

Valid CKS Exam Syllabus - Unlimited CKS Exam Practice



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>> Valid CKS Exam Syllabus <<

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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 now 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
- 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.

3. 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.


4. 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.

5. 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 tuned/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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