Kubernetes - CKAD preparation

Eric Hemmerlin · Follow
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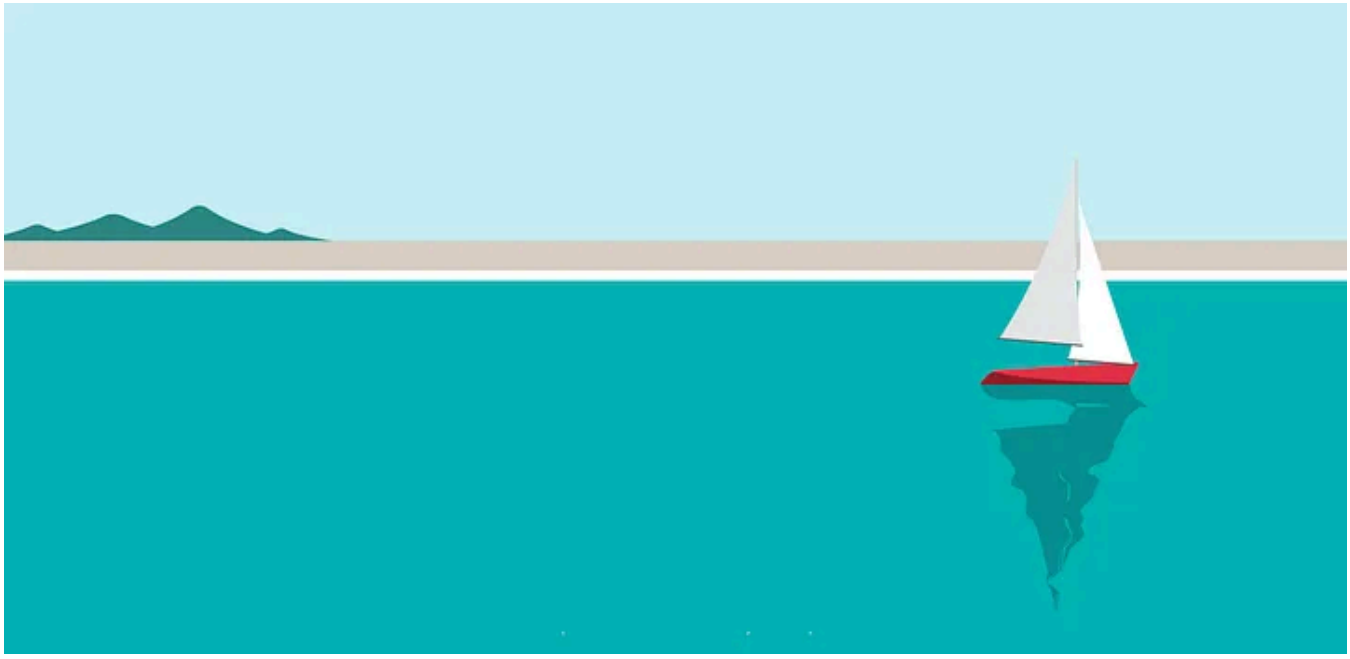

Let's face it, all these yaml files in Kubernetes can be overwhelming. Here is what helped me during my preparation to pass the CKAD exam : building step by step, a big, giant, Pod yaml file in a specific Namespace, containing a Service Account, an Environment variable, a Port, Resources (limits and requests), a Label, a Command, an ImagePullPolicy, Secrets, ConfigMaps, Volumes and an InitContainer.

```
> alias k=kubectl
```

Namespace

```
> k create ns ckad
> k config set-context --current --namespace=ckad
```

Pod

Generate a Pod with Service Account, Environment variable, Port, Resources, Label, Command, ImagePullPolicy

```
> k run nginx --image=nginx --env=USER=user --port=80 --
serviceaccount=default --limits='cpu=200m,memory=512Mi' --
requests='cpu=200m,memory=512Mi' --labels=app=dev --image-pull-
policy=IfNotPresent --command --dry-run=client -oyaml -- /bin/sh -c
"echo 'Hello Kubernetes!'; sleep 3600" > pod.yaml
```

```
> cat pod.yaml
apiVersion: v1
kind: Pod
metadata:
  creationTimestamp: null
  labels:
    app: dev
  name: nginx
spec:
  containers:
  - command:
    - /bin/sh
    - -c
    - echo 'Hello Kubernetes!'; sleep 3600
    env:
    - name: USER
      value: user
    image: nginx
    imagePullPolicy: Never
    name: nginx
    ports:
    - containerPort: 80
    resources:
      limits:
        cpu: 200m
        memory: 512Mi
      requests:
        cpu: 200m
        memory: 512Mi
  dnsPolicy: ClusterFirst
```

```
  restartPolicy: Always
  serviceAccountName: default
status: {}
```

```
> k logs nginx
Hello Kubernetes!
```

Secrets

Secret from literal

```
> k create secret generic secret-literal --from-
literal=username=user --from-literal=password=pass
```

```
> k get secret secret-literal -oyaml
apiVersion: v1
kind: Secret
metadata:
  name: secret-literal
  namespace: ckad
type: Opaque
data:
  password: cGFzcw==
  username: dXNlcg==
```

Secret from env file

```
> vi secret.env
```

Secret env file

```
> cat secret.env
MYSQL_USER=1234
MYSQL_PASS=azer
```

```
> k create secret generic secret-env-file --from-env-file=secret.env
```

```
> k get secret secret-env-file -oyaml
apiVersion: v1
kind: Secret
metadata:
  name: secret-env-file
  namespace: ckad
type: Opaque
data:
```

```
  MYSQL_PASS: YXplcg==
  MYSQL_USER: MTIzNA==
```

Secret from file

```
> vi secret.file
secret.code.true=true
secret.code.false=false

> k create secret generic secret-file --from-file=secret-
file=secret.file --from-file=secret.file

> k get secret secret-file -oyaml
apiVersion: v1
kind: Secret
metadata:
  name: secret-file
  namespace: ckad
type: Opaque
data:
  secret-file:
c2VjcmV0LmNvZGUudHJ1ZT10cnVlCnNlY3JldC5jb2RlLmZhbHNlPWZhbHNlCg==
  secret.file:
c2VjcmV0LmNvZGUudHJ1ZT10cnVlCnNlY3JldC5jb2RlLmZhbHNlPWZhbHNlCg==
```

Pod using all these secrets

```
> vi pod.yaml
apiVersion: v1
kind: Pod
metadata:
  creationTimestamp: null
  labels:
    app: dev
  name: nginx
spec:
  containers:
  - command:
    - /bin/sh
    - -c
    - echo 'Hello Kubernetes!'; sleep 3600
    env:
    - name: USER
      value: user
    - name: SECRET_USERNAME
      valueFrom:
        secretKeyRef:
          name: secret-literal
          key: username
    - name: SECRET_PASSWORD
```

```
        valueFrom:
          secretKeyRef:
            name: secret-literal
            key: password
    envFrom:
    - secretRef:
        name: secret-env-file
    image: nginx
    imagePullPolicy: IfNotPresent
    name: nginx
    ports:
    - containerPort: 80
    resources:
      limits:
        cpu: 200m
        memory: 512Mi
      requests:
        cpu: 200m
        memory: 512Mi
    volumeMounts:
    - name: secret-file
      mountPath: "/etc/secret"
      readOnly: true
  volumes:
  - name: secret-file
    secret:
      secretName: secret-file
  dnsPolicy: ClusterFirst
  restartPolicy: Always
  serviceAccountName: default
status: {}
```

```
> k apply -f pod.yaml
```

```
> k exec nginx -- env
SECRET_USERNAME=user
SECRET_PASSWORD=pass
MYSQL_PASS=azer
MYSQL_USER=1234
USER=user
```

```
> k exec nginx -- ls /etc/secret
secret-file
secret.file
```

```
> k exec nginx -- more /etc/secret/secret-file
/etc/secret/secret.file
::::::::::::::
/etc/secret/secret-file
::::::::::::::
secret.code.true=true
secret.code.false=false
::::::::::::::
/etc/secret/secret.file
::::::::::::::
```

```
secret.code.true=true
secret.code.false=false
```

```
> k exec nginx -- touch /etc/secret/file
touch: cannot touch '/etc/secret/file': Read-only file system
command terminated with exit code 1
```

ConfigMap

ConfigMap from literal

```
> k create configmap configmap-literal --from-
literal=special.how=very --from-literal=special.type=charm
```

```
> k get cm configmap-literal -oyaml
apiVersion: v1
kind: ConfigMap
metadata:
  name: configmap-literal
  namespace: ckad
data:
  special.how: very
  special.type: charm
```

ConfigMap from env file

```
> k create configmap configmap-env-file --from-env-
file=configmap.env
```

```
> k get cm configmap-env-file -oyaml
apiVersion: v1
kind: ConfigMap
metadata:
  name: configmap-env-file
  namespace: ckad
data:
  allowed: '"true"'
  lives: "3"
```

ConfigMap from file

```
> k create cm configmap-file --from-file=configmap-
file=configmap.file --from-file=configmap.file
```

```
> k get cm configmap-file -oyaml
apiVersion: v1
kind: ConfigMap
```

```
metadata:
  name: configmap-file
  namespace: ckad
data:
  configmap-file: |
    color.good=purple
    color.bad=yellow
  configmap.file: |
    color.good=purple
    color.bad=yellow
```

Pod using all these ConfigMaps

```
> vi pod.yaml
apiVersion: v1
kind: Pod
metadata:
  creationTimestamp: null
  labels:
    app: dev
  name: nginx
spec:
  containers:
  - command:
    - /bin/sh
    - -c
    - echo 'Hello Kubernetes!'; sleep 3600
    env:
    - name: USER
      value: user
    - name: SECRET_USERNAME
      valueFrom:
        secretKeyRef:
          name: secret-literal
          key: username
    - name: SECRET_PASSWORD
      valueFrom:
        secretKeyRef:
          name: secret-literal
          key: password
    - name: CONFIGMAP_SPECIAL_HOW
      valueFrom:
        configMapKeyRef:
          name: configmap-literal
          key: special.how
    - name: CONFIGMAP_SPECIAL_TYPE
      valueFrom:
        configMapKeyRef:
          name: configmap-literal
          key: special.type
    envFrom:
    - secretRef:
```

```
          name: secret-env-file
      - configMapRef:
          name: configmap-env-file
      image: nginx
      imagePullPolicy: IfNotPresent
      name: nginx
      ports:
      - containerPort: 80
      resources:
        limits:
          cpu: 200m
          memory: 512Mi
        requests:
          cpu: 200m
          memory: 512Mi
      volumeMounts:
      - name: secret-file
        mountPath: "/etc/secret"
        readOnly: true
      - name: configmap-file
        mountPath: "/etc/configmap"
        readOnly: true
    volumes:
    - name: secret-file
      secret:
        secretName: secret-file
    - name: configmap-file
      configMap:
        name: configmap-file
    dnsPolicy: ClusterFirst
    restartPolicy: Always
    serviceAccountName: default
  status: {}
```

```
> k apply -f pod.yaml
```

```
> k exec nginx -- env
MYSQL_PASS=azer
MYSQL_USER=1234
USER=user
SECRET_USERNAME=user
SECRET_PASSWORD=pass
CONFIGMAP_SPECIAL_HOW=very
CONFIGMAP_SPECIAL_TYPE=charm
lives=3
allowed="true"
```

```
> k exec nginx -- ls /etc/configmap
configmap-file
configmap.file
```

```
> k exec nginx -- more /etc/configmap/configmap-file
/etc/configmap/configmap.file
::::::::::::::
/etc/configmap/configmap-file
::::::::::::::
```

```
color.good=purple
color.bad=yellow
::::::::::::::
/etc/configmap/configmap.file
::::::::::::::
color.good=purple
color.bad=yellow
```

Volumes

HostPath volume

```
> mkdir /tmp/ckad
> echo 'Hello from Kubernetes storage' > /tmp/ckad/message.txt
```

```
> vi hostpath-storage.yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: hostpath-pv
  labels:
    type: local
spec:
  storageClassName: manual
  capacity:
    storage: 10Mi
  accessModes:
    - ReadWriteOnce
  hostPath:
    path: "/tmp/ckad"
---
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: hostpath-pvc
spec:
  storageClassName: manual
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 5Mi
```

```
> k get pv,pvc
NAME                              CAPACITY   ACCESS MODES   RECLAIM
POLICY   STATUS     CLAIM               STORAGECLASS
persistentvolume/hostpath-pv      10Mi       RWO            Retain
Bound      ckad/hostpath-pvc   manual

NAME                                   STATUS   VOLUME        CAPACITY
ACCESS MODES   STORAGECLASS
```

```
persistentvolumeclaim/hostpath-pvc   Bound    hostpath-pv   10Mi
RWO            manual
```

Pod mounting this HostPath volume and an emptyDir

```
> vi pod.yaml
apiVersion: v1
kind: Pod
metadata:
  creationTimestamp: null
  labels:
    app: dev
  name: nginx
spec:
  containers:
  - command:
    - /bin/sh
    - -c
    - echo 'Hello Kubernetes!'; sleep 3600
    env:
    - name: USER
      value: user
    - name: SECRET_USERNAME
      valueFrom:
        secretKeyRef:
          name: secret-literal
          key: username
    - name: SECRET_PASSWORD
      valueFrom:
        secretKeyRef:
          name: secret-literal
          key: password
    - name: CONFIGMAP_SPECIAL_HOW
      valueFrom:
        configMapKeyRef:
          name: configmap-literal
          key: special.how
    - name: CONFIGMAP_SPECIAL_TYPE
      valueFrom:
        configMapKeyRef:
          name: configmap-literal
          key: special.type
    envFrom:
    - secretRef:
        name: secret-env-file
    - configMapRef:
        name: configmap-env-file
    image: nginx
    imagePullPolicy: IfNotPresent
    name: nginx
    ports:
    - containerPort: 80
```

```
      resources:
        limits:
          cpu: 200m
          memory: 512Mi
        requests:
          cpu: 200m
          memory: 512Mi
      volumeMounts:
      - name: secret-file
        mountPath: "/etc/secret"
        readOnly: true
      - name: configmap-file
        mountPath: "/etc/configmap"
        readOnly: true
      - name: hostpath-storage
        mountPath: "/mnt/hostpath"
      - name: emptydir-storage
        mountPath: "/mnt/emptydir"
    volumes:
    - name: secret-file
      secret:
        secretName: secret-file
    - name: configmap-file
      configMap:
        name: configmap-file
    - name: hostpath-storage
      persistentVolumeClaim:
        claimName: hostpath-pvc
    - name: emptydir-storage
      emptyDir: {}
    dnsPolicy: ClusterFirst
    restartPolicy: Always
    serviceAccountName: default
  status: {}
```

```
> k exec nginx -- ls /mnt
emptydir
hostpath
```

```
> k exec nginx -- ls /mnt/emptydir
```

```
> k exec nginx -- ls /mnt/hostpath
message.txt
```

```
> k exec nginx -- cat /mnt/hostpath/message.txt
Hello from Kubernetes storage
```

Init container

```
> k exec nginx -- curl localhost
Failed to connect to localhost port 80: Connection refused
```

```
> vi pod.yaml
apiVersion: v1
kind: Pod
metadata:
  creationTimestamp: null
  labels:
    app: dev
  name: nginx
spec:
  initContainers:
  - name: init
    image: busybox
    command:
    - /bin/sh
    - -c
    - echo 'Hello Kubernetes!'; sleep 2
  containers:
  - env:
    - name: USER
      value: user
    - name: SECRET_USERNAME
      valueFrom:
        secretKeyRef:
          name: secret-literal
          key: username
    - name: SECRET_PASSWORD
      valueFrom:
        secretKeyRef:
          name: secret-literal
          key: password
    - name: CONFIGMAP_SPECIAL_HOW
      valueFrom:
        configMapKeyRef:
          name: configmap-literal
          key: special.how
    - name: CONFIGMAP_SPECIAL_TYPE
      valueFrom:
        configMapKeyRef:
          name: configmap-literal
          key: special.type
    envFrom:
    - secretRef:
        name: secret-env-file
    - configMapRef:
        name: configmap-env-file
    image: nginx
    imagePullPolicy: IfNotPresent
    name: nginx
    ports:
    - containerPort: 80
    resources:
      limits:
        cpu: 200m
        memory: 512Mi
      requests:
```

```
          cpu: 200m
          memory: 512Mi
      volumeMounts:
      - name: secret-file
        mountPath: "/etc/secret"
        readOnly: true
      - name: configmap-file
        mountPath: "/etc/configmap"
        readOnly: true
      - name: hostpath-storage
        mountPath: "/mnt/hostpath"
      - name: emptydir-storage
        mountPath: "/mnt/emptydir"
  volumes:
  - name: secret-file
    secret:
      secretName: secret-file
  - name: configmap-file
    configMap:
      name: configmap-file
  - name: hostpath-storage
    persistentVolumeClaim:
      claimName: hostpath-pvc
  - name: emptydir-storage
    emptyDir: {}
  dnsPolicy: ClusterFirst
  restartPolicy: Always
  serviceAccountName: default
status: {}
```

```
> k exec nginx -- curl localhost
<html>
...
</html>
```

```
> k logs nginx -c init
Hello Kubernetes!
```

Credits

- Image created by rawpixel.com - www.freepik.com

Kubernetes

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Written by Eric Hemmerlin

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With 10+ years of experience in software engineering and 7+ years as a training manager, I'm a passionate engineer embracing the serverless computing journey.

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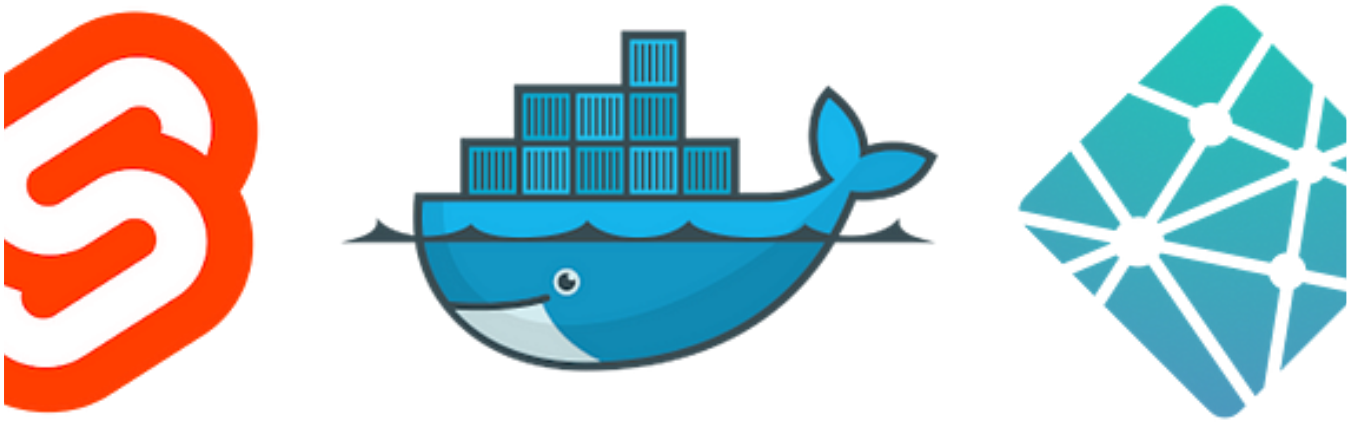

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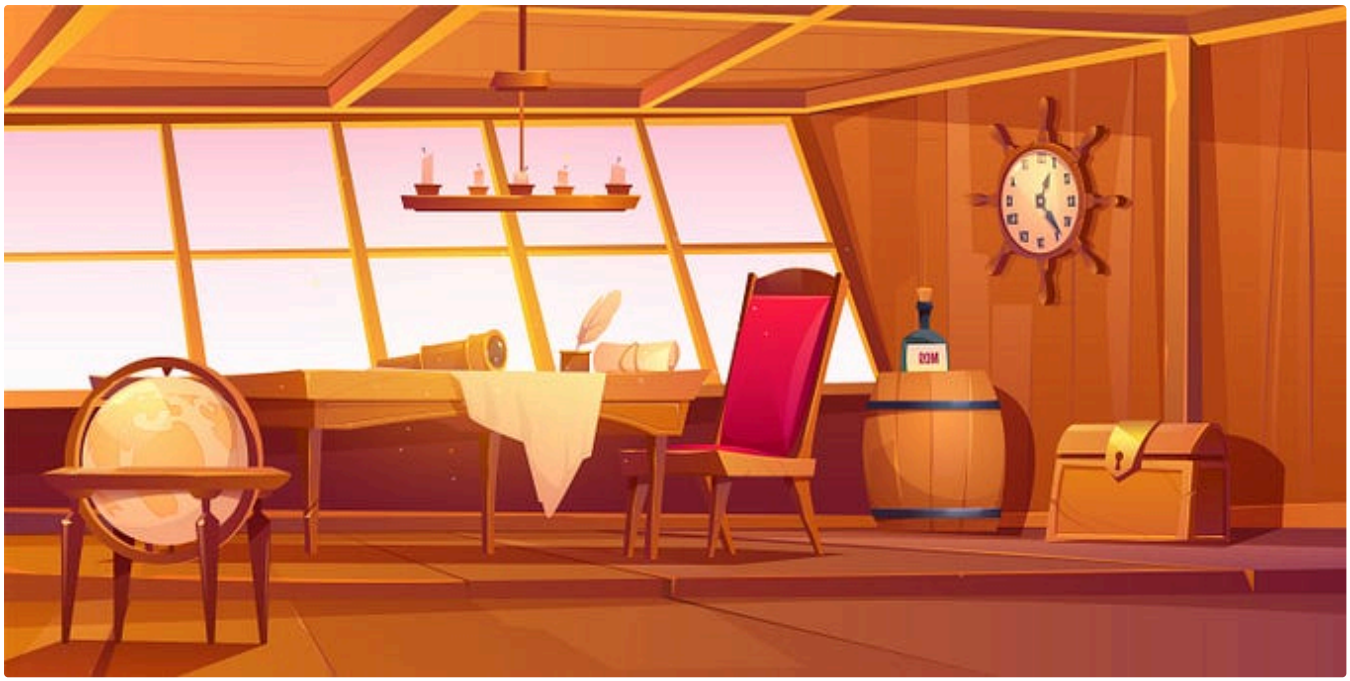

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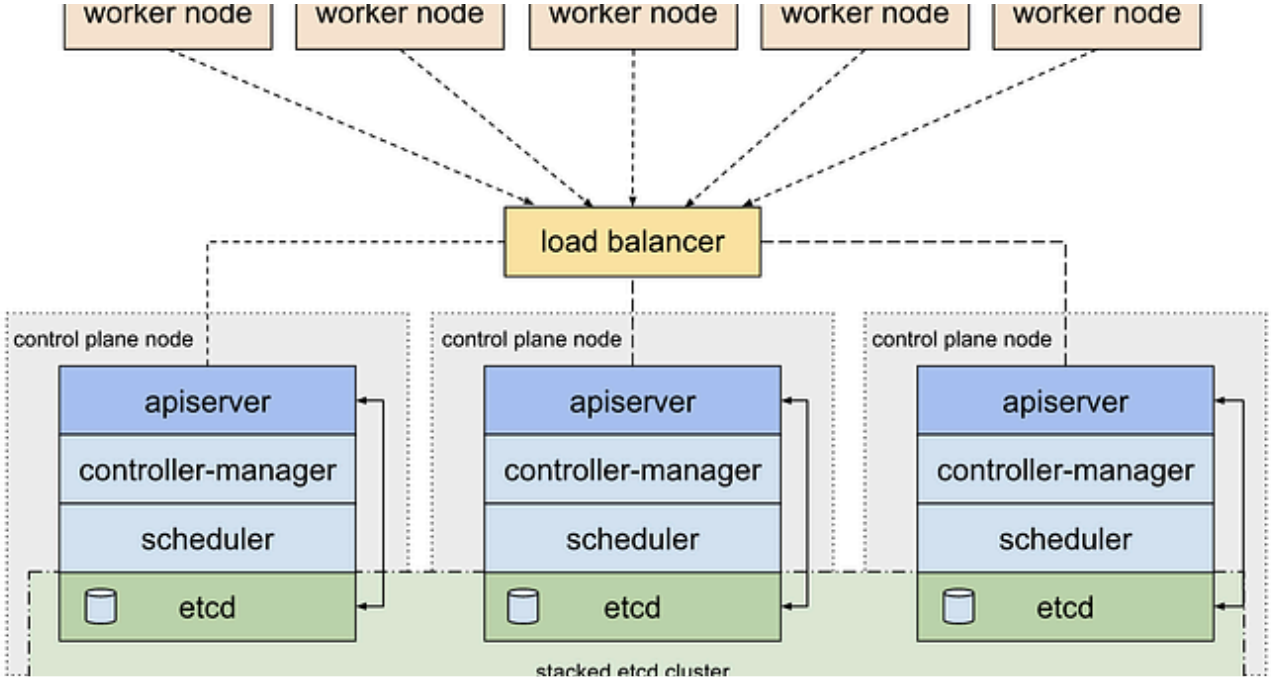

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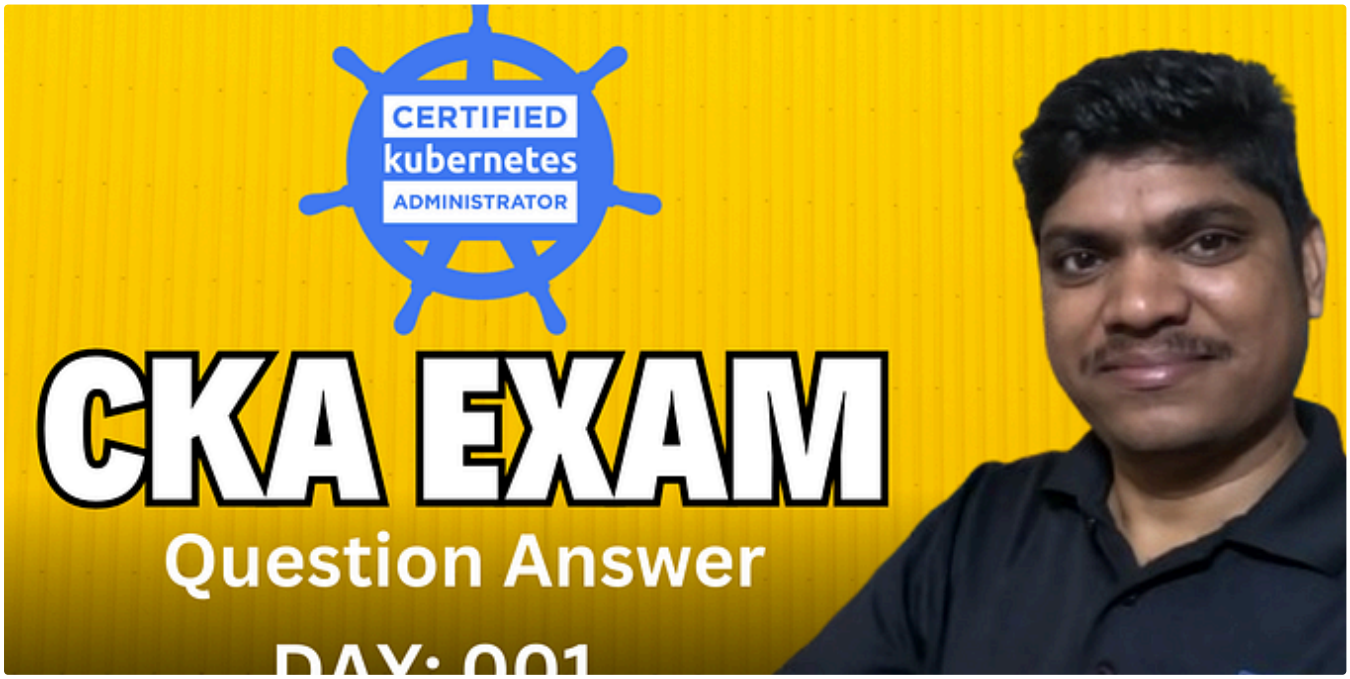

Tech Mahato

Day 001 | CKA Exam Preparation | Contexts

Question 1: Contexts

Sep 17

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