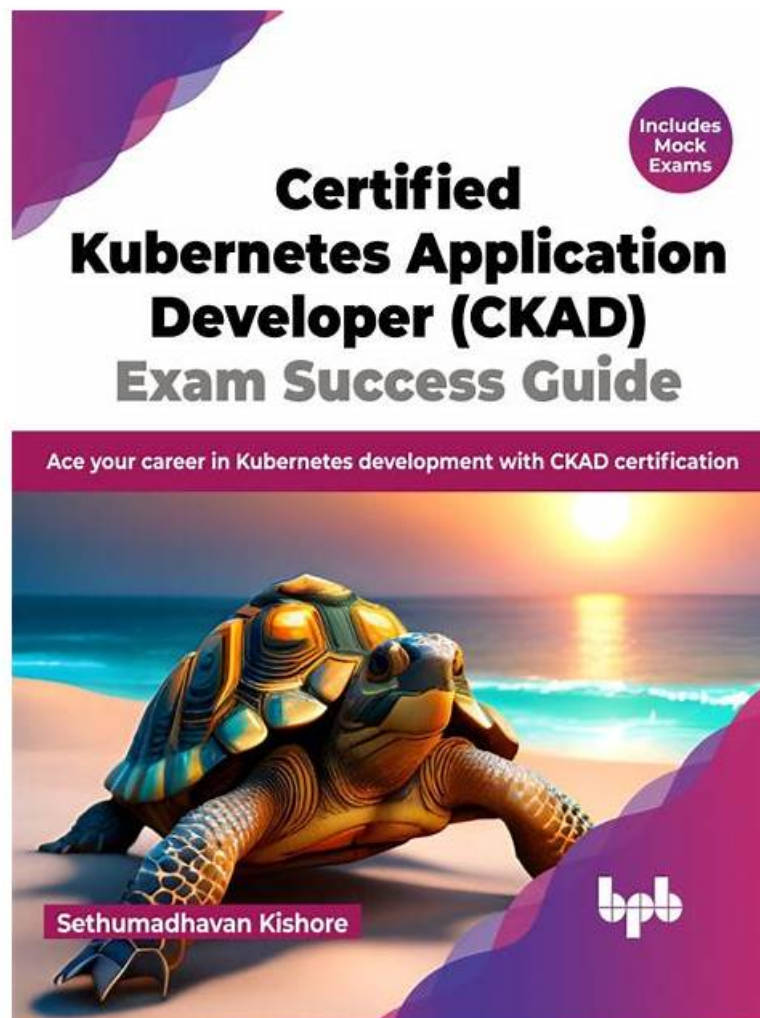


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## Valid CKAD Exam Materials, CKAD Study Guide

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The CKAD exam is a hands-on, performance-based test that measures a candidate's ability to perform real-world tasks with Kubernetes. CKAD exam consists of a set of practical challenges that require the candidate to use their knowledge of Kubernetes to complete a series of tasks. CKAD Exam is conducted online and can be taken from anywhere in the world. Candidates are provided with a set of tools and resources to complete the exam, including a terminal and a set of Kubernetes objects.

## Linux Foundation Certified Kubernetes Application Developer Exam Sample Questions (Q145-Q150):

### NEW QUESTION # 145

Context

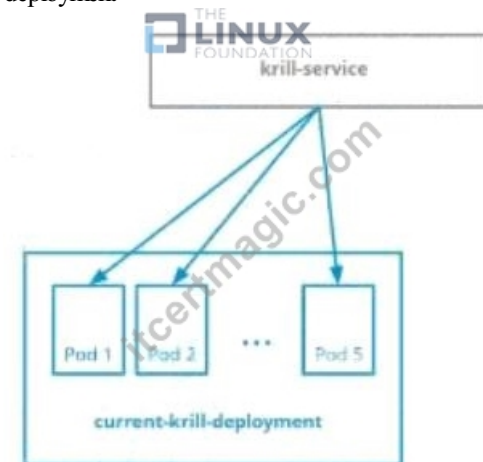


Context

You are asked to prepare a Canary deployment for testing a new application release.

Task:

A Service named `krill-service` in the `goshawk` namespace points to 5 pod created by the Deployment named `current-krill-deployment`



- 1) Create an identical Deployment named `canary-kill-deployment`, in the same namespace.
- 2) Modify the Deployment so that:
  - A maximum number of 10 pods run in the `goshawk` namespace.
  - 40% of the `krill-service` 's traffic goes to the `canary-krill-deployment` pod(s)



The Service is exposed on NodePort 30000. To test its load-balancing, run:

```
[candidate@node-1] $ curl http://k8s-master-0:30000/
```

**Answer:**

**Explanation:**

**Solution:**

```
candidate@node-1:~/humane-storks$ kubectl scale deploy canary-krill-deployment --replicas 4 -n goshawk
deployment.apps/canary-krill-deployment scaled
candidate@node-1:~/humane-storks$ kubectl get deploy -n goshawk
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
canary-krill-deployment  4/4     4            4           46s
current-krill-deployment 5/5     5            5           7h22m
candidate@node-1:~/humane-storks$ wget https://k8s.io/examples/

ndidate@node-1:~/humane-storks$ wget https://k8s.io/examples/admin/resource/quota-pod.yaml
2022-09-24 11:43:51-- https://k8s.io/examples/admin/resource/quota-pod.yaml
solving k8s.io (k8s.io)... 31 107.204.206, 2600:1901:0:26f3::
nnecting to k8s.io (k8s.io)[31 107.204.206]:443... connected.
TP request sent, awaiting response... 301 Moved Permanently
cation: https://kubernetes.io/examples/admin/resource/quota-pod.yaml [following]
2022-09-24 11:43:52-- https://kubernetes.io/examples/admin/resource/quota-pod.yaml
solving kubernetes.io (kubernetes.io)... 147.75.40.148
nnecting to kubernetes.io (kubernetes.io)[147.75.40.148]:443... connected.
TP request sent, awaiting response... 200 OK
ngth: 90 [application/x-yaml]
ving to: 'quota-pod.yaml'

ota-pod.yaml          100%[=====]          90  --.-KB/s   in 0s

22-09-24 11:43:52 (15.0 MB/s) - 'quota-pod.yaml' saved [90/90]

ndidate@node-1:~/humane-storks$ vim quota-pod.yaml
```

```
File Edit View Terminal Tabs Help
2022-09-24 11:43:52 (15.0 MB/s) - 'quota-pod.yaml' saved [90/90]

candidate@node-1:~/humane-storks$ vim quota-pod.yaml
candidate@node-1:~/humane-storks$ kubectl create -f quota-pod.yaml
resourcequota/pod-demo created
candidate@node-1:~/humane-storks$ kubectl get quota -n go
No resources found in go namespace.
candidate@node-1:~/humane-storks$ kubectl get quota -n goshawk
NAME      AGE  REQUEST  LIMIT
pod-demo  19s  pods: 9/10
candidate@node-1:~/humane-storks$ curl http://k8s-master-0:30000/
current-krill-deployment-fb7c7995c-kvtjr
app.kubernetes.io/name="current"
app.kubernetes.io/part-of="krill"
pod-template-hash="fb7c7995c"candidate@node-1:~/humane-storks$ curl http://k8s-master-0:30000/
current-krill-deployment-fb7c7995c-4whfm
app.kubernetes.io/name="current"
app.kubernetes.io/part-of="krill"
pod-template-hash="fb7c7995c"candidate@node-1:~/humane-storks$ curl http://k8s-master-0:30000/
canary-krill-deployment-5f78fd4786-dfk7l
app.kubernetes.io/name="canary"
app.kubernetes.io/part-of="krill"
pod-template-hash="5f78fd4786"candidate@node-1:~/humane-storks$ curl http://k8s-master-0:30000/
canary-krill-deployment-5f78fd4786-z5zrt
app.kubernetes.io/name="canary"
app.kubernetes.io/part-of="krill"
pod-template-hash="5f78fd4786"candidate@node-1:~/humane-storks$ curl http://k8s-master-0:30000/
canary-krill-deployment-5f78fd4786-2774b
app.kubernetes.io/name="canary"
app.kubernetes.io/part-of="krill"
pod-template-hash="5f78fd4786"candidate@node-1:~/humane-storks$
```

#### NEW QUESTION # 146

You are developing a new microservice that requires access to a database deployed in a different namespace. You want to configure a ServiceAccount and RoleBinding to provide the necessary permissions for the microservice to connect to the database.

**Answer:**

Explanation:

See the solution below with Step by Step Explanation.

Explanation:

Solution (Step by Step) :

1. Create a ServiceAccount:

- Create a ServiceAccount in the namespace where our microservice is deployed:

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: my-microservice-sa
  namespace: my-microservice-namespace
```

2. Create a Role: - Create a Role in the namespace where the database is deployed, granting access to the database resources:

```
apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  name: my-database-access-role
  namespace: my-database-namespace
rules:
- apiGroups: [""]
  resources: ["pods", "services", "secrets"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["apps"]
  resources: ["deployments"]
  verbs: ["get", "list", "watch", "create", "update", "delete"]
- apiGroups: ["batch"]
  resources: ["jobs", "cronjobs"]
  verbs: ["get", "list", "watch", "create", "update", "delete"]
```

3. Create a RoleBinding: - Create a RoleBinding in the database namespace to bind the Role to the ServiceAccount:



```

apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: my-database-access-rolebinding
  namespace: my-database-namespace
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: Role
  name: my-database-access-role
subjects:
- kind: ServiceAccount
  name: my-microservice-sa
  namespace: my-microservice-namespace

```

4. Apply the Configuration: - Apply the created ServiceAccount, Role, and Rolebinding using 'kubectl apply -f' commands: `bash kubectl apply -f my-microservice-sa.yaml kubectl apply -f my-database-access-role.yaml kubectl apply -f my-database-access-rolebinding.yaml` 5. Configure the Microservice: - Mount the ServiceAccount token as a secret within the microservice's pod:

```

apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-microservice
  namespace: my-microservice-namespace
spec:
  replicas: 1
  selector:
    matchLabels:
      app: my-microservice
  template:
    metadata:
      labels:
        app: my-microservice
    spec:
      serviceAccountName: my-microservice-sa
      containers:
      - name: my-microservice
        image: my-microservice-image:latest
        volumeMounts:
        - name: sa-token
          mountPath: /var/run/secrets/kubernetes.io/serviceaccount
      volumes:
      - name: sa-token
        secret:
          secretName: default-token-my-microservice-sa

```

6. Verify Permissions: - Access the database from the microservice pod to verify that the required permissions are granted.

#### NEW QUESTION # 147

You are tasked with setting up a secure Kubernetes cluster for a web application. The application has sensitive data that must be protected. You need to configure a mechanism to restrict access to the application's pods based on user identities. Describe a method to achieve this using Kubernetes RBAC and Service Accounts, ensuring that only authorized users can access specific pods.

**Answer:**

Explanation:

See the solution below with Step by Step Explanation.

Explanation:

Solution (Step by Step) :

1. Create a Service Account

- Create a Service Account for the application:

```

apiVersion: v1
kind: ServiceAccount
metadata:
  name: webapp-sa

```

- Apply the Service Account configuration basn `kubectl apply -f webapp-sa.yaml` 2. Create a Role: - Define a Role that grants access to the specific pods:

```

apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  name: webapp-pod-reader
  namespace:
rules:
- apiGroups: ["apps"]
  resources: ["deployments"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["apps"]
  resources: ["deployments/finalizers"]
  verbs: ["update"]
- apiGroups: ["apps"]
  resources: ["statefulsets"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["apps"]
  resources: ["statefulsets/finalizers"]
  verbs: ["update"]
- apiGroups: ["extensions"]
  resources: ["ingresses"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["extensions"]
  resources: ["ingresses/finalizers"]
  verbs: ["update"]
- apiGroups: ["extensions"]
  resources: ["daemonsets"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["extensions"]
  resources: ["daemonsets/finalizers"]
  verbs: ["update"]
- apiGroups: ["batch"]
  resources: ["jobs"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["batch"]
  resources: ["jobs/finalizers"]
  verbs: ["update"]
- apiGroups: ["batch"]
  resources: ["cronjobs"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["batch"]
  resources: ["cronjobs/finalizers"]
  verbs: ["update"]
- apiGroups: ["policy"]
  resources: ["podsecuritypolicies"]
  verbs: ["use"]
- apiGroups: ["admissionregistration.k8s.io"]
  resources: ["validatingwebhookconfigurations"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["admissionregistration.k8s.io"]
  resources: ["mutatingwebhookconfigurations"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["rbac.authorization.k8s.io"]
  resources: ["roles", "rolebindings"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["", "apps", "extensions", "batch"]

```

```

resources: ["pods"]
verbs: ["get", "list", "watch"]
- apiGroups: ["", "apps", "extensions", "batch"]
  resources: ["pods/log"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["apps", "extensions", "batch"]
  resources: ["pods/exec"]
  verbs: ["create"]
- apiGroups: ["apps", "extensions", "batch"]
  resources: ["pods/portforward"]
  verbs: ["create"]
- apiGroups: ["apps", "extensions", "batch"]
  resources: ["pods/proxy"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["apps", "extensions", "batch"]
  resources: ["pods/attach"]
  verbs: ["create"]
- apiGroups: ["apps", "extensions", "batch"]
  resources: ["pods/status"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["apps", "extensions", "batch"]
  resources: ["pods/binding"]
  verbs: ["get", "list", "watch"]
- apiGroups: ["apps", "extensions", "batch"]
  resources: ["pods/eviction"]
  verbs: ["create"]
- apiGroups: ["apps", "extensions", "batch"]
  resources: ["pods/delete"]
  verbs: ["delete"]

```

- Apply the Role configuration: `bash kubectl apply -f webapp-pod-reader.yaml` 3. Create a RoleBinding: - Bind the Role to the Service Account

```

apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: webapp-pod-reader-binding
  namespace:
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: Role
  name: webapp-pod-reader
subjects:
- kind: ServiceAccount
  name: webapp-sa
  namespace:

```

- Apply the RoleBinding configuration: `bash kubectl apply -f webapp-pod-reader-binding.yaml` 4. Configure the Application: - When deploying the application, specify the Service Account:

```

apiVersion: apps/v1
kind: Deployment
metadata:
  name: webapp-deployment
spec:
  replicas: 2
  selector:
    matchLabels:
      app: webapp
  template:
    metadata:
      labels:
        app: webapp
    spec:
      serviceAccountName: webapp-sa
      containers:
      - name: webapp
        image:

```



5. Verify Access: - Use the 'kubectl' command with the Service Account's credentials to verify that only authorized users can access the application's pods: `bash kubectl -service-account=webapp-sa get pods -n` This setup utilizes Kubernetes RBAC to control access to the application's pods. - The Service Account acts as an identity for the application. - The Role defines the permissions granted to the Service Account, specifically allowing access to the pods. - The RoleBinding associates the Role with the Service Account, linking the permissions to the identity. - When the application is deployed with the specified Service Account, it inherits the permissions defined in the RoleBinding. This ensures that only users with the necessary credentials (associated with the Service Account) can access and interact with the application's pods, safeguarding sensitive data.

#### NEW QUESTION # 148

You are running a Deployment for a database service with 3 replicas. You want to ensure that only one pod is updated at a time, but you need to guarantee that the database service remains available throughout the update process. How would you configure the Deployment to achieve this?

#### Answer:

Explanation:

See the solution below with Step by Step Explanation.

Explanation:

Solution (Step by Step) :

1. Update the Deployment YAML

- Update the 'replicas' to 3.
- Define 'maxUnavailable: 1' and 'maxSurge: 0' in the 'strategy-rollingupdate' section to control the rolling update process.
- Use a 'readiness probe' within your container definition to ensure that the pod is considered ready only when the database is successfully started and connected.
- Configure a 'strategy-type' to 'RollingUpdate' to trigger a rolling update when the deployment is updated.



```

apiVersion: apps/v1
kind: Deployment
metadata:
  name: database-deployment
spec:
  replicas: 3
  selector:
    matchLabels:
      app: database
  template:
    metadata:
      labels:
        app: database
    spec:
      containers:
        - name: database
          image: database-image:latest
          imagePullPolicy: Always
          readinessProbe:
            tcpSocket:
              port: 5432
            initialDelaySeconds: 15
            periodSeconds: 5
      strategy:
        type: RollingUpdate
        rollingUpdate:
          maxUnavailable: 1
          maxSurge: 0

```

2. Create the Deployment: - Apply the updated YAML file using 'kubectl apply -f database-deployment-yaml'. 3. Verify the Deployment - Check the status of the deployment using 'kubectl get deployments database-deployment' to confirm the rollout and updated replica count. 4. Trigger the Automatic Update: - Push a new image to the Docker Hub repository. 5. Monitor the Deployment - Use 'kubectl get pods -l' to monitor the pod updates during the rolling update process. You will observe that only one pod is terminated at a time. The readiness probe will ensure that a new pod is only considered ready when it's successfully connected to the database. 6. Check for Successful Update: - Once the deployment is complete, use 'kubectl describe deployment database-deployment' to see that the 'updatedReplicas' field matches the 'replicas' field, indicating a successful update.,

#### NEW QUESTION # 149

You are building a microservices application on Kubernetes, where two services, 'service-a' and 'service-b', need to communicate with each other securely. 'Service-b' needs to expose a secure endpoint that is only accessible by 'service-a'. Describe how you would implement this using Kubernetes resources, including the configuration for the 'service-b' endpoint.

#### Answer:

Explanation:

See the solution below with Step by Step Explanation.

Explanation:

Solution (Step by Step) :

1. Define a Kubernetes Secret:

- Create a Kubernetes secret to store the certificate and key pair for 'service-a'. This secret will be used to secure the communication.

- Example:

```

apiVersion: v1
kind: Secret
metadata:
  name: service-b-tls
type: kubernetes.io/tls
data:
  tls.crt:
  tls.key:

```

2. Configure 'service-b' Deployment: - Define a Deployment for 'service-b' , specifying a container that uses the secret for TLS. - Ensure that the container has the required dependencies and configuration to use TLS. - Example:

```

apiVersion: apps/v1
kind: Deployment
metadata:
  name: service-b-deployment
spec:
  replicas: 1
  selector:
    matchLabels:
      app: service-b
  template:
    metadata:
      labels:
        app: service-b
    spec:
      containers:
        - name: service-b
          image: your-image:latest
          ports:
            - containerPort: 8443
          volumeMounts:
            - name: service-b-tls
              mountPath: /var/tls/
      volumes:
        - name: service-b-tls
          secret:
            secretName: service-b-tls

```

3. Define a Kubernetes Service for 'service-b'. - Create a Service for 'service-b' that exposes the secure endpoint on a specific port (e.g., 8443) and uses the LoadBalancer type for external access. - Use the 'targetPort' field to specify the container port that 'service-b' is listening on. - Example:

```

apiVersion: v1
kind: Service
metadata:
  name: service-b-service
spec:
  type: LoadBalancer
  ports:
    - protocol: TCP
      port: 8443
      targetPort: 8443
  selector:
    app: service-b

```

4. Configure 'service-a' Deployment: - Define a Deployment for 'service-a', specifying a container that uses the secret for TLS when connecting to service-W. - Example:

```

apiVersion: apps/v1
kind: Deployment
metadata:
  name: service-a-deployment
spec:
  replicas: 1
  selector:
    matchLabels:
      app: service-a
  template:
    metadata:
      labels:
        app: service-a
    spec:
      containers:
        - name: service-a
          image: your-image:latest
          ports:
            - containerPort: 8080
          volumeMounts:
            - name: service-b-tls
              mountPath: /var/tls/
          volumes:
            - name: service-b-tls
              secret:
                secretName: service-b-tls

```

5. Update 'service-a' Container Configuration: - Within the 'service-a' container, ensure the application is configured to use the certificate and key from the mounted volume ('/var/tls/') for secure communication with 'service-b'. 6. Verify Secure Communication: - Use 'kubectl get pods' to check the status of both 'service-a' and 'service-W' pods. - Test the communication between 'service-a'

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