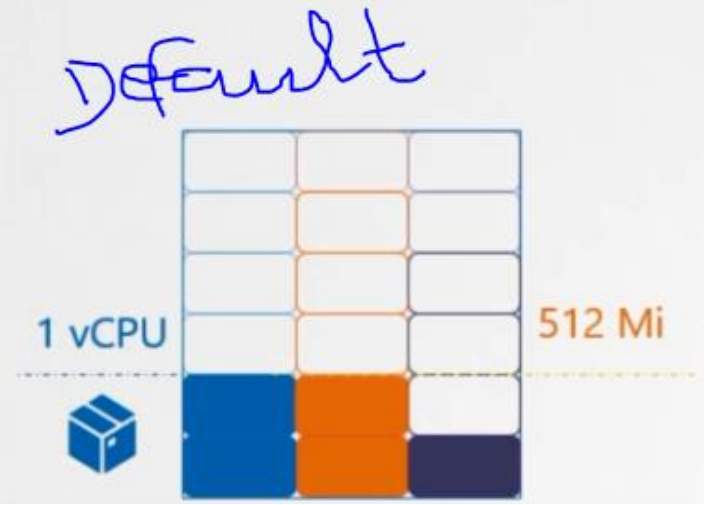
```yaml
template:
  spec:
    serviceAccountName: default
```

Resources Requirement:

Default:

We can also set limit for resource usages in the pod

Resource Limits

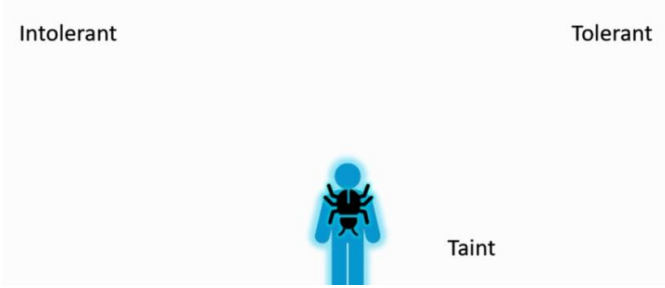


pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
  labels:
    name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080
    resources:
      requests:
        memory: "1Gi"
        cpu: 1
      limits:
        memory: "2Gi"
        cpu: 2
```

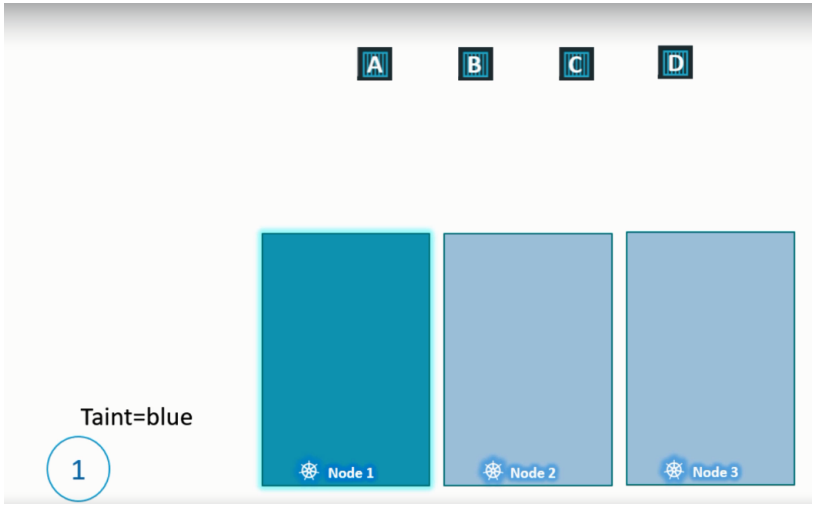
Container can use the more memory resources than its limit, But not CpU

Taints and Tolerants



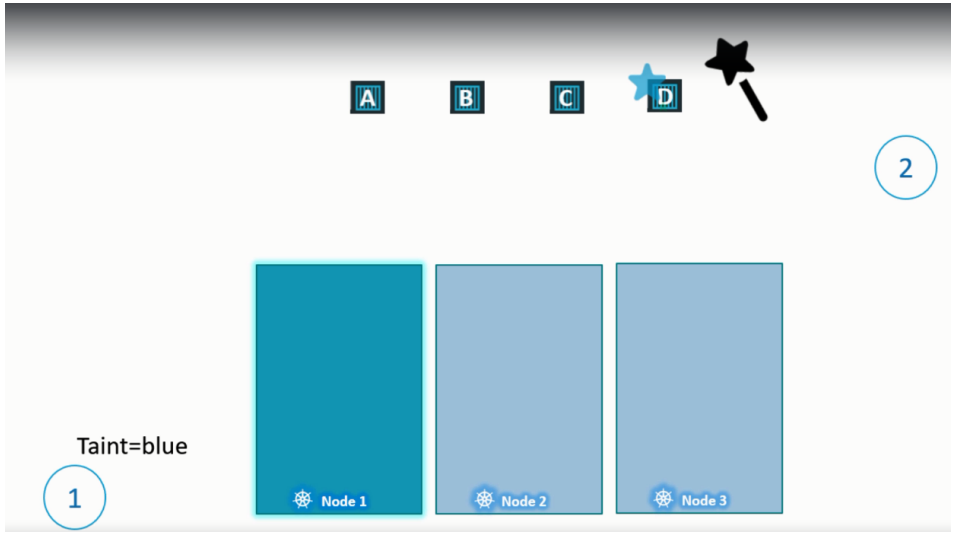
Imp 1. Taints on Node 2. Tolerant level

For some specific use cases , we nee dto deploy the pod on specific Nodes.



No unwanted pods ll be placed on Node1

Taints on set on Nodes , Tolerance set on Pods



Add Tolerant to pod-D , so that it can deploy in Node1

Taints - Node

```
kubectl taint nodes node-name key=value:taint-effect
```

What happens to PODs that do not tolerate this taint?

`NoSchedule | PreferNoSchedule | NoExecute`

```
kubectl taint nodes node1 app=blue:NoSchedule
```

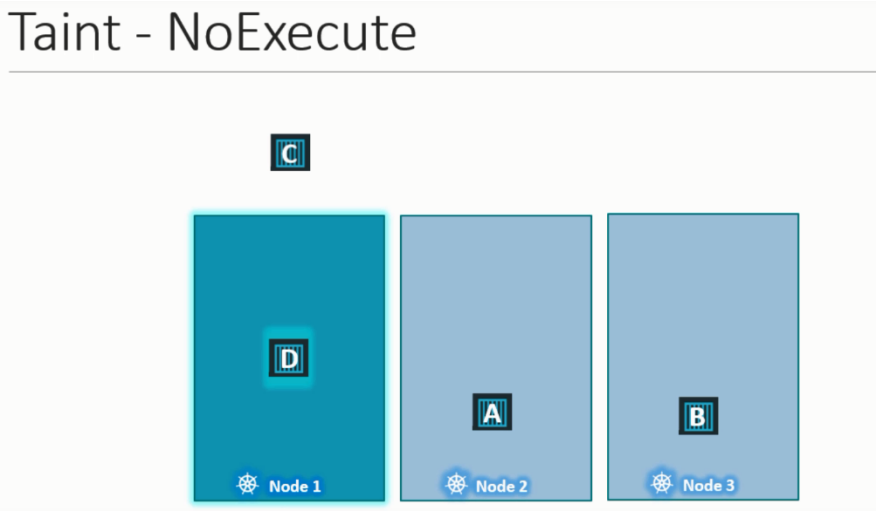
Tolerations - PODs

pod-definition.yml

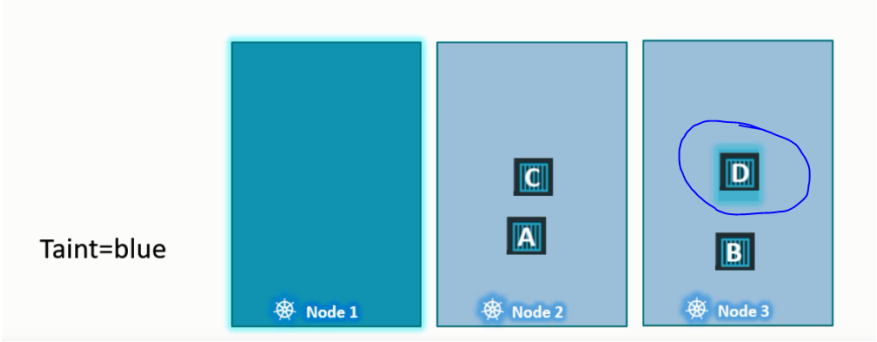
```yaml
apiVersion:
kind: Pod
metadata:
  name: myapp-pod
spec:
  containers:
  - name: nginx-container
    image: nginx

  tolerations:
  - key:"app"
    operator:"Equal"
    value:" blue"
    effect:" NoSchedule"
```

Initialy pod C deployed in the Node1, before adding taint to node1.

Pod C from Node1 was evicted because it cannot tolerate the newly added taint



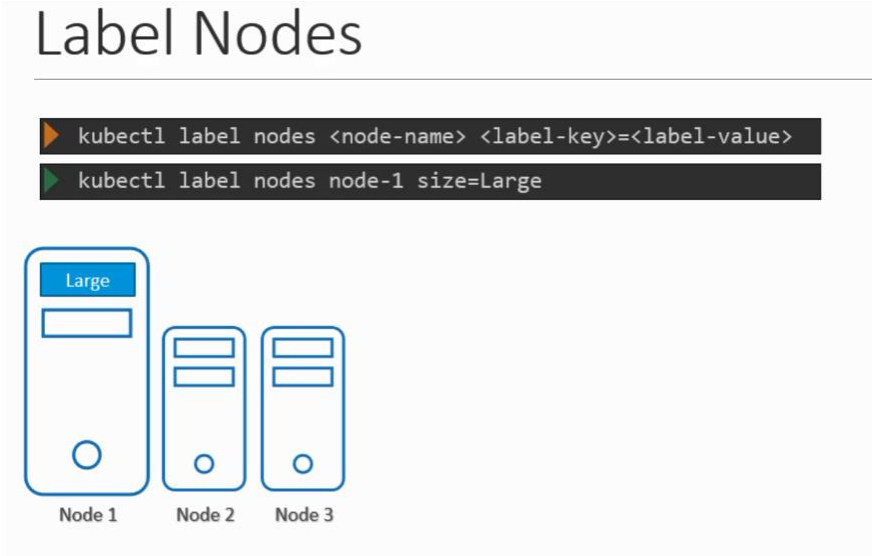
No Gurantee that pod D always deployed in Node1. It could be deployed in Node3.

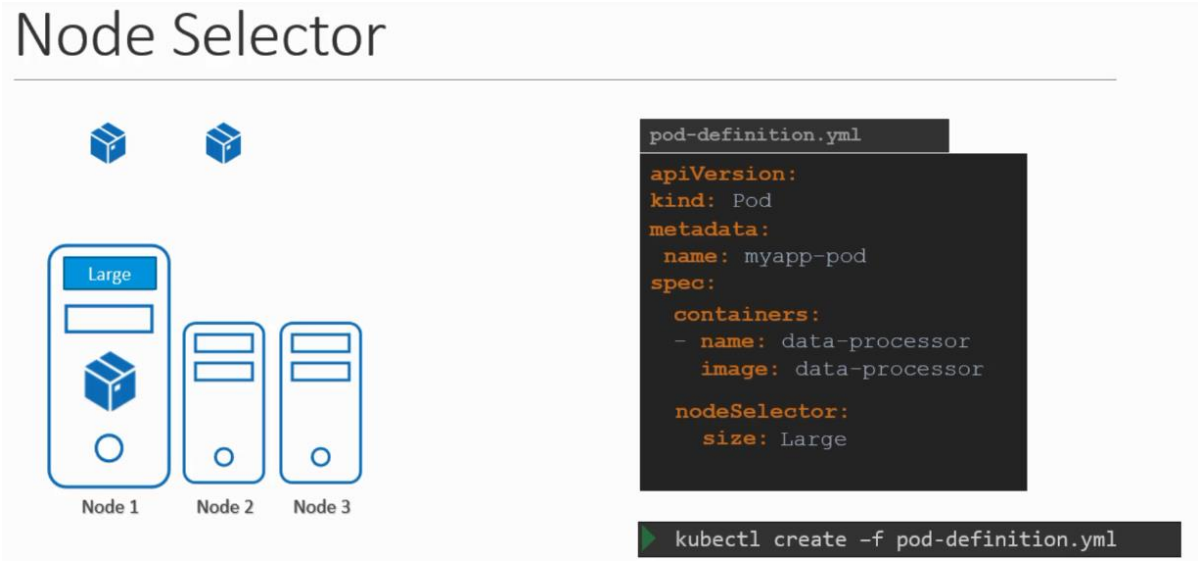


BY default Master node is tainted to avoid deploying pod.

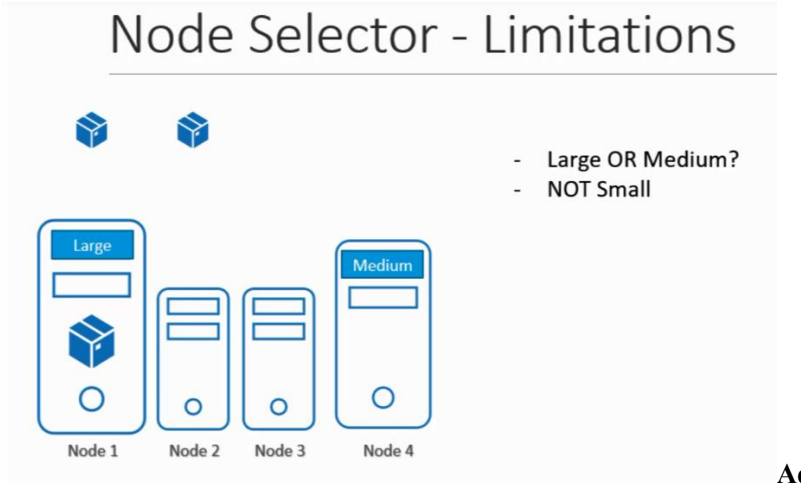
```
kubectl describe node kubemaster | grep Taint
Taints:             node-role.kubernetes.io/master:NoSchedule
```

Node Selector



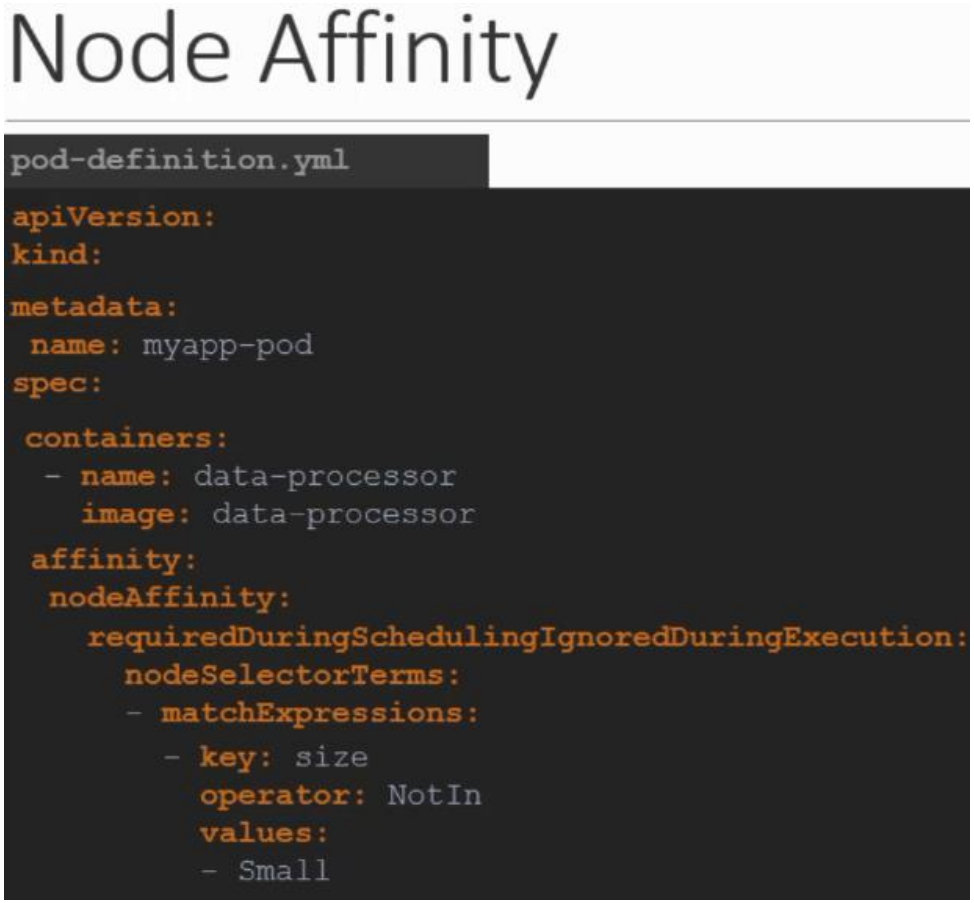


Some cases cannot be achieved by Node selector



Advanced operators like – OR,AND,IN,NOTIN,EXISTS

Node affinity – To add extra operators so that pod is deployed on desired node



Many operators are available , ex – In, NotIn, Exists

Node Affinity Types

Available:

requiredDuringSchedulingIgnoredDuringExecution

preferredDuringSchedulingIgnoredDuringExecution

Planned:

requiredDuringSchedulingRequiredDuringExecution

Node Affinity Types

Available:

requiredDuringSchedulingIgnoredDuringExecution

preferredDuringSchedulingIgnoredDuringExecution

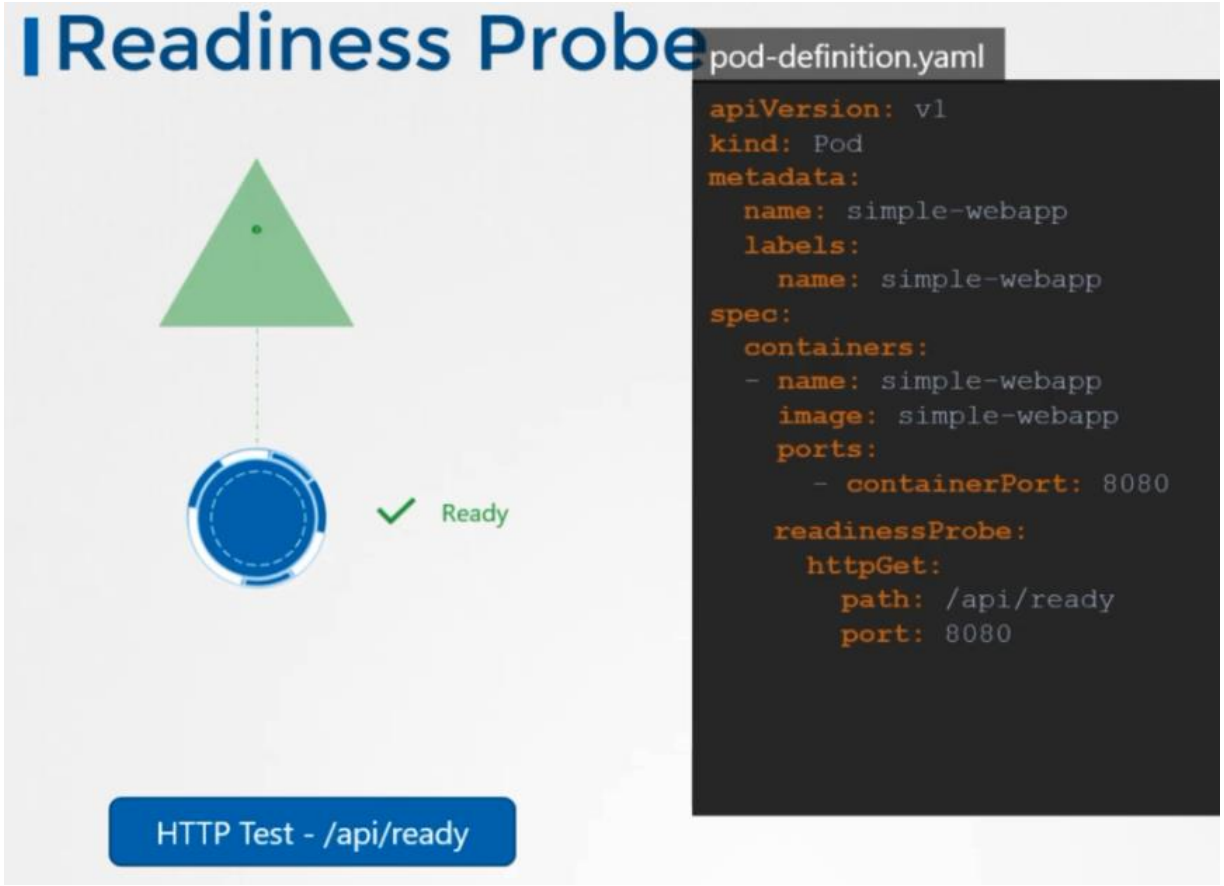
	DuringScheduling	DuringExecution
Type 1	Required	Ignored
Type 2	Preferred	Ignored

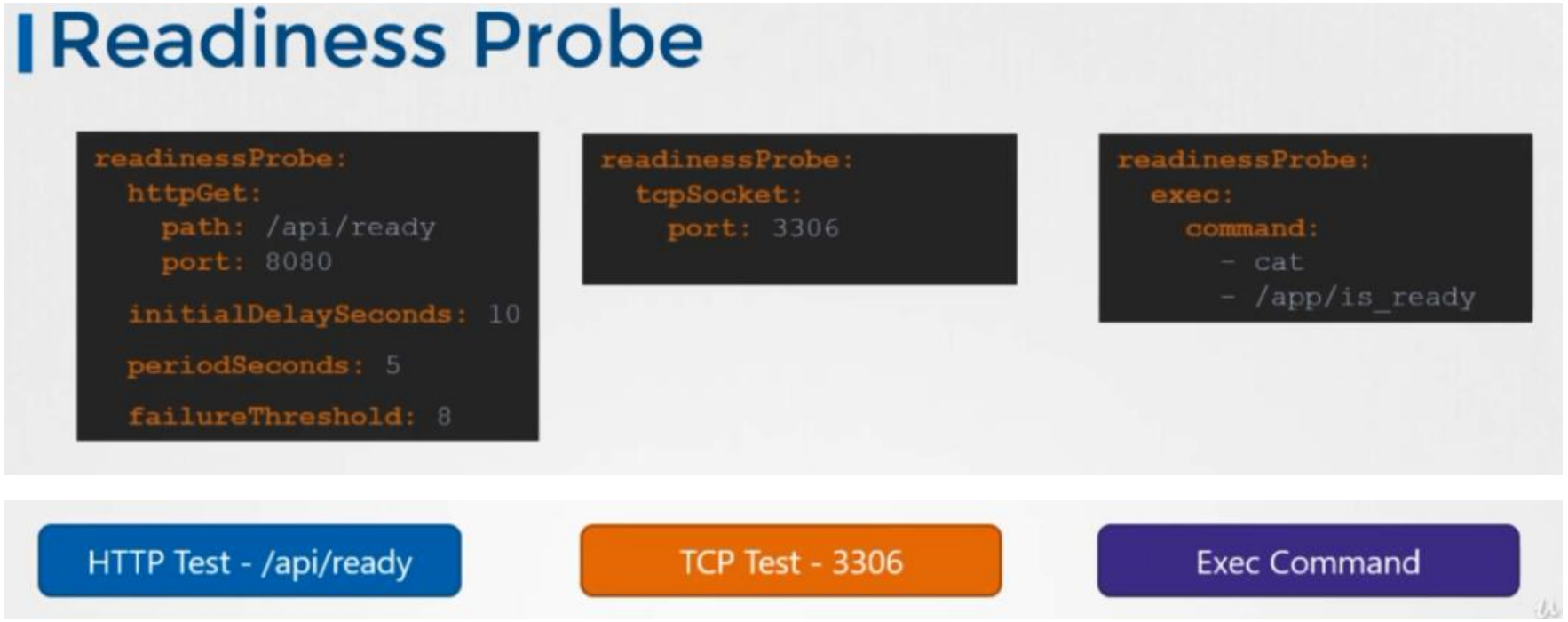
A pod is running in a Node, in future the label of the Node is changed, in that case pod is continued to be run on the same Node.

Taints/Tolerations and Node Affinity

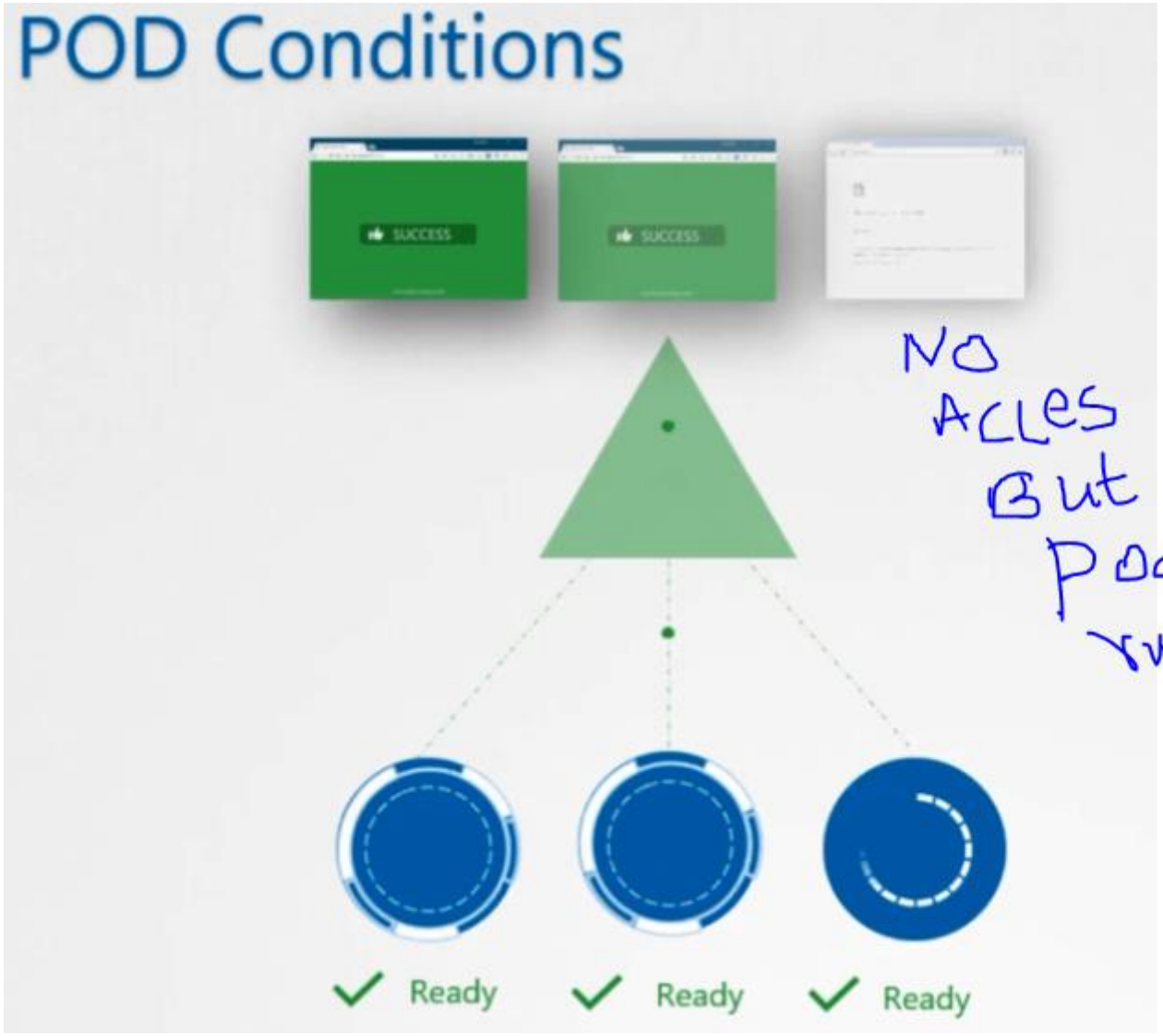
Observability- 18%

Have to search liveness probe in search get the template





Default threshold is 3 attempts,after that it declare it as fail. But we can increase threshold by failureThreshold option


POD Conditions
SUCCESS
SUCCESS
No
ACLES
But
Pod
runing
Ready
Ready
Ready


```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp
  labels:
    name: simple-webapp
spec:
  containers:
  - name: simple-webapp
    image: simple-webapp
    ports:
      - containerPort: 8080
    livenessProbe:
      httpGet:
        path: /api/healthy
        port: 8080
```

Similar to readynessProbe

Logs - Docker

```
docker run -d kodekloud/event-simulator
```

```
docker logs -f ecf
2018-10-06 15:57:15,937 - root - INFO - USER1 logged in
2018-10-06 15:57:16,943 - root - INFO - USER2 logged out
2018-10-06 15:57:17,944 - root - INFO - USER2 is viewing page2
2018-10-06 15:57:18,951 - root - INFO - USER3 is viewing page3
2018-10-06 15:57:19,954 - root - INFO - USER4 is viewing page1
2018-10-06 15:57:20,955 - root - INFO - USER2 logged out
2018-10-06 15:57:21,956 - root - INFO - USER1 logged in
2018-10-06 15:57:22,957 - root - INFO - USER3 is viewing page2
2018-10-06 15:57:23,959 - root - INFO - USER1 logged out
2018-10-06 15:57:24,959 - root - INFO - USER2 is viewing page2
2018-10-06 15:57:25,961 - root - INFO - USER1 logged in
2018-10-06 15:57:26,965 - root - INFO - USER4 is viewing page3
2018-10-06 15:57:27,965 - root - INFO - USER4 is viewing page3
2018-10-06 15:57:28,967 - root - INFO - USER2 is viewing page1
2018-10-06 15:57:29,967 - root - INFO - USER3 logged out
```

Logs - Kubernetes

```
kubectl create -f event-simulator.yaml
```

```
kubectl logs -f event-simulator-pod
2018-10-06 15:57:15,937 - root - INFO - USER1 logged in
2018-10-06 15:57:16,943 - root - INFO - USER2 logged out
2018-10-06 15:57:17,944 - root - INFO - USER2 is viewing page2
2018-10-06 15:57:18,951 - root - INFO - USER3 is viewing page3
2018-10-06 15:57:19,954 - root - INFO - USER4 is viewing page1
2018-10-06 15:57:20,955 - root - INFO - USER2 logged out
2018-10-06 15:57:21,956 - root - INFO - USER1 logged in
```

event-simulator.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: event-simulator-pod
spec:
  containers:
  - name: event-simulator
    image: kodekloud/event-simulator
```

Multi container Pod

```
kubectl logs -f event-simulator-pod event-simulator
2018-10-06 15:57:15,937 - root - INFO - USER1 logged in
2018-10-06 15:57:16,943 - root - INFO - USER2 logged out
2018-10-06 15:57:17,944 - root - INFO - USER2 is viewing page2
2018-10-06 15:57:18,951 - root - INFO - USER3 is viewing page3
2018-10-06 15:57:19,954 - root - INFO - USER4 is viewing page1
2018-10-06 15:57:20,955 - root - INFO - USER2 logged out
```

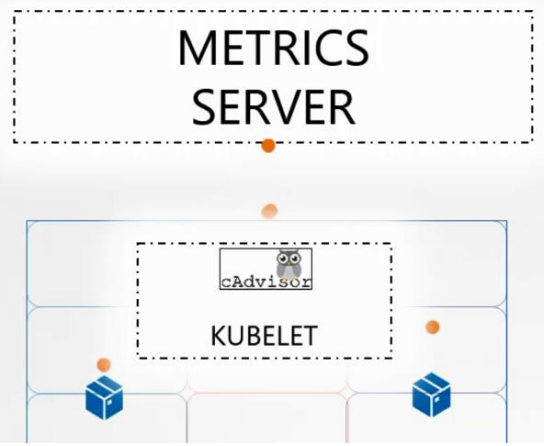
event-simulator.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: event-simulator-pod
spec:
  containers:
  - name: event-simulator
    image: kodekloud/event-simulator
  - name: image-processor
    image: some-image-processor
```

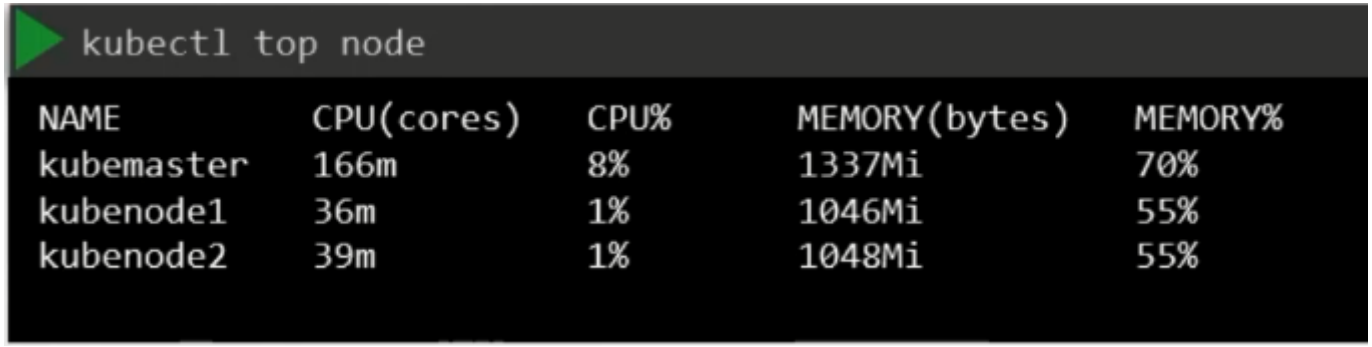
Monitoring: Node level, Pod level – collect metrics of Cpu,Ram,memory usages and give proper analytics

Many 3rd party open source solutions are available. Now we l look only Metrics Server

Metrics-Server: **In memory only**



After installing Metrics server in k8s cluster run the below command to see the metrics



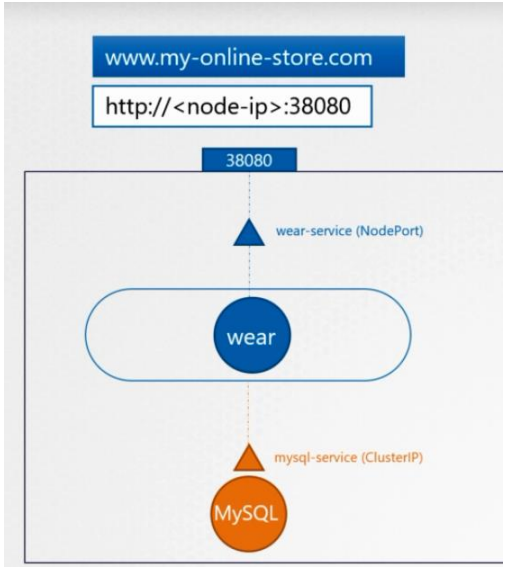
Network and Services – 13%

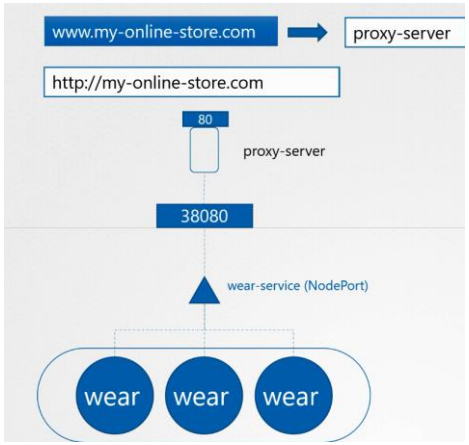
service-definition.yml

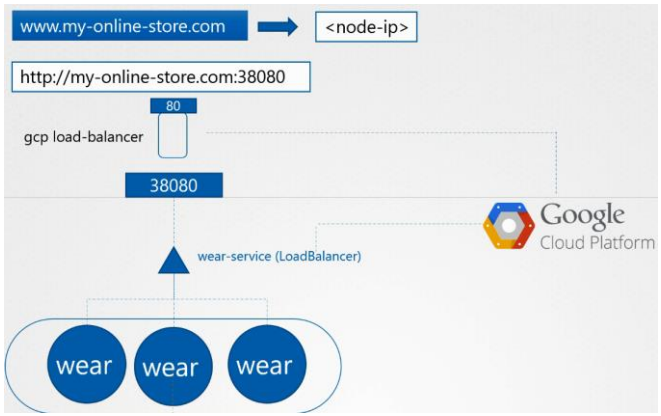
```yaml
apiVersion: v1
kind: Service
metadata:
    name: myapp-service

spec:
    type: NodePort
    ports:
     - targetPort: 80
       port: 80
       nodePort: 30008
    selector:
       app: myapp
       type: front-end
```

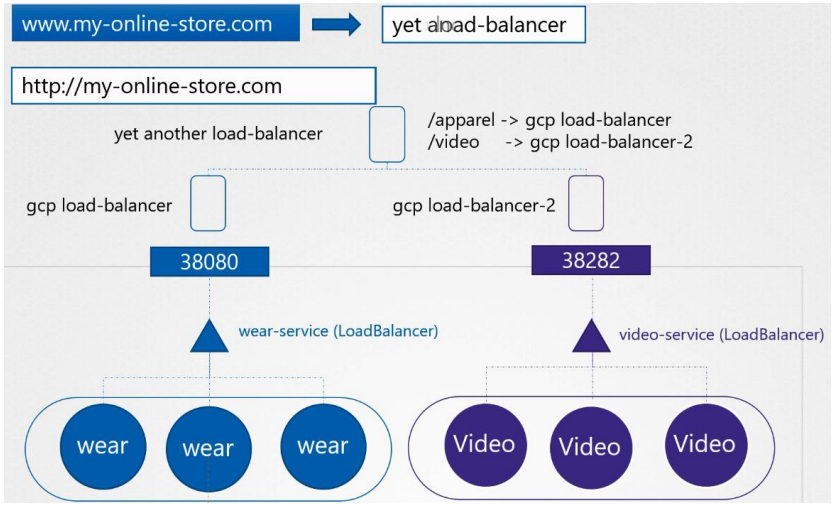
service-definition.yml

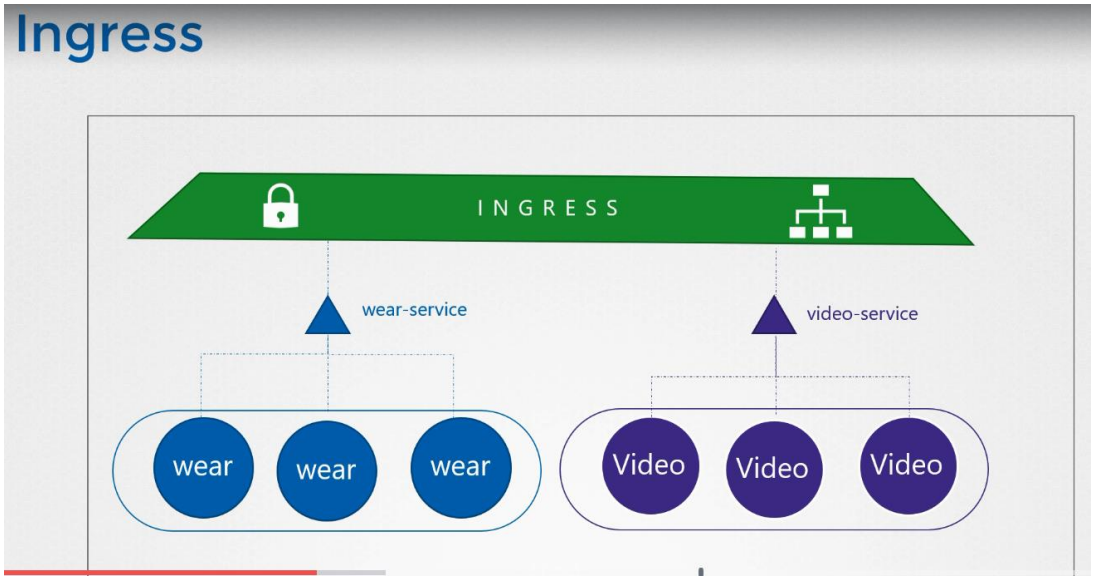
```yaml
apiVersion: v1
kind: Service
metadata:
    name: back-end

spec:
    type: ClusterIP
    ports:
     - targetPort: 80
       port: 80

    selector:
       app: myapp
       type: back-end
```

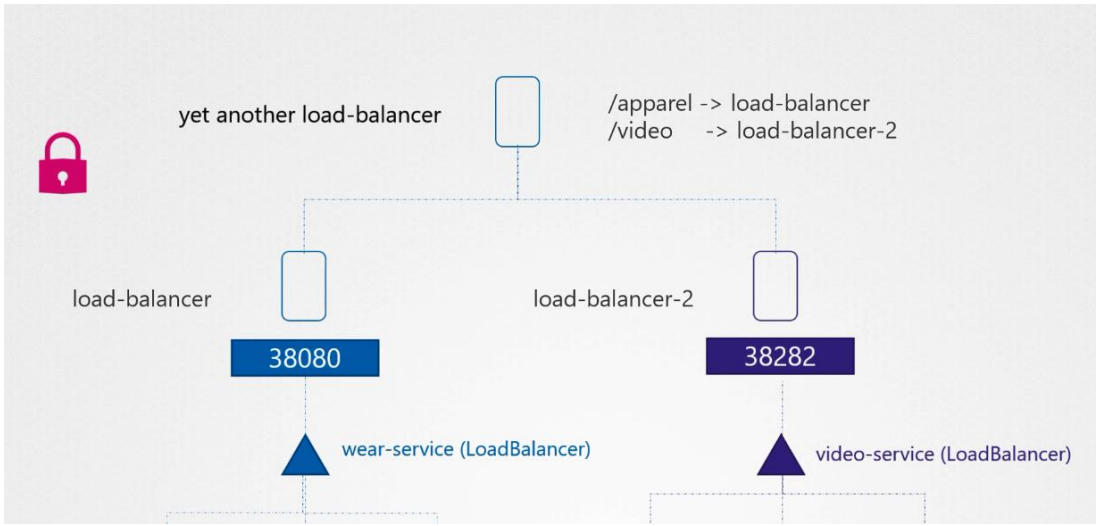

www.my-online-store.com
http://<node-ip>:38080
38080
wear-service (NodePort)
wear
mysql-service (ClusterIP)
MySQL

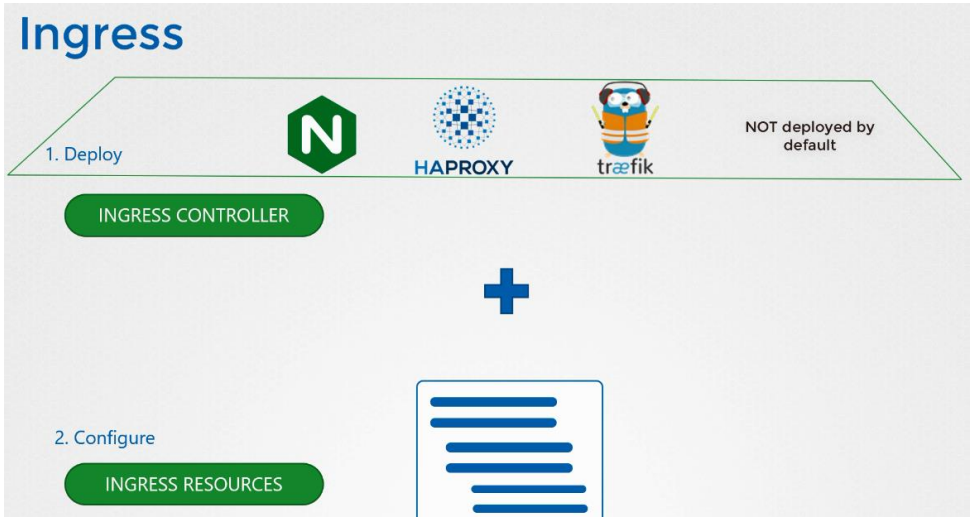

www.my-online-store.com
proxy-server
http://my-online-store.com
80
proxy-server
38080
wear-service (NodePort)
wear
wear
wear


www.my-online-store.com
<node-ip>
http://my-online-store.com:38080
80
gcp load-balancer
38080
Google
Cloud Platform
wear-service (LoadBalancer)
wear
wear
wear

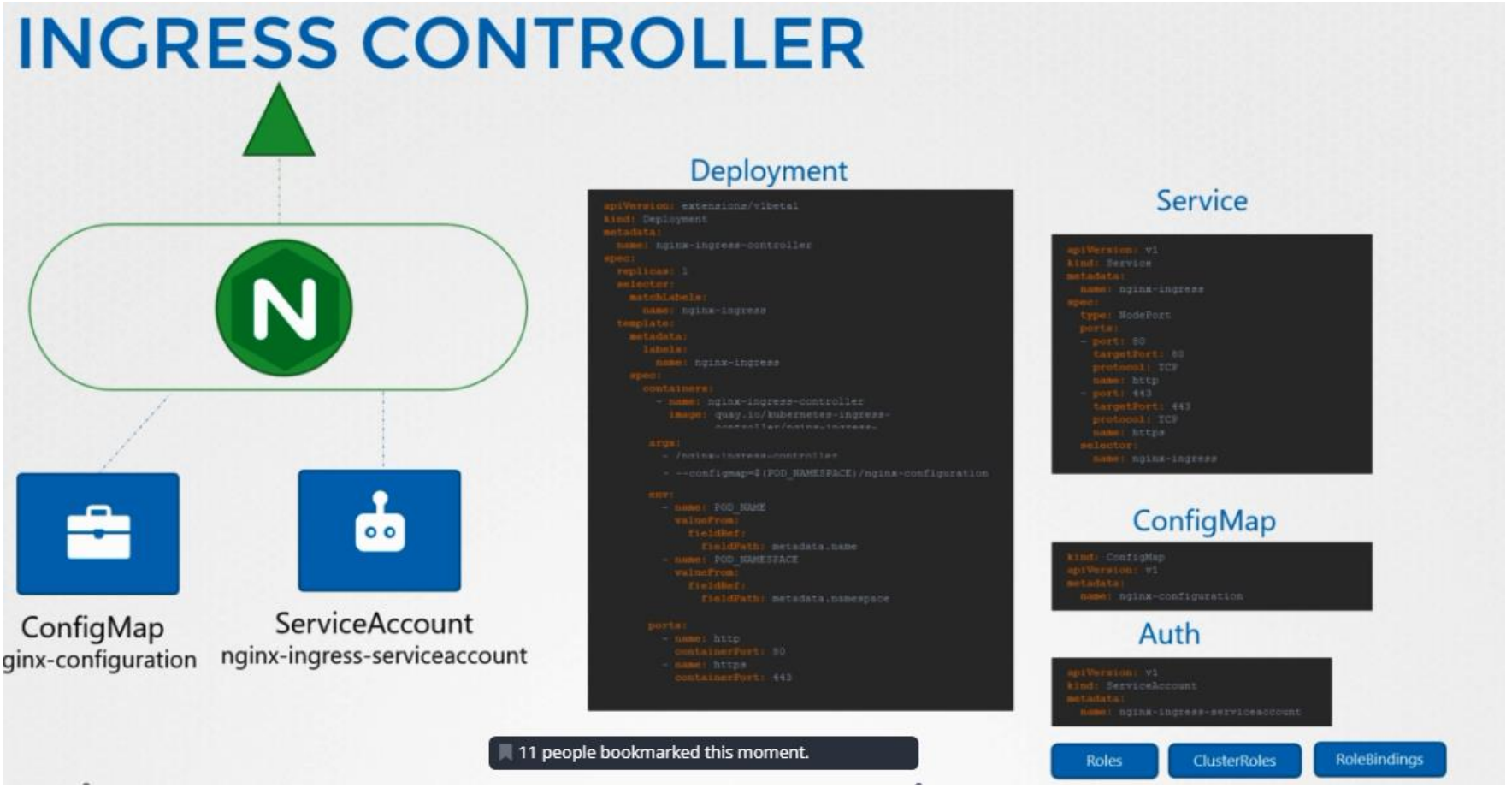

www.my-online-store.com
yet another load-balancer
http://my-online-store.com
yet another load-balancer
/apparel -> gcp load-balancer
/video -> gcp load-balancer-2
gcp load-balancer
gcp load-balancer-2
38080
38282
wear-service (LoadBalancer)
video-service (LoadBalancer)
wear
wear
wear
Video
Video
Video

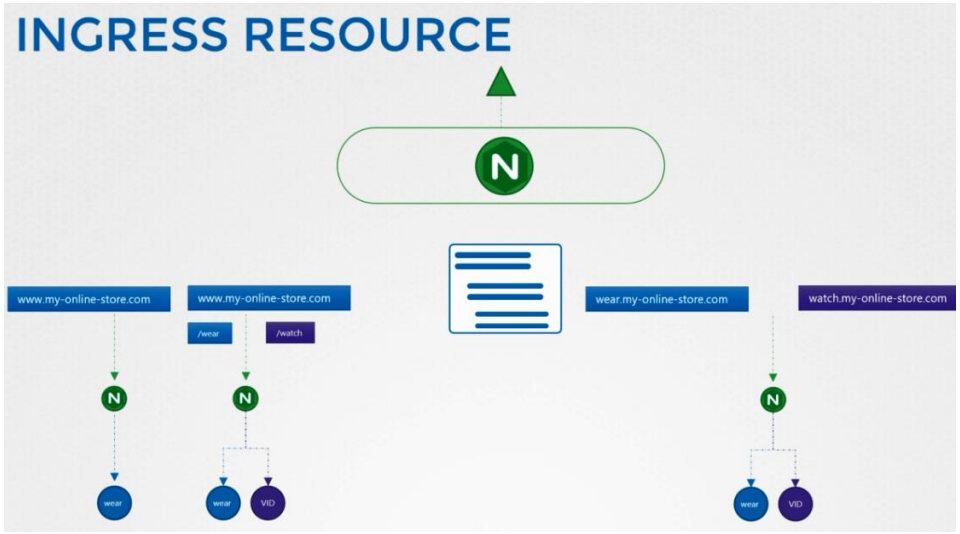

Ingress
INGRESS
wear-service
video-service
wear
wear
wear
Video
Video
Video

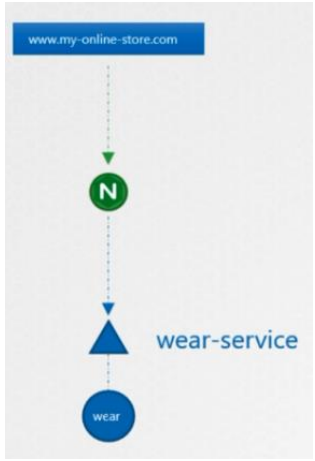

yet another load-balancer
/apparel -> load-balancer
/video -> load-balancer-2
load-balancer
load-balancer-2
38080
38282
wear-service (LoadBalancer)
video-service (LoadBalancer)


Ingress
1. Deploy
HAPROXY
træfik
NOT deployed by default
INGRESS CONTROLLER
2. Configure
INGRESS RESOURCES


INGRESS CONTROLLER
GCP HTTP(S)
Load Balancer (GCE)
Contour
HAPROXY
træfik
Istio


INGRESS CONTROLLER
N
ConfigMap
ginx-configuration
ServiceAccount
nginx-ingress-serviceaccount
Deployment
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
name: nginx-ingress-controller
spec:
replicas: 1
selector:
matchLabels:
name: nginx-ingress
template:
metadata:
labels:
name: nginx-ingress
spec:
containers:
- name: nginx-ingress-controller
image: quay.io/kubernetes-ingress-
args:
- --configmap=$(POD_NAMESPACE)/nginx-configuration
env:
- name: POD_NAME
valueFrom:
fieldRef:
fieldPath: metadata.name
- name: POD_NAMESPACE
valueFrom:
fieldRef:
fieldPath: metadata.namespace
ports:
- name: http
containerPort: 80
- name: https
containerPort: 443
Service
apiVersion: v1
kind: Service
metadata:
name: nginx-ingress
spec:
type: NodePort
ports:
- port: 80
targetPort: 80
protocol: TCP
name: http
- port: 443
targetPort: 443
protocol: TCP
name: https
selector:
name: nginx-ingress
ConfigMap
kind: ConfigMap
apiVersion: v1
metadata:
name: nginx-configuration
Auth
apiVersion: v1
kind: ServiceAccount
metadata:
name: nginx-ingress-serviceaccount
Roles
ClusterRoles
RoleBindings
11 people bookmarked this moment.





Ingress-wear.yaml

```
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: ingress-wear
spec:
 backend:
      serviceName: wear-service
      servicePort: 80
```

INGRESS RESOURCE - RULES

www.my-online-store.com	www.wear.my-online-store.com	www.watch.my-online-store.com	Everything Else
http://www.my-online-store.com/wear	http://www.wear.my-online-store.com/	http://www.watch.my-online-store.com/	http://www.listen.my-online-store.com/
http://www.my-online-store.com/watch	http://www.wear.my-online-store.com/returns	http://www.watch.my-online-store.com/movies	http://www.eat.my-online-store.com/
http://www.my-online-store.com/listen	http://www.wear.my-online-store.com/support	http://www.watch.my-online-store.com/tv	http://www.drink.my-online-store.com/tv

Rule 1

Path /wear

Path /watch

Path /

Rule 2

Path /

Path /returns

Path /support

Rule 3

Path /

Path /movies

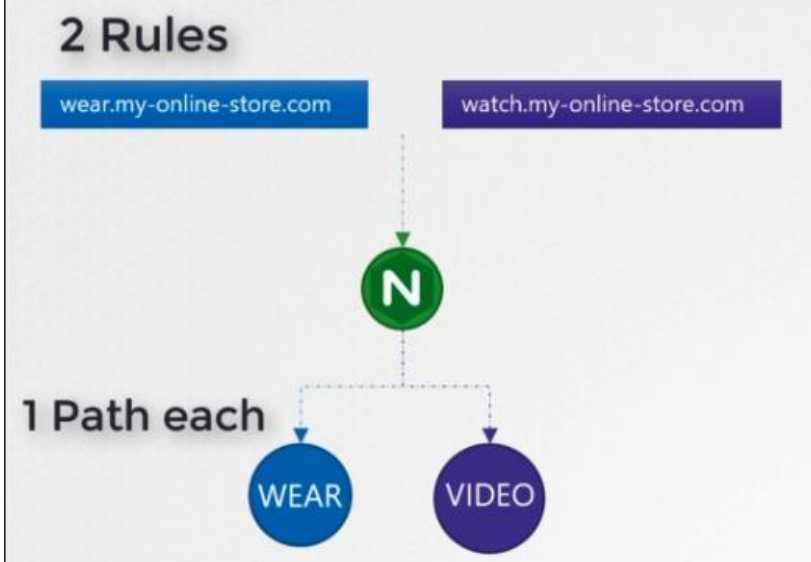
Path /tv

Rule 4

Path /

```yaml
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: ingress-wear-watch
spec:
   rules:
   - http:
       paths:
       - path: /wear
         backend:
           serviceName: wear-service
           servicePort: 80
       - path: /watch
         backend:
           serviceName: watch-service
           servicePort: 80
```

INGRESS RESOURCE



Ingress-wear-watch.yaml

```yaml
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: ingress-wear-watch
spec:
  rules:
  - host: wear.my-online-store.com
    http:
      paths:
      - backend:
          serviceName: wear-service
          servicePort: 80
  - host: watch.my-online-store.com
    http:
      paths:
      - backend:
          serviceName: watch-service
          servicePort: 80
```

INGRESS RESOURCE

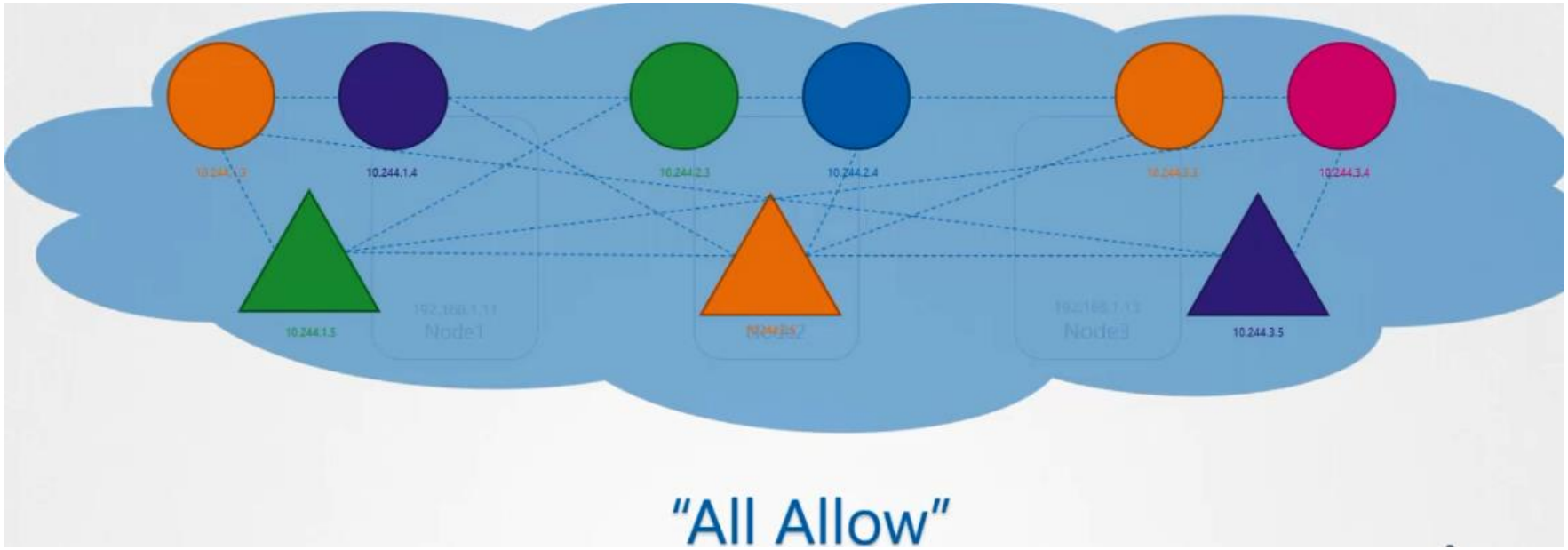
Ingress-wear-watch.yaml

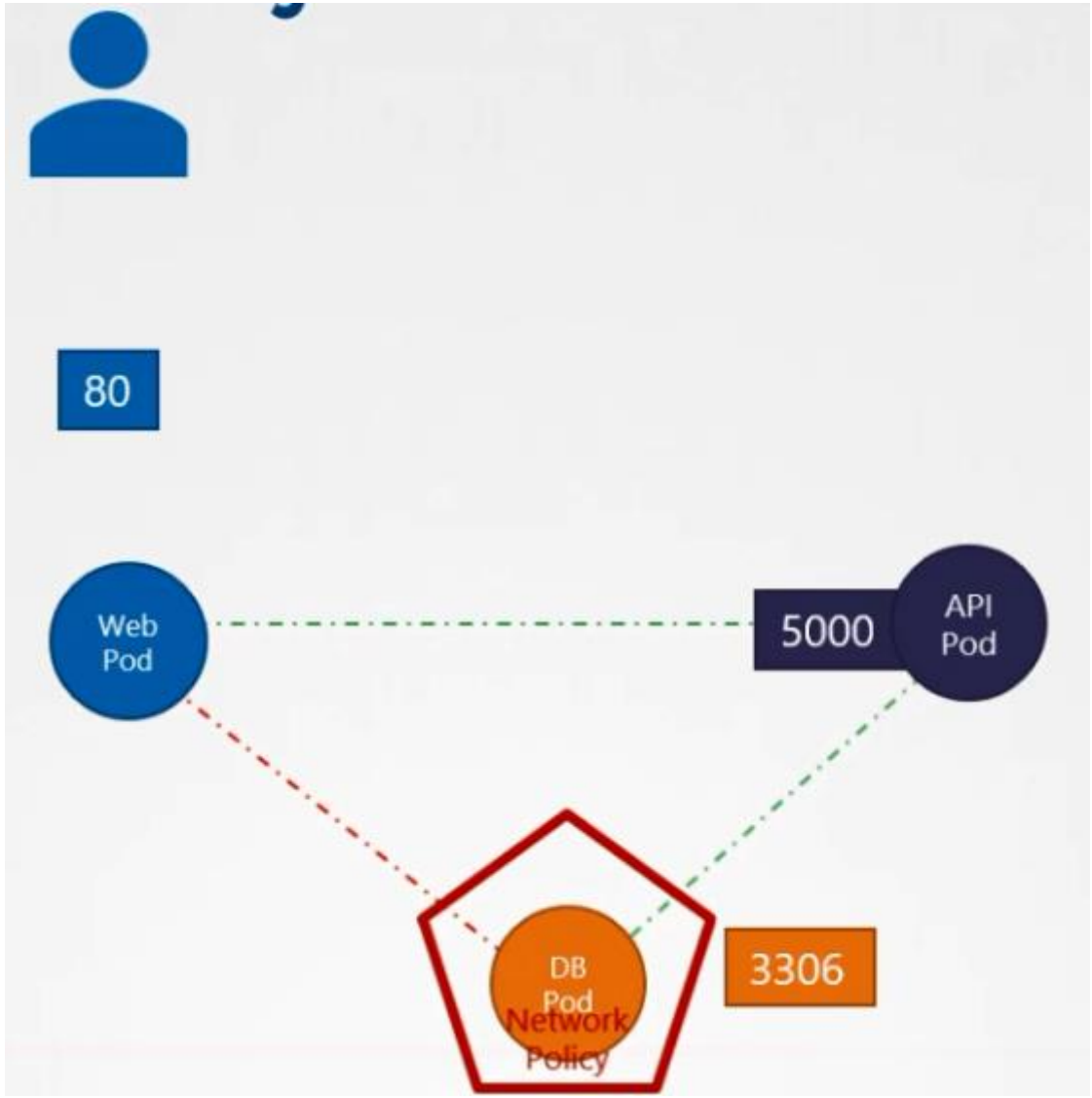
```yaml
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: ingress-wear-watch
spec:
  rules:
  - http:
      paths:
      - path: /wear
        backend:
          serviceName: wear-service
          servicePort: 80
      - path: /watch
        backend:
          serviceName: watch-service
          servicePort: 80
```

Ingress-wear-watch.yaml

```yaml
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: ingress-wear-watch
spec:
  rules:
  - host: wear.my-online-store.com
    http:
      paths:
      - backend:
          serviceName: wear-service
          servicePort: 80
  - host: watch.my-online-store.com
    http:
      paths:
      - backend:
          serviceName: watch-service
          servicePort: 80
```

By Default each pod can commincate with all pod. But some cases it should not be , that's where we specify network policy where we set rules which pod can communicat with which pod




80
Web Pod
5000
API Pod
DB Pod
3306
Network Policy

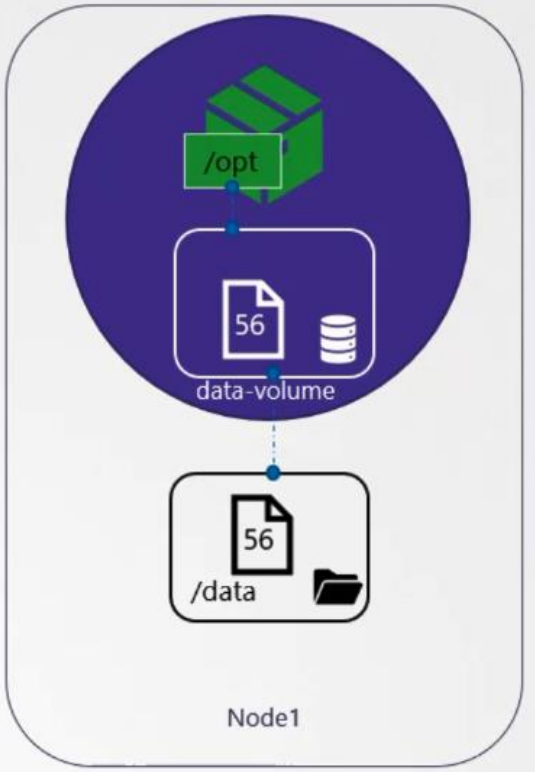
Network Policy

```yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: db-policy
spec:
   podSelector:
     matchLabels:
       role: db
   policyTypes:
   - Ingress
   ingress:
   - from:
     - podSelector:
         matchLabels:
           name: api-pod
     ports:
     - protocol: TCP
       port: 3306
```

State Persistence – 8%

Volumes & Mounts

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: random-number-generator
spec:
  containers:
  - image: alpine
    name: alpine
    command: ["/bin/sh","-c"]
    args: ["shuf -i 0-100 -n 1 >> /opt/number.out;"]
    volumeMounts:
    - mountPath: /opt
      name: data-volume

  volumes:
  - name: data-volume
    hostPath:
      path: /data
      type: Directory
```



```
volumes:
- name: data-volume
  awsElasticBlockStore:
    volumeID: <volume-id>
    fsType: ext4
```

Persistent Volume

pv-definition.yaml

```yaml
apiVersion: v1
kind: PersistentVolume
metadata:
   name: pv-vol1
spec:
  accessModes:
       - ReadWriteOnce
  capacity:
      storage: 1Gi
  hostPath:
     path: /tmp/data
```

pv-definition.yaml

```yaml
apiVersion: v1
kind: PersistentVolume
metadata:
   name: pv-vol1
spec:
  accessModes:
       - ReadWriteOnce
  capacity:
      storage: 1Gi
  awsElasticBlockStore:
    volumeID: <volume-id>
    fsType: ext4
```

Persistent Volume Claim

pvc-definition.yaml

```yaml
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: myclaim
spec:
  accessModes:
     - ReadWriteOnce
  resources:
     requests:
       storage: 500Mi
```

pv-definition.yaml

```yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: pv-vol1
spec:
  accessModes:
       - ReadWriteOnce
  capacity:
       storage: 1Gi
  awsElasticBlockStore:
    volumeID: <volume-id>
    fsType: ext4
```

```
kubectl get persistentvolumeclaim
```

NAME	STATUS	VOLUME	CAPACITY	ACCESS MODES	STORAGECLASS	AGE
myclaim	Bound	pv-vol1	1Gi	RWO		43m

```
kubectl delete persistentvolumeclaim myclaim
persistentvolumeclaim "myclaim" deleted
```

```
persistentVolumeReclaimPolicy: Retain
```

```
persistentVolumeReclaimPolicy:  Recycle
```

```
persistentVolumeReclaimPolicy: Delete
```

Use Shortcuts/Aliases

po for PODs
rs for ReplicaSets
deploy for Deployments
svc for Services
ns for Namespaces
netpol for Network policies
pv for Persistent Volumes
pvc for PersistentVolumeClaims
sa for service accounts