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The CKAD Exam is a 2-hour, performance-based exam that consists of 19 questions. CKAD exam is conducted on a live Kubernetes cluster, and candidates are required to perform hands-on tasks using the command line interface. CKAD Exam is designed to test the candidate's ability to perform real-world tasks in a Kubernetes environment.

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Linux Foundation Certified Kubernetes Application Developer Exam Sample Questions (Q182-Q187):

NEW QUESTION # 182
You are building a Kubernetes application tnat requires persistent storage for its dat a. The application needs to be able to access the data even if the pod is restarted or deleted. You have a PersistentVolumeClaim (PVC) defined for this purpose.

Answer:

Explanation:
See the solution below with Step by Step Explanation.
Explanation:
Solution (Step by Step) :
1. Create a PersistentVolume (PV):
- Define a PV with a suitable storage class, access modes (ReadWriteOnce), and a capacity that meets your application's storage requirements.
- Example:

```
apiVersion: v1
kind: PersistentVolume
metadata:
  name: my-pv
spec:
  capacity:
    storage: 1Gi
  accessModes:
    - ReadWriteOnce
  hostPath:
    path: "/data/my-pv"
  persistentVolumeReclaimPolicy: Retain
```

2. Create a PersistentVolumeClaim (PVC): - Define a PVC with the desired storage class and access modes. - Specify the desired storage capacity. - Example:

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: my-pvc
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 1Gi
  storageClassName: my-storage-class
```

3. Create a Deployment With the PVC: - In the Deployment YAML, define a volume mount that uses the PVC you created_ - Specify the volume mount path within the container. - Example:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-app
spec:
  replicas: 1
  selector:
    matchLabels:
      app: my-app
  template:
    metadata:
      labels:
        app: my-app
    spec:
      containers:
      - name: my-app-container
        image: my-app-image:latest
        volumeMounts:
        - name: my-data
          mountPath: /data
      volumes:
      - name: my-data
        persistentVolumeClaim:
          claimName: my-pvc
```

4. Create the Deployment: - Apply the Deployment YAML using 'kubectl apply -f my-app-deployment.yamr 5. Verify the Deployment - Check the status of the Deployment using 'kubectl get deployments my-app' - Verify that the Pod is running and using the PersistentVolumeClaim. - You can also check the pod's logs for confirmation that the data is stored in the mounted volume.

NEW QUESTION # 183
You are designing a microservice architecture where a frontend application needs to communicate with multiple backend services. The services are deployed as Pods in a Kubernetes cluster- To streamline communication and security, you decide to implement a sidecar proxy pattern Explain the benefits of using a sidecar proxy in this scenario and illustrate how you would implement it using a container image like Envoy Proxy.

Answer:

Explanation:
See the solution below with Step by Step Explanation.
Explanation:
Solution (Step by Step) :
1. Understand Sidecar Proxy Pattern:
- In the sidecar proxy pattern, a proxy container runs alongside your main application container within the same Pod.
- The proxy acts as an intermediary, handling network tratfic between your application and other services.
2. Benefits of Using a Sidecar Proxy:
- Traffic Management:
- Routing requests to different backend services.
- Load balancing across multiple instances ot a service.
- Security:
- Enforcing access control and authentication.
- Handling SSL termination.
- Observability:
- Monitoring and logging network traffic.
- Simplified Development:
- Separating networking concerns from application logic.
3. Implementing with Envoy Proxy:
- Choose Envoy Proxy:
- Envoy is a popular open-source proxy designed for high-performance network communication.
- Create a Deployment YAML:
- Define a Deployment for your application, including a main container for your application code and a sidecar container for Envoy Proxy.

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-app-deployment
spec:
  replicas: 3
  selector:
    matchLabels:
      app: my-app
  template:
    metadata:
      labels:
        app: my-app
    spec:
      containers:
      - name: my-app
        image: my-app-image:latest
        ports:
        - containerPort: 8080
      - name: envoy
        image: envoyproxy/envoy:v1.23.0
        ports:
        - containerPort: 9901
        command: ["/usr/local/bin/envoy", "-c", "/etc/envoy/envoy.yaml"]
        volumeMounts:
        - name: config-volume
          mountPath: /etc/envoy
      volumes:
      - name: config-volume
        configMap:
          name: envoy-config
```

4. Configure Envoy: - Create a ConfigMap: - Create a ConfigMap to hold the Envoy configuration (envoy-yaml). - Define the routes, listeners, and clusters for your services.

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: envoy-config
data:
  envoy.yaml: |-
    static_resources:
      listeners:
      - name: listener_0
        address:
          socket_address:
            port_value: 9901
        filter_chains:
        - filters:
          - name: envoy.filters.network.http_connection_manager
            typed_config:
              "@type": type.googleapis.com/envoy.config.filter.network.http_connection_manager.v3.HttpConnectionManager
              stat_prefix: ingress_http
              route_config:
                name: local_route
                virtual_hosts:
                - name: my_app_host
                  domains: [""]
                  routes:
                  - match:
                      prefix: "/service1"
                    route:
                      cluster: service1_cluster
                  - match:
                      prefix: "/service2"
                    route:
                      cluster: service2_cluster
              http_filters:
              - name: envoy.filters.http.router
      clusters:
      - name: service1_cluster
        connect_timeout: 0.25s
        type: strict_dns
        lb_policy: ROUND_ROBIN
        hosts:
        - socket_address:
            address: service1
            port_value: 8080
      - name: service2_cluster
        connect_timeout: 0.25s
        type: strict_dns
        lb_policy: ROUND_ROBIN
        hosts:
        - socket_address:
            address: service2
            port_value: 8080
```

5. Deploy the Configuration: - Apply the Deployment and ConfigMap using 'kubectl apply -f deployment.yaml' and 'kubectl apply -f configmap.yaml' 6. Test tne Setup: - Access your trontend application from outside the cluster. - Verity that traffic is routed correctly to the backend services through the Envoy proxy. 7. Optional: Service Discovery: - For more dynamic environments, you can integrate Envoy with service discovery mechanisms like Kubernetes Service or Consul to automatically update its configuration based on service changes. This configuration assumes that your backend services are named "servicel " and "service2" with ports 8080. Adjust the configuration based on your specific services and their port numbers.,

NEW QUESTION # 184
You are working on a Kubernetes cluster where you have a Deployment named 'web-app' running an application. The application has a sensitive configuration file named 'config.jsons that is mounted as a volume to each pod. You need to ensure that this configuration file is not accessible by any user or process running within the pod, except for the application itselt Describe how you would implement this security best practice, using specific Kubernetes configurations, to protect the sensitivity of the 'config.json' file.

Answer:

Explanation:
See the solution below with Step by Step Explanation.
Explanation:
Solution (Step by Step) :
1. Create a Secret for the Configuration File:
- Create a Kubernetes Secret to store the 'config.json' file securely. This will ensure that the configuration data is encrypted and stored in a way that is not accessible directly by users or processes within the pod.
- Use the following command to create the Secret:
bash
kubectl create secret generic config-secret -from-file-config .json=configjson
2. Mount the Secret as a Volume:
- In your Deployment YAML, mount the 'contig-secret' as a volume to the pod. This will make the secret's content available to the pod.
- Define the volume mount in the 'spec-template-spec-containers' section of your Deployment YAML:

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: web-app
spec:
  replicas: 3
  selector:
    matchLabels:
      app: web-app
  template:
    metadata:
      labels:
        app: web-app
    spec:
      containers:
      - name: web-app
        image: example/web-app:latest
        volumeMounts:
        - name: config-volume
          mountPath: /etc/config
      volumes:
      - name: config-volume
        secret:
          secretName: config-secret
```

3. Restrict Access using Security Context: - Define a 'securityContexts for the container in your Deployment YAML. This will restrict the container's capabilities and permissions. - Add a 'securitycontext' section to the section of your Deployment YAML:

```yaml
securityContext:
  # Set the container's user to a non-root user (e.g., 1000)
  runAsUser: 1000
  # Set the container's group to a non-root group (e.g., 1000)
  runAsGroup: 1000
  # Set the container's permissions to a restricted set (e.g., read-only for /etc/config)
  readOnlyRootFilesystem: true
```

4. Limit the Container's Capabilities: - Configure the 'capabilities' section within the 'securityContexts to restrict the container's access to specific system capabilities. This is essential for limiting the containers ability to access sensitive information or perform privileged operations. - Add a 'capabilities' section to the 'spec-template-spec-containers-securitycontext' section of your Deployment YAML:

5. Apply the Deployment: - Once tne Deployment configuration is updated, apply it to the cluster using the following command: bash kubectl apply -f deployment.yaml By implementing these steps, you ensure that the 'config.json' file is secured using a Kubernetes Secret, mounted as a volume, and access is restricted using security context and capabilities settings. This effectively protects the sensitive configuration from unauthorized access within the pod.

NEW QUESTION # 185

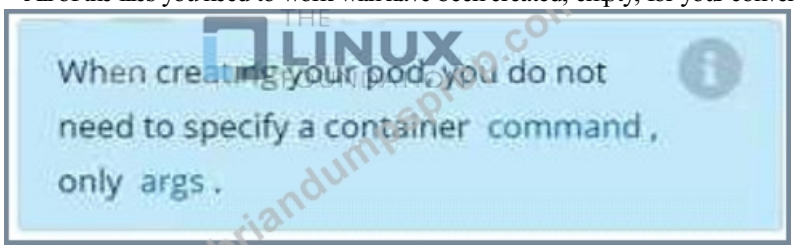
Context

Anytime a team needs to run a container on Kubernetes they will need to define a pod within which to run the container.

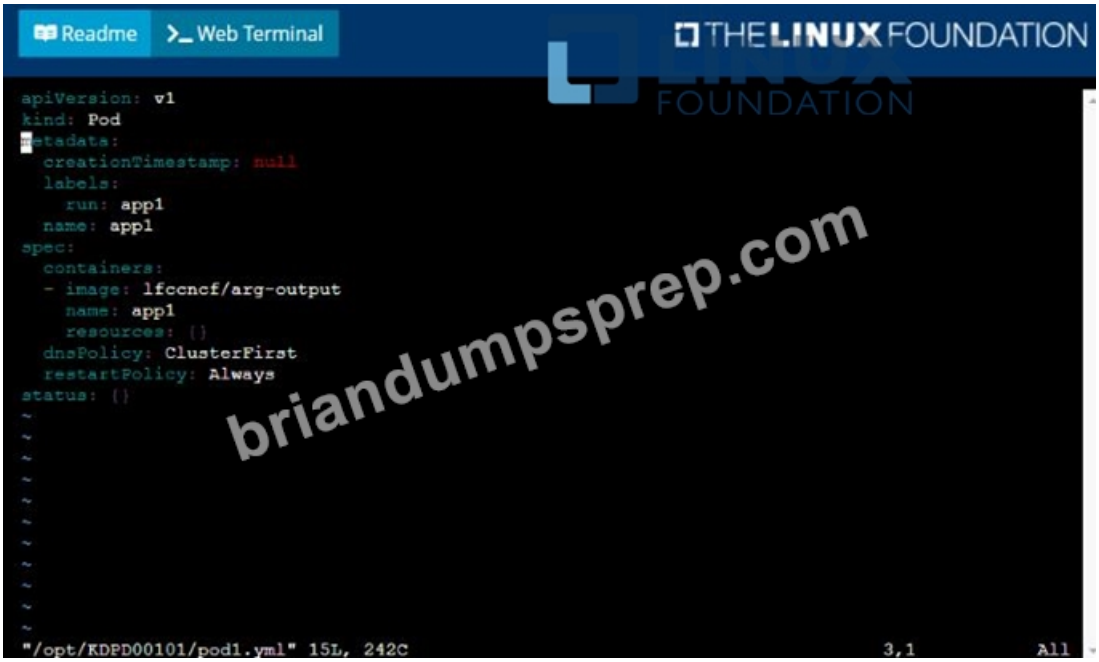
Task

Please complete the following:

* Create a YAML formatted pod manifest /opt/KDPD00101/pod1.yml to create a pod named app1 that runs a container named app1cont using image lfccncf/arg-output with these command line arguments: -lines 56 -F
* Create the pod with the kubect1 command using the YAML file created in the previous step
* When the pod is running display summary data about the pod in JSON format using the kubect1 command and redirect the output to a file named /opt/KDPD00101/out1.json
* All of the files you need to work with have been created, empty, for your convenience



- A. Solution:




Readme
Web Terminal
THE LINUX FOUNDATION
apiVersion: v1
kind: Pod
metadata:
labels:
run: app1
name: app1
spec:
containers:
- image: lfccncf/arg-output
name: app1
args: ["--lines","56","-f"]
11,30 All
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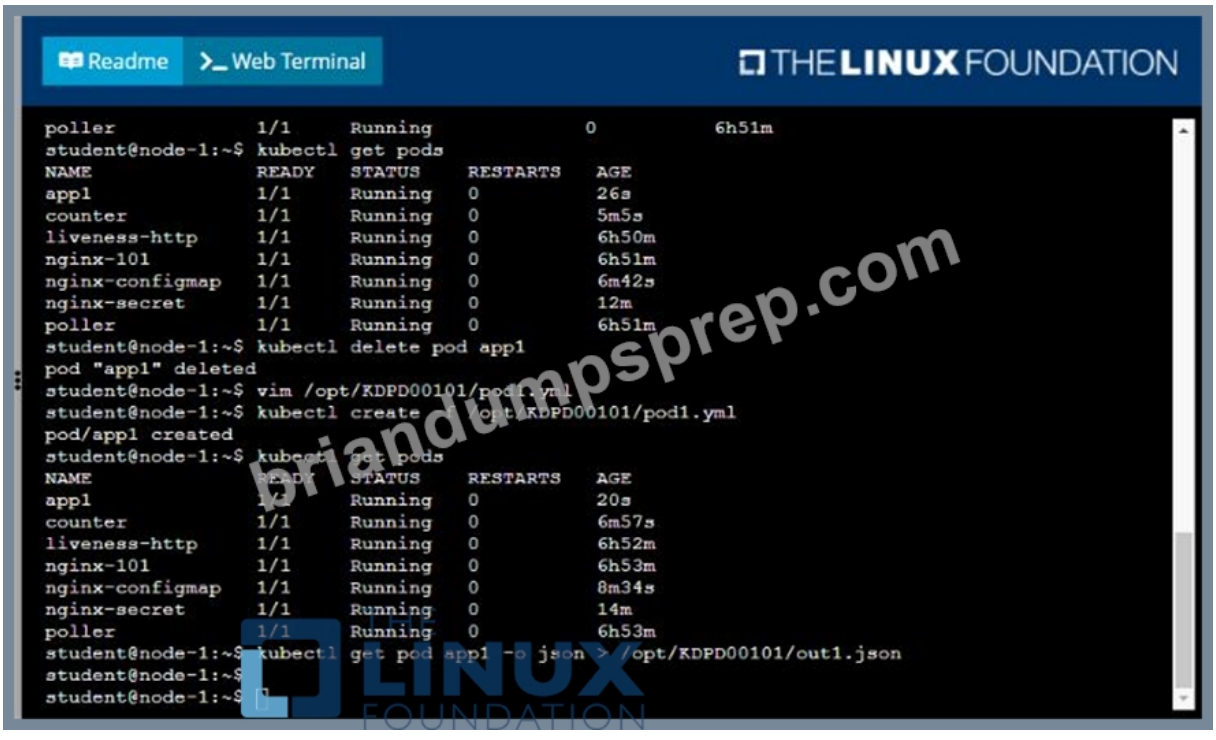
pod/app1 created
student@node-1:~$ kubectl get pods
NAME READY STATUS RESTARTS AGE
app1 0/1 ContainerCreating 0 5s
counter 1/1 Running 0 4m44
liveness-http 1/1 Running 0 6h50
nginx-101 1/1 Running 0 6h51
nginx-configmap 1/1 Running 0 6m21
nginx-secret 1/1 Running 11m
poller 1/1 Running 0 6h51
student@node-1:~$ kubectl get pods
NAME READY STATUS RESTARTS AGE
app1 1/1 Running 0 26s
counter 1/1 Running 0 5m5s
liveness-http 1/1 Running 0 6h50m
nginx-101 1/1 Running 0 6h51m
nginx-configmap 1/1 Running 0 6m42s
nginx-secret 1/1 Running 0 12m
poller 1/1 Running 0 6h51m
student@node-1:~$ kubectl delete pod app1
pod "app1" deleted
student@node-1:~$ vim /opt/KDPD00101/pod1.yml


Readme
Web Terminal
THE LINUX FOUNDATION
poller 1/1 Running 0 6h51m
student@node-1:~$ kubectl get pods
NAME READY STATUS RESTARTS AGE
app1 1/1 Running 0 26s
counter 1/1 Running 0 5m5s
liveness-http 1/1 Running 0 6h50m
nginx-101 1/1 Running 0 6h51m
nginx-configmap 1/1 Running 0 6m42s
nginx-secret 1/1 Running 0 12m
poller 1/1 Running 0 6h51m
student@node-1:~$ kubectl delete pod app1
pod "app1" deleted
student@node-1:~$ vim /opt/KDPD00101/pod1.yml
student@node-1:~$ kubectl create -f /opt/KDPD00101/pod1.yml
pod/app1 created
student@node-1:~$ kubectl get pods
NAME READY STATUS RESTARTS AGE
app1 1/1 Running 0 20s
counter 1/1 Running 0 6m57s
liveness-http 1/1 Running 0 6h52m
nginx-101 1/1 Running 0 6h53m
nginx-configmap 1/1 Running 0 8m34s
nginx-secret 1/1 Running 0 14m
poller 1/1 Running 0 6h53m
student@node-1:~$ kubectl get pod app1 -o json > /opt/KDPD00101/out1.json
student@node-1:~$
student@node-1:~$
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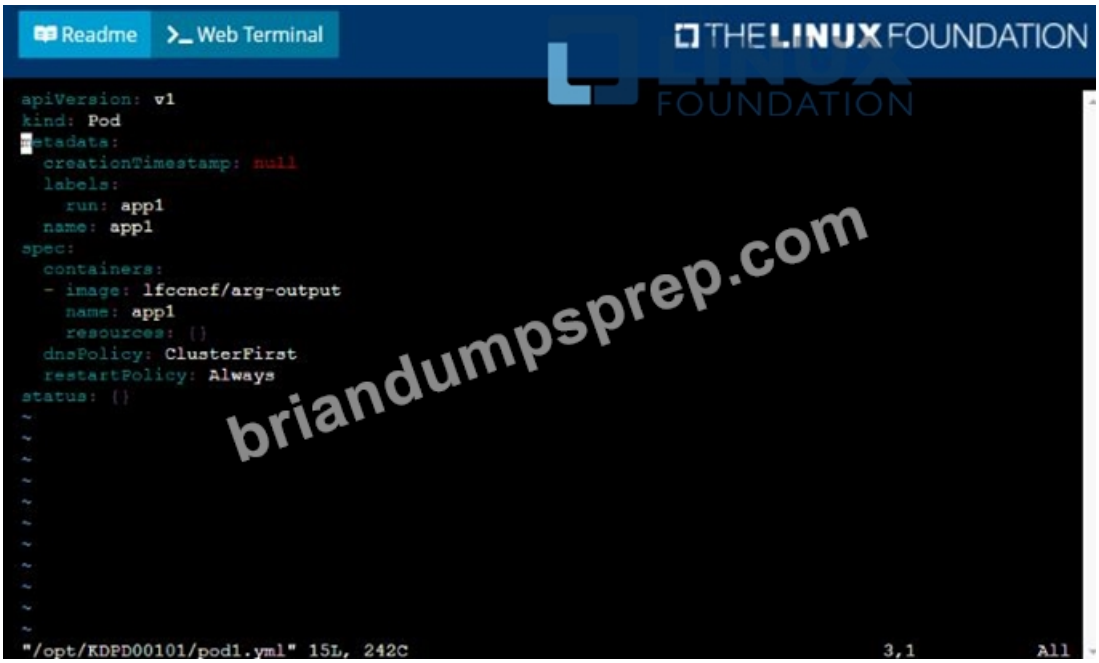
- B. Solution:


student@node-1:~$ kubectl run app1 --image=lfccncf/arg-output --dry-run=client -o yaml > /opt/KDPD00101/pod1.yml
student@node-1:~$ vim /opt/KDPD00101/pod1.yml


Readme
Web Terminal
THE LINUX FOUNDATION
apiVersion: v1
kind: Pod
metadata:
creationTimestamp: null
labels:
run: app1
name: app1
spec:
containers:
- image: lfccncf/arg-output
name: app1
resources: {}
dnsPolicy: ClusterFirst
restartPolicy: Always
status: {}
"/opt/KDPD00101/pod1.yml" 15L, 242C
3,1
All
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Readme
Web Terminal
THE LINUX FOUNDATION
apiVersion: v1
kind: Pod
metadata:
labels:
run: app1
name: app1
spec:
containers:
- image: lfccncf/arg-output
name: app1
args: ["--lines","56","-f"]
11,30
All
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pod/app1 created
student@node-1:~$ kubectl get pods
NAME READY STATUS RESTARTS AGE
app1 0/1 ContainerCreating 0 5s
counter 1/1 Running 0 4m44
liveness-http 1/1 Running 0 6h50
nginx-101 1/1 Running 0 6h51
nginx-configmap 1/1 Running 0 6m21
nginx-secret 1/1 Running 0 11m
poller 1/1 Running 0 6h51
student@node-1:~$ kubectl get pods
NAME READY STATUS RESTARTS AGE
app1 1/1 Running 0 26s
counter 1/1 Running 0 5m5s
liveness-http 1/1 Running 0 6h50m
nginx-101 1/1 Running 0 6h51m
nginx-configmap 1/1 Running 0 6m42s
nginx-secret 1/1 Running 0 12m
poller 1/1 Running 0 6h51m
student@node-1:~$ kubectl delete pod app1
pod "app1" deleted
student@node-1:~$ vim /opt/KDPD00101/pod1.yml
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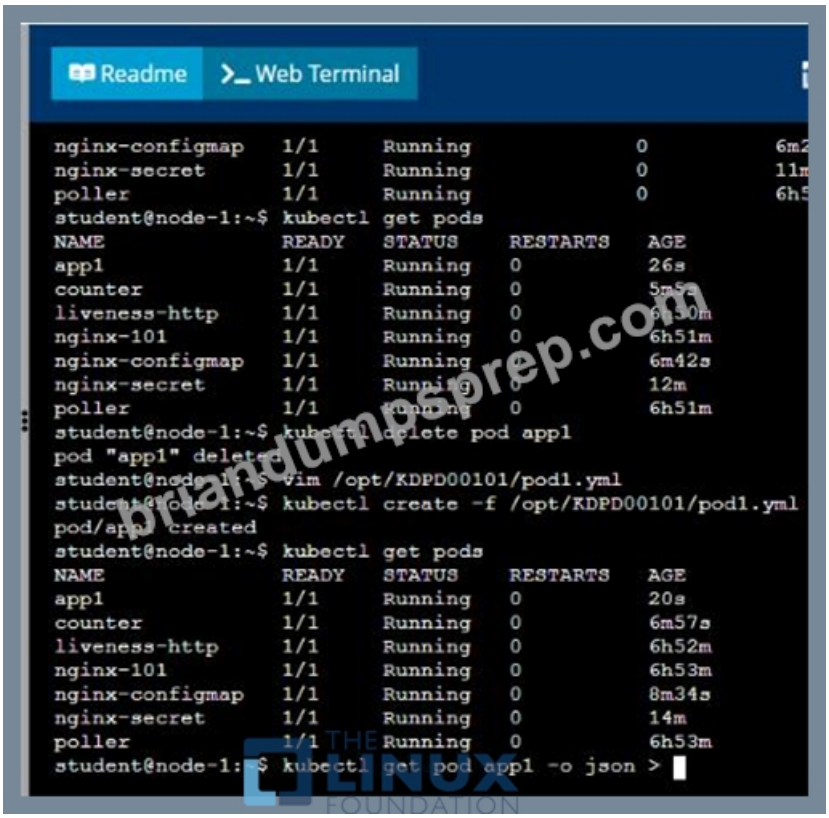

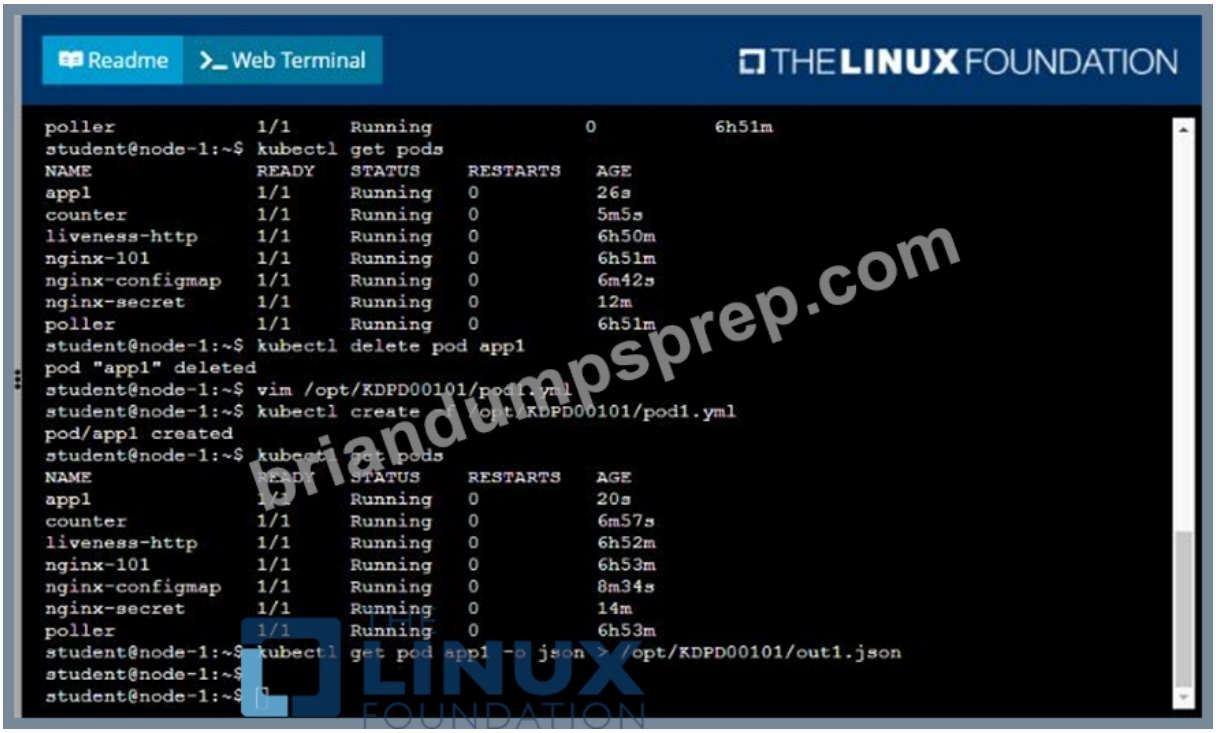

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Answer: B

NEW QUESTION # 186
You have a Deployment named 'my-app-deployment' running a Flask application. You need to configure a rolling update strategy with a maximum of one pod unavailable at any time. You also want to trigger an automatic update whenever a new image is pushed to the Docker Hub repository. Additionally, you want to analyze the application logs during the update process to ensure everything is working smoothly. How would you achieve this?

Answer:

Explanation:
See the solution below with Step by Step Explanation.
Explanation:
Solution (Step by Step) :
1. Configure Deployment with Rolling Update:
- Update the 'my-app-deployment' Deployment configuration to include the following:
- 'replicas': Set to 2 to ensure a rolling update with a maximum of one unavailable pod.
- 'maxUnavailable: 1': This specifies that a maximum of one pod can be unavailable during the update.
- 'maxSurge: 0': This ensures no new pods are created beyond the desired replicas.
- 'imagePullPolicy: Always': This forces the pods to pull the latest image from the repository.
- 'strategy.type: RollingUpdate': Specifies the rolling update strategy.

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-app-deployment
spec:
  replicas: 2
  selector:
    matchLabels:
      app: my-app
  template:
    metadata:
      labels:
        app: my-app
    spec:
      containers:
        name: my-app
          image: my-app-image:latest
          imagePullPolicy: Always
  strategy:
    type: RollingUpdate
    rollingUpdate:
      maxUnavailable: 1
      maxSurge: 0
```

2. Apply Deployment Configuration: - Apply the updated YAML file to your cluster: 'kubectl apply -f my-app-deployment.yamr 3. Analyze Application Logs: - To monitor the logs of your Flask application, utilize a tool like 'kubectl logs' or a dedicated logging service like Fluentd or ElasticSearch. - Example using 'kubectl logs' bash kubectl logs -f my-app-deployment-pod-name - During the rolling update, closely watch the logs for errors or warnings to ensure smooth transitions. 4. Trigger an Automatic Update: - Push a new image with updates to the 'my-app-image:latest' Docker Hub repository. 5. Monitor the Deployment: - Use 'kubectl get pods -l app=my-app' to monitor the pods during the rolling update. 6. Verify Deployment Status: - Check the status of the Deployment using 'kubectl describe deployment my-app-deployment' . The 'updatedReplicas' field should match the 'replicas' field, indicating a successful update.

NEW QUESTION # 187
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