

# Valid CKS Exam Syllabus - Unlimited CKS Exam Practice



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[\*\*>> Valid CKS Exam Syllabus <<\*\*](#)

## Unlimited Linux Foundation CKS Exam Practice - CKS Exam Reference

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## Linux Foundation Certified Kubernetes Security Specialist (CKS) Sample Questions (Q87-Q92):

### NEW QUESTION # 87

You are tasked with ensuring the security of a Kubernetes cluster running a sensitive application. Describe how you would implement a "least privilege" principle for both users and service accounts in this cluster.

**Answer:**

Explanation:

Solution (Step by Step) :

1. User Roles and Permissions:

- Define specific roles with minimal permissions for different user groups based on their responsibilities.
- For example, developers might have access to deploy applications, while operations team members might have access to manage resources.
- use RBAC (Role-Based Access Control) in Kubernetes to define roles and assign them to users.

2. Service Account Permissions:

- Create separate service accounts for each application or service in the cluster.
- Grant the service accounts only the necessary permissions to perform their specific tasks.
- Avoid using default service accounts with broad permissions.
- Employ the "principle of least privilege" by defining minimal permissions for service accounts.

3. Pod Security Policies (PSPs):

- Implement PSPs to enforce security constraints on pods, restricting resources that they can access.
- Define PSPs to allow only specific container images, disable privileged containers, limit resource requests, and enforce other security controls.
- Consider using Pod Security Admission (PSA) as a replacement for PSPs in Kubernetes 1.25+.

4. Network Policies:

- Implement network policies to control network communication between pods and services.
- Define rules that allow only necessary traffic between pods, restricting any unnecessary or unauthorized connections.

5. Secret Management

- Utilize Kubernetes Secrets to store sensitive information like passwords and API keys.
- Limit access to secrets based on the principle of least privilege.
- Avoid storing sensitive information directly in deployment YAML files.

```
# Example Role definition in RBAC:
apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  name: deployer-role
rules:
- apiGroups: ["apps"]
  resources: ["deployments"]
  verbs: ["get", "list", "watch", "create", "update", "delete"]

# Example Pod Security Policy:
apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
  name: restrictive-psp
spec:
  privileged: false
  hostNetwork: false
  hostIPC: false
  hostPID: false
  readOnlyRootFilesystem: true
  runAsUser:
    rule: "RunAsAny"
  supplementalGroups:
    rule: "RunAsAny"
  fsGroup:
    rule: "RunAsAny"

# Example Service Account with limited permissions:
apiVersion: v1
kind: ServiceAccount
metadata:
  name: my-app-sa
---
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: my-app-sa-binding
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: Role
  name: my-app-role
subjects:
- kind: ServiceAccount
  name: my-app-sa
  namespace: default
```



## NEW QUESTION # 88

You need to implement a container image vulnerability scanning solution within your Kubernetes cluster. You want to use an external vulnerability scanner API that provides information about vulnerabilities in container images. Explain how you would design and implement this solution.

### Answer:

Explanation:

Solution (Step by Step) :

#### 1. choose Vulnerability Scanner:

- Select a reputable vulnerability scanner API that provides a comprehensive database and accurate information about container image vulnerabilities.
- Some options include Aqua Security, Anchore Engine, Snyk, Twistlock, and more.
- Choose a scanner with a suitable API interface for integration with your Kubernetes environment.

#### 2. Implement a Scanner Service:

- Create a Kubernetes service that will communicate with your chosen vulnerability scanner API.

- This service will act as an intermediary between Kubernetes and the external scanner

#### 3. Design Scanner Workflow:

- The service should be able to:

- Accept image details (registry, image name, tag) as input.
- Send requests to the scanner API to retrieve vulnerability information.
- Process the results from the scanner and format them for Kubernetes.
- (Optional) Store the scan results for future analysis and reporting.

#### 4. Design Scanner Workflow:

- You can trigger scans using different methods:

- Automated Scanning: Implement a mechanism (e.g., a cron job or webhook triggered by image pushes) to automatically scan new images.

- On-Demand Scanning: Allow users to manually request image scans via a command line interface (CLI) or a user interface.

#### 5. Integration with Kubernetes:

- You can integrate your scanner service with Kubernetes using several approaches:

- Admission Webhook: Use a webhook to intercept pod creation or updates. The webhook can send the image details to your scanner service and block pod creation if critical vulnerabilities are detected.

- Custom Resource Definitions (CRDs): Create CRDs to manage image scanning tasks. You can define a "ImageScan" or "VulnerabilityScan" resource that represents a scan request.

- Deployment Controller: Use a custom controller or operator to manage the scanning process. This allows you to define rules for automatic scanning

and integrate with other Kubernetes resources.

#### 6. Scanner Service Implementation (Example):

- Here's a simplified example using Python and a hypothetical "vulnerability-scanner" API

```
python
import requests
import json
```

```

def scan_image(image_name):
    api_url = "https://vulnerability-scanner.example.com/api/v1/scan"
    headers = {'Content-Type': 'application/json'}
    payload = {"image": image_name}

    response = requests.post(api_url, data=json.dumps(payload), headers=headers)

    if response.status_code == 200:
        return response.json()
    else:
        return {"error": "Failed to scan image"}

# Example usage:
image_to_scan = "docker.io/nginx:latest"
scan_results = scan_image(image_to_scan)
print(scan_results)

```



6. Handle Scan Results: - After scanning, process the vulnerability information received from the API. - You can: - Store the scan results in a database or log file. - Generate alerts or reports based on the severity of vulnerabilities found. - Integrate with other security tools or dashboards for analysis and remediation.

#### NEW QUESTION # 89

You have a Kubernetes cluster running a highly sensitive microservices application. You need to implement a strict security policy where only pods with specific labels can communicate with each other within the same namespace. How can you achieve this using NetworkPolicies?

#### Answer:

Explanation:

Solution (Step by Step) :

1. Define Label-Based Access: Identify the specific labels that pods within the namespace should have to allow communication. For example, let's say pods with the labels `app: serviceA` and `app: serviceB` should be allowed to communicate, but other pods should be isolated.
2. Create NetworkPolicy: Create a NetworkPolicy YAML file named 'strict-communication.yaml' to define the communication policy:

```

apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: strict-communication
  namespace:
spec:
  podSelector: {}
  ingress:
  - from:
    - podSelector:
        matchLabels:
          app: serviceA
  - from:
    - podSelector:
        matchLabels:
          app: serviceB

```



- This policy allows pods with the labels 'app: serviceA' or 'app: serviceB' to communicate with each other. Other pods within the same namespace are not allowed to communicate.

3. Apply Network Policy: Apply the NetworkPolicy using 'kubectl' bash kubectl

apply -f strict-communication.yaml 4. Verify Network Policy: Verify the NetworkPolicy is applied: bash kubectl get networkpolicies -n 5. Test Access: Test communication between pods within the namespace. Pods with the specified labels Capp: serviceAS and Sapp: serviceB' should be able to communicate. Other pods should not be able to communicate with each other or with the labeled pods. This NetworkPolicy enforces a strict communication policy within the namespace. It restricts communication to pods with specific labels, effectively isolating other pods within the same namespace. This policy can be tuner customized to define more granular communication rules based on labels and other pod attributes.

## NEW QUESTION # 90

### SIMULATION

Create a new NetworkPolicy named deny-all in the namespace testing which denies all traffic of type ingress and egress traffic

### Answer:

Explanation:

You can create a "default" isolation policy for a namespace by creating a NetworkPolicy that selects all pods but does not allow any ingress traffic to those pods.

```
---  
apiVersion: networking.k8s.io/v1  
kind: NetworkPolicy  
metadata:  
  name: default-deny-ingress  
spec:  
  podSelector: {}  
  policyTypes:  
  - Ingress
```

You can create a "default" egress isolation policy for a namespace by creating a NetworkPolicy that selects all pods but does not allow any egress traffic from those pods.

```
---  
apiVersion: networking.k8s.io/v1  
kind: NetworkPolicy  
metadata:  
  name: allow-all-egress  
spec:  
  podSelector: {}  
  egress:  
  - {}  
  policyTypes:  
  - Egress
```

Default deny all ingress and all egress traffic

You can create a "default" policy for a namespace which prevents all ingress AND egress traffic by creating the following NetworkPolicy in that namespace.

```
---  
apiVersion: networking.k8s.io/v1  
kind: NetworkPolicy  
metadata:  
  name: default-deny-all  
spec:  
  podSelector: {}  
  policyTypes:  
  - Ingress  
  - Egress
```

This ensures that even pods that aren't selected by any other NetworkPolicy will not be allowed ingress or egress traffic.

## NEW QUESTION # 91

Fix all issues via configuration and restart the affected components to ensure the new setting takes effect.

Fix all of the following violations that were found against the API server:- a. Ensure that the RotateKubeletServerCertificate argument is set to true.

b. Ensure that the admission control plugin PodSecurityPolicy is set.

- c. Ensure that the `--kubelet-certificate-authority` argument is set as appropriate.
- Fix all of the following violations that were found against the Kubelet:-

  - a. Ensure the `--anonymous-auth` argument is set to false.
  - b. Ensure that the `--authorization-mode` argument is set to Webhook.

- Fix all of the following violations that were found against the ETCD:-

  - a. Ensure that the `--auto-tls` argument is not set to true
  - b. Ensure that the `--peer-auto-tls` argument is not set to true

Hint: Take the use of Tool Kube-Bench

**Answer:**

Explanation:

Fix all of the following violations that were found against the API server:-

- a. Ensure that the `RotateKubeletServerCertificate` argument is set to true.

```
apiVersion: v1
kind: Pod
metadata:
  creationTimestamp: null
  labels:
    component: kubelet
    tier: control-plane
    name: kubelet
    namespace: kube-system
  spec:
    containers:
      - command:
          - kube-controller-manager
          +---feature-gates=RotateKubeletServerCertificate=true
        image: gcr.io/google_containers/kubelet-amd64:v1.6.0
        livenessProbe:
          failureThreshold: 8
        httpGet:
          host: 127.0.0.1
          path: /healthz
          port: 6443
          scheme: HTTPS
        initialDelaySeconds: 15
        timeoutSeconds: 15
        name: kubelet
        resources:
          requests:
            cpu: 250m
        volumeMounts:
          - mountPath: /etc/kubernetes
            name: k8s
            readOnly: true
          - mountPath: /etc/ssl/certs
            name: certs
          - mountPath: /etc/pki
            name: pki
        hostNetwork: true
        volumes:
          - hostPath:
              path: /etc/kubernetes
              name: k8s
            - hostPath:
                path: /etc/ssl/certs
                name: certs
            - hostPath:
                path: /etc/pki
                name: pki
  b. Ensure that the admission control plugin PodSecurityPolicy is set.
```

```

audit: "/bin/ps -ef | grep $apiserverbin | grep -v grep"
tests:
test_items:
- flag: "--enable-admission-plugins"
compare:
op: has
value: "PodSecurityPolicy"
set: true
remediation: |
Follow the documentation and create Pod Security Policy objects as per your environment.
Then, edit the API server pod specification file $apiserverconf
on the master node and set the --enable-admission-plugins parameter to a value that includes PodSecurityPolicy :
--enable-admission-plugins=...,PodSecurityPolicy,...
Then restart the API Server.
scored: true
c. Ensure that the --kubelet-certificate-authority argument is set as appropriate.
audit: "/bin/ps -ef | grep $apiserverbin | grep -v grep"
tests:
test_items:
- flag: "--kubelet-certificate-authority"
set: true
remediation: |
Follow the Kubernetes documentation and setup the TLS connection between the apiserver and kubelets. Then, edit the API server
pod specification file
$apiserverconf on the master node and set the --kubelet-certificate-authority parameter to the path to the cert file for the certificate
authority.
--kubelet-certificate-authority=<ca-string>
scored: true
Fix all of the following violations that were found against the ETCD:
a. Ensure that the --auto-tls argument is not set to true
Edit the etcd pod specification file $etcdconf on the master
node and either remove the --auto-tls parameter or set it to false.
--auto-tls=false
b. Ensure that the --peer-auto-tls argument is not set to true
Edit the etcd pod specification file $etcdconf on the master
node and either remove the --peer-auto-tls parameter or set it to false.
--peer-auto-tls=false

```

## NEW QUESTION # 92

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