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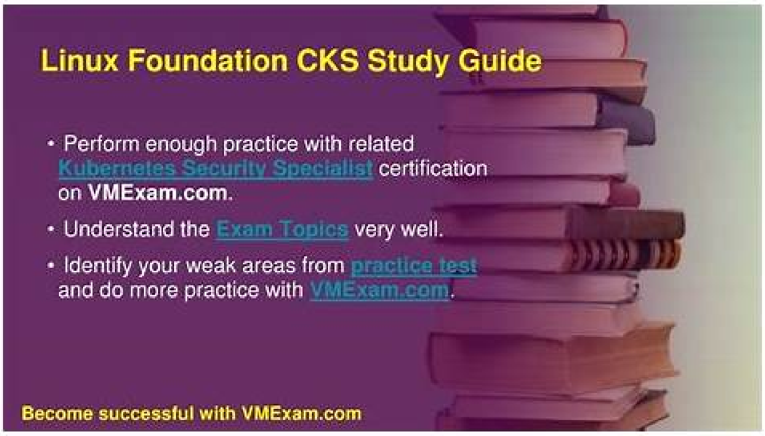

Linux Foundation CKS Study Guide

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The CKS certification exam is designed for professionals who are already certified in the Kubernetes Administration (CKA) exam or have equivalent knowledge and experience. The CKS exam covers a broad range of topics related to Kubernetes security, including cluster hardening, network policies, authentication, authorization, and encryption. CKS exam also tests the candidate's ability to identify and mitigate common security threats and vulnerabilities in Kubernetes clusters.

Linux Foundation CKS (Certified Kubernetes Security Specialist) Certification Exam is an essential certification program for professionals seeking to validate their knowledge and skills in securing Kubernetes clusters. Certified Kubernetes Security Specialist (CKS) certification exam covers a wide range of security topics and is vendor-neutral, making it a valuable credential for professionals working in a variety of industries. CKS Exam is rigorous and performance-based, ensuring that certified professionals possess the necessary knowledge and skills to secure Kubernetes environments effectively.

To be eligible for the CKS certification exam, individuals must hold a valid Kubernetes administrator (CKA) certification. The CKS certification builds upon the knowledge and skills learned in the CKA certification, providing individuals with a deeper understanding of Kubernetes security. The CKS certification exam is designed for professionals working in various roles, including Kubernetes administrators, DevOps engineers, cloud security engineers, and security analysts.

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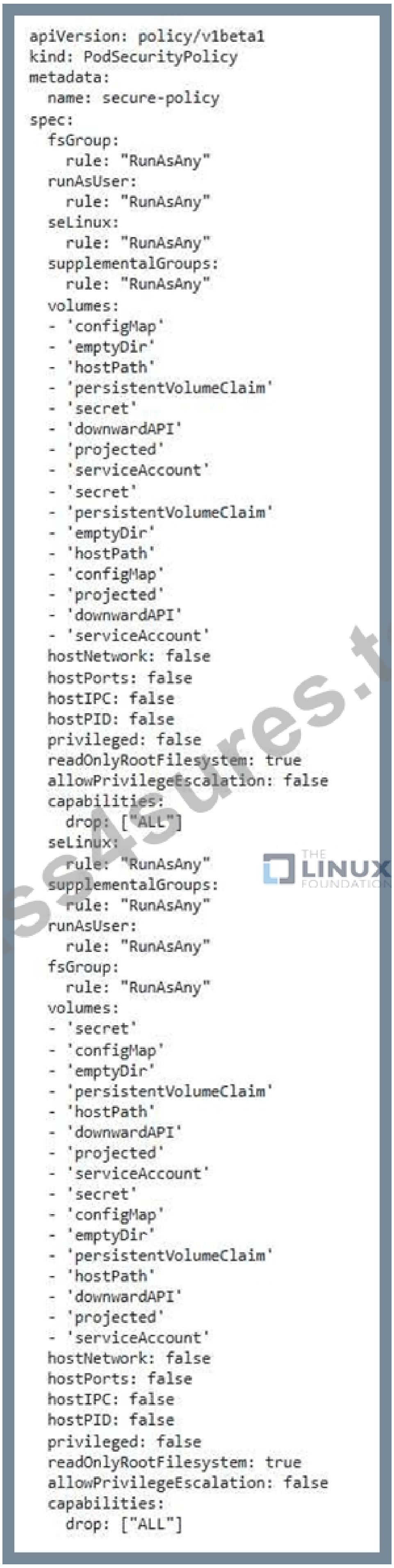
Linux Foundation Certified Kubernetes Security Specialist (CKS) Sample Questions (Q142-Q147):

NEW QUESTION # 142

Your organization has a policy requiring all Kubernetes deployments to utilize Pod Security Policies (PSPs) to enforce security best practices. You're responsible for creating a PSP that enforces the following:
- Only allows containers with a specific security context (privileged: false, runAsUser: 1000, readOnlyRootFilesystem: true)
- Restricts access to most resources by denying the 'hostPort and 'hostNetwork' capabilities.
- Prohibits the use of privileged containers.
Implement the required PSP configuration

Answer:

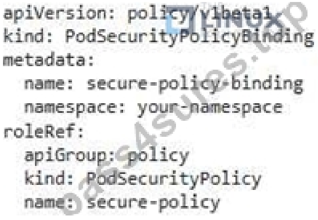
Explanation:
Solution (Step by Step) :
1. Create a PodSecurityPolicy:
- Define a PodSecurityP01icy named 'secure-policy' that enforces the specified security restrictions.



```
apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
  name: secure-policy
spec:
  fsGroup:
    rule: "RunAsAny"
  runAsUser:
    rule: "RunAsAny"
  seLinux:
    rule: "RunAsAny"
  supplementalGroups:
    rule: "RunAsAny"
  volumes:
  - 'configMap'
  - 'emptyDir'
  - 'hostPath'
  - 'persistentVolumeClaim'
  - 'secret'
  - 'downwardAPI'
  - 'projected'
  - 'serviceAccount'
  - 'secret'
  - 'persistentVolumeClaim'
  - 'emptyDir'
  - 'hostPath'
  - 'configMap'
  - 'projected'
  - 'downwardAPI'
  - 'serviceAccount'
  hostNetwork: false
  hostPorts: false
  hostIPC: false
  hostPID: false
  privileged: false
  readOnlyRootFilesystem: true
  allowPrivilegeEscalation: false
  capabilities:
    drop: ["ALL"]
  seLinux:
    rule: "RunAsAny"
  supplementalGroups:
    rule: "RunAsAny"
  runAsUser:
    rule: "RunAsAny"
  fsGroup:
    rule: "RunAsAny"
  volumes:
  - 'secret'
  - 'configMap'
  - 'emptyDir'
  - 'persistentVolumeClaim'
  - 'hostPath'
  - 'downwardAPI'
  - 'projected'
  - 'serviceAccount'
  - 'secret'
  - 'configMap'
  - 'emptyDir'
  - 'persistentVolumeClaim'
  - 'hostPath'
  - 'downwardAPI'
  - 'projected'
  - 'serviceAccount'
  hostNetwork: false
  hostPorts: false
  hostIPC: false
  hostPID: false
  privileged: false
  readOnlyRootFilesystem: true
  allowPrivilegeEscalation: false
  capabilities:
    drop: ["ALL"]
```

2. Create a PodSecurityPolicy8inding: - Bind the 'secure-policy' to a namespace or specific deployments. - This ensures that the

PSP is enforced for deployments Within the bound scope.



```
apiVersion: policy/v1beta1
kind: PodSecurityPolicyBinding
metadata:
  name: secure-policy-binding
  namespace: your-namespace
roleRef:
  apiGroup: policy
  kind: PodSecurityPolicy
  name: secure-policy
```

3. Deploy the PSP: - Apply the 'secure-policy.yaml and 'secure-policy-binding.yaml files to the cluster - This will activate the PSP and enforce the defined security rules. 4. Validate PSP Enforcement - Attempt to create a deployment that violates the PSP rules. - Verify that the deployment creation fails due to the PSP enforcement.

NEW QUESTION # 143

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
```

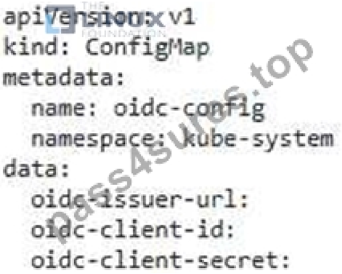
This ensures that even pods that aren't selected by any other NetworkPolicy will not be allowed ingress or egress traffic.

NEW QUESTION # 144

You are tasked with securing a Kubernetes cluster that is accessible from the public internet. You need to ensure that only authorized users can access the Kubernetes API server Implement a solution that uses role-based access control (RBAC) to restrict access to the API server based on user groups defined in an external identity provider (e.g., Okta, Azure AD).

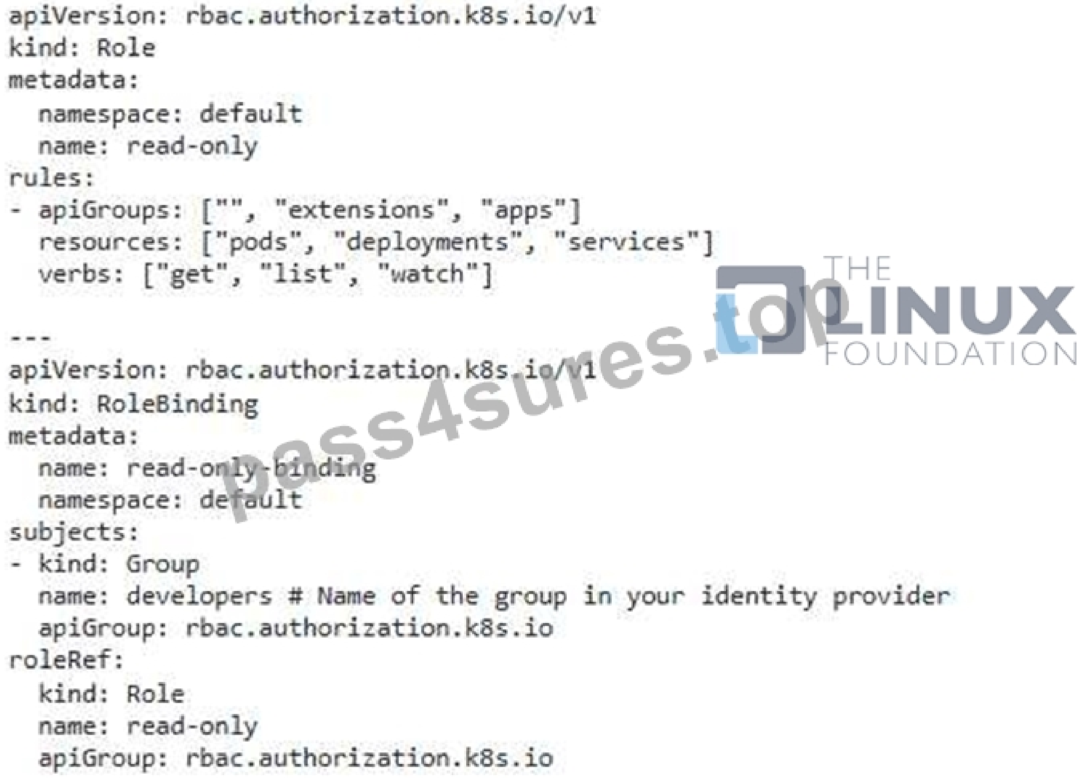
Answer:

Explanation:
Solution (Step by Step):
1. Configure Kubernetes to authenticate with your external identity provider. This typically involves setting up an OpenID Connect (OIDC) authentication plugin. You'll need to provide the necessary configuration details for your identity provider, such as the issuer URL, client ID, and client secret.



```
apiVersion: v1
kind: ConfigMap
metadata:
  name: oidc-config
  namespace: kube-system
data:
  oidc-issuer-url:
  oidc-client-id:
  oidc-client-secret:
```

2. Create a Kubernetes Role and ROIe8inding to define permissions for a specific user group. For example, you might create a "developers" group in your identity provider and grant them read-only access to the Kubernetes API.



```
apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  namespace: default
  name: read-only
rules:
- apiGroups: ["", "extensions", "apps"]
  resources: ["pods", "deployments", "services"]
  verbs: ["get", "list", "watch"]

---
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
  name: read-only-binding
  namespace: default
subjects:
- kind: Group
  name: developers # Name of the group in your identity provider
  apiGroup: rbac.authorization.k8s.io
roleRef:
  kind: Role
  name: read-only
  apiGroup: rbac.authorization.k8s.io
```

3. Verify that users can only access the resources they are authorized for. use 'kubectl auth can-i' to test the permissions of a user from the "developers" group. For example: bash kubectl auth can-i get pods --as=developers-group-member This should return "yes" if the user has permission to get pods. Important Considerations: Principle of Least Privilege: Grant only the necessary permissions to each user group. Regular Audits: Regularly review and update RBAC configurations to ensure they are still appropriate. Network Policies: Implement Network Policies to further restrict network access within the cluster

NEW QUESTION # 145
Cluster: qa-cluster
Master node: master Worker node: worker1
You can switch the cluster/configuration context using the following command:
[desk@cli] $ kubectl config use-context qa-cluster
Task:
Create a NetworkPolicy named restricted-policy to restrict access to Pod product running in namespace dev.
Only allow the following Pods to connect to Pod products-service:

1. Pods in the namespace qa
2. Pods with label environment: stage, in any namespace

Answer:

Explanation:

```
$ k get ns qa --show-labels
NAME STATUS AGE LABELS
qa Active 47m env=stage
$ k get pods -n dev --show-labels
NAME READY STATUS RESTARTS AGE LABELS
product 1/1 Running 0 3s env=dev-team
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
name: restricted-policy
namespace: dev
spec:
podSelector:
matchLabels:
env: dev-team
policyTypes:
- Ingress
ingress:
- from:
- namespaceSelector:
matchLabels:
env: stage
- podSelector:
matchLabels:
env: stage
[desk@cli] $ k get ns qa --show-labels
NAME STATUS AGE LABELS
qa Active 47m env=stage
[desk@cli] $ k get pods -n dev --show-labels
NAME READY STATUS RESTARTS AGE LABELS
product 1/1 Running 0 3s env=dev-team
[desk@cli] $ vim netpol2.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
name: restricted-policy
namespace: dev
spec:
podSelector:
matchLabels:
env: dev-team
policyTypes:
- Ingress
ingress:
- from:
- namespaceSelector:
matchLabels:
env: stage
- podSelector:
matchLabels:
env: stage
[desk@cli] $ k apply -f netpol2.yaml Reference: https://kubernetes.io/docs/concepts/services-networking/network-policies/
```

[desk@cli] $ k apply -f netpol2.yaml Reference: https://kubernetes.io/docs/concepts/services-networking/network-policies/

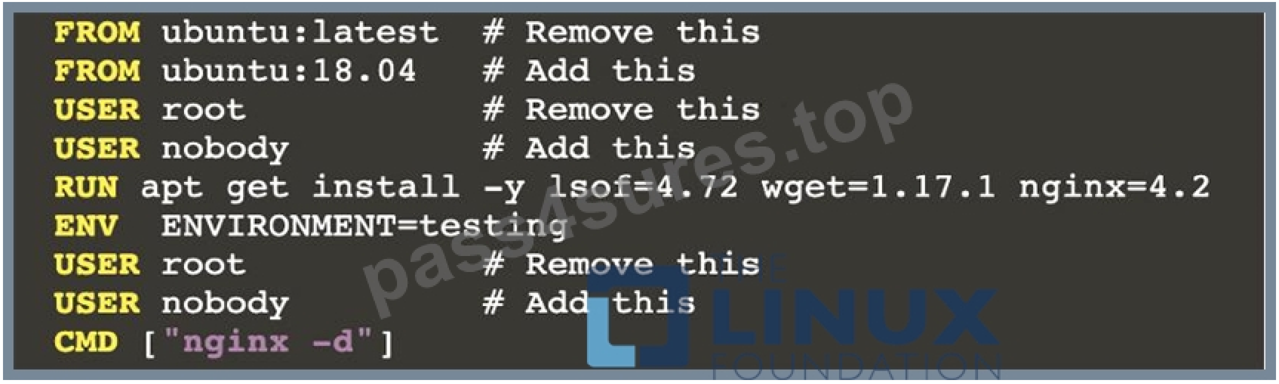
NEW QUESTION # 146

Context:
Cluster: prod
Master node: master1
Worker node: worker1
You can switch the cluster/configuration context using the following command:
[desk@cli] $ kubectl config use-context prod
Task:
Analyse and edit the given Dockerfile (based on the ubuntu:18:04 image)
/home/cert_masters/Dockerfile fixing two instructions present in the file being prominent security/best-practice issues.
Analyse and edit the given manifest file
/home/cert_masters/mydeployment.yaml fixing two fields present in the file being prominent security/best-practice issues.
Note: Don't add or remove configuration settings; only modify the existing configuration settings, so that two configuration settings each are no longer security/best-practice concerns.
Should you need an unprivileged user for any of the tasks, use user nobody with user id 65535

Answer:

Explanation:
1. For Dockerfile: Fix the image version & user name in Dockerfile
2. For mydeployment.yaml : Fix security contexts
Explanation

```
[desk@cli] $ vim /home/cert_masters/Dockerfile
FROM ubuntu:latest # Remove this
FROM ubuntu:18.04 # Add this
USER root # Remove this
USER nobody # Add this
RUN apt get install -y lsof=4.72 wget=1.17.1 nginx=4.2
ENV ENVIRONMENT=testing
USER root # Remove this
USER nobody # Add this
CMD ["nginx -d"]
```



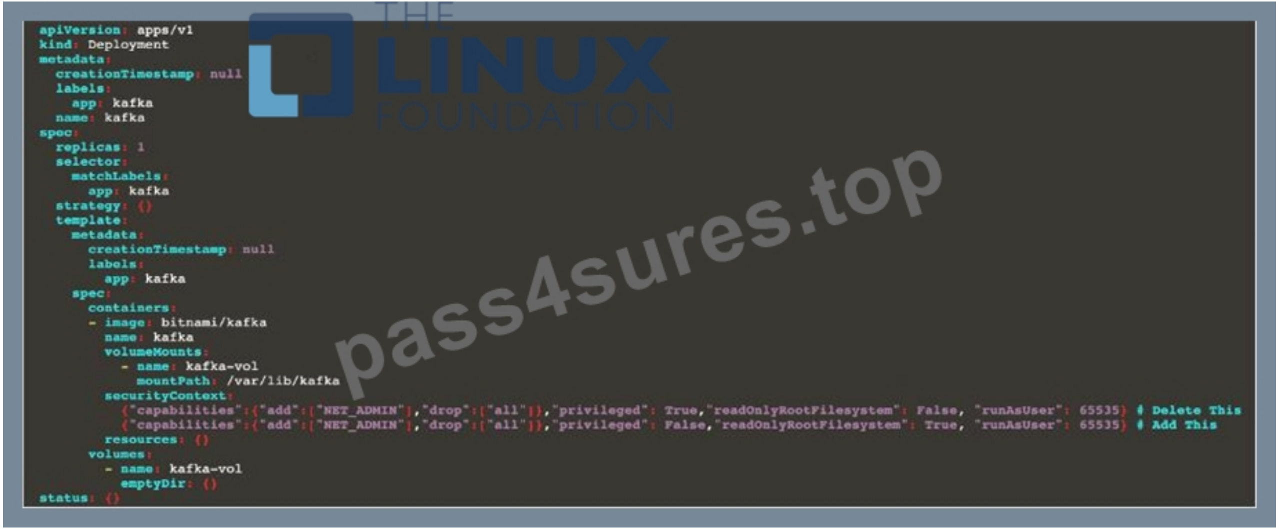
```
FROM ubuntu:latest   # Remove this
FROM ubuntu:18.04    # Add this
USER root            # Remove this
USER nobody          # Add this
RUN apt get install -y lsof=4.72 wget=1.17.1 nginx=4.2
ENV  ENVIRONMENT=testing
USER root            # Remove this
USER nobody          # Add this
CMD ["nginx -d"]
```

```
[desk@cli] $ vim /home/cert_masters/mydeployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
creationTimestamp: null
labels:
app: kafka
name: kafka
spec:
replicas: 1
selector:
matchLabels:
app: kafka
strategy: {}
template:
metadata:
creationTimestamp: null
```

```
labels:
app: kafka
spec:
containers:
- image: bitnami/kafka
name: kafka
volumeMounts:
- name: kafka-vol
mountPath: /var/lib/kafka
securityContext:
{"capabilities":{"add":["NET_ADMIN"],"drop":["all"]},"privileged": True,"readOnlyRootFilesystem": False, "runAsUser": 65535} # Delete This
{"capabilities":{"add":["NET_ADMIN"],"drop":["all"]},"privileged": False,"readOnlyRootFilesystem": True, "runAsUser": 65535} # Add This resources: {} volumes:
- name: kafka-vol
emptyDir: {}
status: {}
```

Pictorial View:

[desk@cli] $ vim /home/cert_masters/mydeployment.yaml



```
apiVersion: apps/v1
kind: Deployment
metadata:
  creationTimestamp: null
  labels:
    app: kafka
  name: kafka
spec:
  replicas: 1
  selector:
    matchLabels:
      app: kafka
  strategy: {}
  template:
    metadata:
      creationTimestamp: null
      labels:
        app: kafka
    spec:
      containers:
      - image: bitnami/kafka
        name: kafka
        volumeMounts:
          - name: kafka-vol
            mountPath: /var/lib/kafka
        securityContext:
          {"capabilities":{"add":["NET_ADMIN"],"drop":["all"]},"privileged": True,"readOnlyRootFilesystem": False, "runAsUser": 65535} # Delete This
          {"capabilities":{"add":["NET_ADMIN"],"drop":["all"]},"privileged": False,"readOnlyRootFilesystem": True, "runAsUser": 65535} # Add This
        resources: {}
      volumes:
        - name: kafka-vol
          emptyDir: {}
status: {}
```

NEW QUESTION # 147

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