Number: CKS
Passing Score: 800
Time Limit: 120
File Version:

Exam Code: CKS

Website: www.Vdumps.com

Exam A

QUESTION 1
Create a new ServiceAccount named backend-sa in the existing namespace default, which has the capability to list the pods inside the namespace default.

Correct Answer: E, E, E, H, S, T
Section:
Explanation:
Explanation:
A service account provides an identity for processes that run in a Pod.
When you (a human) access the cluster (for example, using kubectl), you are authenticated by the apiserver as a particular User Account (currently this is usually admin, unless your cluster administrator has customized your cluster). Processes in containers inside pods can also contact the apiserver. When they do, they are authenticated as a particular Service Account (for example, default).
When you create a pod, if you do not specify a service account, it is automatically assigned the default service account in the same namespace. If you get the raw json or yaml for a pod you have created (for example, kubectl get pods/<podname> -o yaml), you can see the spec.serviceAccountName field has been automatically set.
You can access the API from inside a pod using automatically mounted service account credentials, as described in Accessing the Cluster. The API permissions of the service account depend on the authorization plugin and policy in use.
In version 1.6+, you can opt out of automounting API credentials for a service account by setting automountServiceAccountToken: false on the service account: apiVersion: v1 kind: ServiceAccount metadata: name: build-robot automountServiceAccountToken: false
...
In version 1.6+, you can also opt out of automounting API credentials for a particular pod: apiVersion: v1 kind: Pod metadata: name: my-pod spec: serviceAccountName: build-robot automountServiceAccountToken: false
...
The pod spec takes precedence over the service account if both specify a automountServiceAccountToken value.

QUESTION 2
Fix all issues via configuration and restart the affected components to ensure the new setting takes effect.

Correct Answer: E, E, E, H, S, T
Section:
Explanation:
Explanation:
API server:
Ensure the --authorization-mode argument includes RBAC
Turn on Role Based Access Control.
Role Based Access Control (RBAC) allows fine-grained control over the operations that different entities can perform on different objects in the cluster. It is recommended to use the RBAC authorization mode.
Fix - Buildtime
Kubernetes
apiVersion: v1
kind: Pod
metadata:
creationTimestamp: null
labels:
component: kube-apiserver
tier: control-plane
name: kube-apiserver
namespace: kube-system

spec:
containers:
- command:
+ - kube-apiserver
+ - --authorization-mode=RBAC,Node
image: gcr.io/google_containers/kube-apiserver-amd64:v1.6.0 livenessProbe:
failureThreshold: 8
httpGet:
host: 127.0.0.1
path: /healthz
port: 6443
scheme: HTTPS
initialDelaySeconds: 15
timeoutSeconds: 15
name: kube-apiserver-should-pass
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
Ensure the --authorization-mode argument includes Node
Remediation: Edit the API server pod specification file /etc/kubernetes/manifests/kubeapiserver. yaml on the master node and set the --authorization-mode parameter to a value that includes Node.
--authorization-mode=Node,RBAC
Audit:
/bin/ps -ef | grep kube-apiserver | grep -v grep
Expected result:
'Node,RBAC' has 'Node'
Ensure that the --profiling argument is set to false
Remediation: Edit the API server pod specification file /etc/kubernetes/manifests/kubeapiserver. yaml on the master node and set the below parameter.
--profiling=false
Audit:
/bin/ps -ef | grep kube-apiserver | grep -v grep
Expected result:

'false' is equal to 'false'
Fix all of the following violations that were found against the Kubelet:-Ensure the --anonymous-auth argument is set to false.
Remediation: If using a Kubelet config file, edit the file to set authentication: anonymous: enabled to false. If using executable arguments, edit the kubelet service file /etc/systemd/system/kubelet.service.d/10-kubeadm.conf on each worker node and set the below parameter in KUBELET_SYSTEM_PODS_ARGS variable.
--anonymous-auth=false
Based on your system, restart the kubelet service. For example:
systemctl daemon-reload
systemctl restart kubelet.service
Audit:
/bin/ps -fC kubelet
Audit Config:
/bin/cat /var/lib/kubelet/config.yaml
Expected result:
'false' is equal to 'false'
2) Ensure that the --authorization-mode argument is set to Webhook. Audit
docker inspect kubelet | jq -e '.[0].Args[] | match("--authorization-mode=Webhook").string' Returned Value: --authorization-mode=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
Do not use self-signed certificates for TLS. etcd is a highly-available key value store used by Kubernetes deployments for persistent storage of all of its REST API objects. These objects are sensitive in nature and should not be available to unauthenticated clients. You should enable the client authentication via valid certificates to secure the access to the etcd service. Fix - Buildtime
Kubernetes
apiVersion: v1
kind: Pod
metadata:
annotations:
scheduler.alpha.kubernetes.io/critical-pod: ""
creationTimestamp: null
labels:
component: etcd
tier: control-plane
name: etcd
namespace: kube-system
spec:
containers:
- command:
+ - etcd
+ - --auto-tls=true
image: k8s.gcr.io/etcd-amd64:3.2.18
imagePullPolicy: IfNotPresent
livenessProbe:
exec:
command:
- /bin/sh
- -ec
- ETCDCTL_API=3 etcdctl --endpoints=https://[192.168.22.9]:2379 --cacert=/etc/kubernetes/pki/etcd/ca.crt
--cert=/etc/kubernetes/pki/etcd/healthcheck-client.crt --
key=/etc/kubernetes/pki/etcd/healthcheck-client.key
get foo
failureThreshold: 8
initialDelaySeconds: 15
timeoutSeconds: 15
name: etcd-should-fail

resources: {}
volumeMounts:
- mountPath: /var/lib/etcd
name: etcd-data
- mountPath: /etc/kubernetes/pki/etcd
name: etcd-certs
hostNetwork: true
priorityClassName: system-cluster-critical
volumes:
- hostPath:
path: /var/lib/etcd
type: DirectoryOrCreate
name: etcd-data
- hostPath:
path: /etc/kubernetes/pki/etcd
type: DirectoryOrCreate
name: etcd-certs
status: {}
Explanation:

```
candidate@cli:~$ kubectl delete sa/podrunner -n qa
serviceaccount "podrunner" deleted
candidate@cli:~$ kubectl config use-context KSCS00201
Switched to context "KSCS00201".
candidate@cli:~$ ssh kscs00201-master
Warning: Permanently added '10.240.86.194' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@kscs00201-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
root@kscs00201-master:~# systemctl daemon-reload
root@kscs00201-master:~# systemctl restart kubelet.service
root@kscs00201-master:~# systemctl enable kubelet.service
root@kscs00201-master:~# systemctl status kubelet.service
● kubelet.service - kubelet: The Kubernetes Node Agent
     Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
    Drop-In: /etc/systemd/system/kubelet.service.d
             └─10-kubeadm.conf
     Active: active (running) since Fri 2022-05-20 14:19:31 UTC; 29s ago
       Docs: https://kubernetes.io/docs/home/
   Main PID: 134205 (kubelet)
      Tasks: 16 (limit: 76200)
     Memory: 39.5M
     CGroup: /system.slice/kubelet.service
             └─134205 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub>

May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420825  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420863  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420907  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420928  134205 reconciler.>
May 20 14:19:36 kscs00201-master kubelet[134205]: I0520 14:19:36.572353  134205 request.go:>
May 20 14:19:37 kscs00201-master kubelet[134205]: I0520 14:19:37.112347  134205 prober_mana>
May 20 14:19:37 kscs00201-master kubelet[134205]: E0520 14:19:37.185076  134205 kubelet.go:>
May 20 14:19:37 kscs00201-master kubelet[134205]: I0520 14:19:37.645798  134205 kubelet.go:>
May 20 14:19:38 kscs00201-master kubelet[134205]: I0520 14:19:38.184062  134205 kubelet.go:>
May 20 14:19:40 kscs00201-master kubelet[134205]: I0520 14:19:40.036042  134205 prober_mana>
lines 1-22/22 (END)
```


de Agent
et.service; enabled; vendor preset: enabled)
ce.d
5-20 14:19:31 UTC; 29s ago
trap-kubeconfig=/etc/kubernetes/bootstrap-kubelet.conf --kubeconfig=/etc/kubernetes/kubelet
5]: I0520 14:19:35.420825 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt
5]: I0520 14:19:35.420863 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt
5]: I0520 14:19:35.420907 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt
5]: I0520 14:19:35.420928 134205 reconciler.go:157] "Reconciler: start to sync state"
5]: I0520 14:19:36.572353 134205 request.go:665] Waited for 1.049946364s due to client-sid
5]: I0520 14:19:37.112347 134205 prober_manager.go:255] "Failed to trigger a manual run" p
5]: E0520 14:19:37.185076 134205 kubelet.go:1711] "Failed creating a mirror pod for" err="
5]: I0520 14:19:37.645798 134205 kubelet.go:1693] "Trying to delete pod" pod="kube-system/
5]: I0520 14:19:38.184062 134205 kubelet.go:1698] "Deleted mirror pod because it is outdat
5]: I0520 14:19:40.036042 134205 prober_manager.go:255] "Failed to trigger a manual run" p
~
~
lines 1-22/22 (END)
let.conf --kubeconfig=/etc/kubernetes/kubelet.conf --config=/var/lib/kubelet/config.yaml --
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"kube-proxy\"
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"lib-modules\"
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"flannel-cfg\"
o:157] "Reconciler: start to sync state"
65] Waited for 1.049946364s due to client-side throttling, not priority and fairness, reque
er.go:255] "Failed to trigger a manual run" probe="Readiness"
711] "Failed creating a mirror pod for" err="pods \"kube-apiserver-kscs00201-master\" alrea
693] "Trying to delete pod" pod="kube-system/kube-apiserver-kscs00201-master" podUID=bb91e1
698] "Deleted mirror pod because it is outdated" pod="kube-system/kube-apiserver-kscs00201-
er.go:255] "Failed to trigger a manual run" probe="Readiness"
~
~
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml

```
apiVersion: kubelet.config.k8s.io/v1beta1
authentication:
  anonymous:
    enabled: false
  webhook:
    cacheTTL: 0s
    enabled: true
  x509:
    clientCAFile: /etc/kubernetes/pki/ca.crt
authorization:
  mode: Webhook
  webhook:
    cacheAuthorizedTTL: 0s
    cacheUnauthorizedTTL: 0s
cgroupDriver: systemd
clusterDNS:
~
~
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
root@kscs00201-master:~# vim /etc/kubernetes/manifests/etcd.yaml
root@kscs00201-master:~# systemctl daemon-reload
root@kscs00201-master:~# systemctl restart kubelet.service
root@kscs00201-master:~# systemctl status kubelet.service
● kubelet.service - kubelet: The Kubernetes Node Agent
     Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
    Drop-In: /etc/systemd/system/kubelet.service.d
             └─10-kubeadm.conf
     Active: active (running) since Fri 2022-05-20 14:22:29 UTC; 4s ago
       Docs: https://kubernetes.io/docs/home/
   Main PID: 135849 (kubelet)
      Tasks: 17 (limit: 76200)
     Memory: 38.0M
     CGroup: /system.slice/kubelet.service
             └─135849 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub

May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330232  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330259  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330304  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330354  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330378  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330397  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330415  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330433  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330452  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330463  135849 reconciler.
lines 1-22/22 (END)
```

```
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330463  135849 reconciler.
root@kscs00201-master:~#
root@kscs00201-master:~#
root@kscs00201-master:~#
root@kscs00201-master:~# exit
logout
Connection to 10.240.86.194 closed.
candidate@cli:~$
```

QUESTION 3
Create a PSP that will prevent the creation of privileged pods in the namespace.

Correct Answer: E, E, E, H, S, T
Section:
Explanation:
Explanation:
Create a PSP that will prevent the creation of privileged pods in the namespace. $ cat clusterrole-use-privileged.yaml
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
name: use-privileged-psp
rules:
- apiGroups: ['policy']
resources: ['podsecuritypolicies']
verbs: ['use']
resourceNames:
- default-psp
---
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
name: privileged-role-bind
namespace: psp-test
roleRef:
apiGroup: rbac.authorization.k8s.io
kind: ClusterRole
name: use-privileged-psp
subjects:
- kind: ServiceAccount
name: privileged-sa
$ kubectl -n psp-test apply -f clusterrole-use-privileged.yaml After a few moments, the privileged Pod should be created.
Create a new PodSecurityPolicy named prevent-privileged-policy which prevents the creation of privileged pods. apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
name: example
spec:
privileged: false # Don't allow privileged pods!
The rest fills in some required fields.
seLinux:
rule: RunAsAny
supplementalGroups:

rule: RunAsAny
runAsUser:
rule: RunAsAny
fsGroup:
rule: RunAsAny
volumes:
- '*'
And create it with kubectl:
kubectl-admin create -f example-psp.yaml
Now, as the unprivileged user, try to create a simple pod:
kubectl-user create -f- <<EOF
apiVersion: v1
kind: Pod
metadata:
name: pause
spec:
containers:
- name: pause
image: k8s.gcr.io/pause
EOF
The output is similar to this:
Error from server (Forbidden): error when creating "STDIN": pods "pause" is forbidden: unable to validate against any pod security policy: [] Create a new ServiceAccount named psp-sa in the namespace default. $ cat clusterrole-use-privileged.yaml
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
name: use-privileged-psp
rules:
- apiGroups: ['policy']
resources: ['podsecuritypolicies']
verbs: ['use']
resourceNames:
- default-psp
---
apiVersion: rbac.authorization.k8s.io/v1
kind: RoleBinding
metadata:
name: privileged-role-bind
namespace: psp-test
roleRef:
apiGroup: rbac.authorization.k8s.io
kind: ClusterRole
name: use-privileged-psp
subjects:
- kind: ServiceAccount
name: privileged-sa
$ kubectl -n psp-test apply -f clusterrole-use-privileged.yaml After a few moments, the privileged Pod should be created.
Create a new ClusterRole named prevent-role, which uses the newly created Pod Security Policy prevent-privileged-policy.
apiVersion: policy/v1beta1

kind: PodSecurityPolicy
metadata:
name: example
spec:
privileged: false # Don't allow privileged pods!
The rest fills in some required fields.
seLinux:
rule: RunAsAny
supplementalGroups:
rule: RunAsAny
runAsUser:
rule: RunAsAny
fsGroup:
rule: RunAsAny
volumes:
- '*'
And create it with kubectl:
kubectl-admin create -f example-psp.yaml
Now, as the unprivileged user, try to create a simple pod:
kubectl-user create -f- <<EOF
apiVersion: v1
kind: Pod
metadata:
name: pause
spec:
containers:
- name: pause
image: k8s.gcr.io/pause
EOF
The output is similar to this:
Error from server (Forbidden): error when creating "STDIN": pods "pause" is forbidden: unable to validate against any pod security policy: [] Create a new ClusterRoleBinding named prevent-role-binding, which binds the created ClusterRole prevent-role to the created SA psp-sa.
apiVersion: rbac.authorization.k8s.io/v1
This role binding allows "jane" to read pods in the "default" namespace. # You need to already have a Role named "pod-reader" in that namespace. kind: RoleBinding
metadata:
name: read-pods
namespace: default
subjects:
You can specify more than one "subject"
- kind: User
name: jane # "name" is case sensitive
apiGroup: rbac.authorization.k8s.io
roleRef:
"roleRef" specifies the binding to a Role / ClusterRole
kind: Role #this must be Role or ClusterRole
name: pod-reader # this must match the name of the Role or ClusterRole you wish to bind to apiGroup: rbac.authorization.k8s.io apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
namespace: default
name: pod-reader

rules:
- apiGroups: [""] # "" indicates the core API group
resources: ["pods"]
verbs: ["get", "watch", "list"]

QUESTION 4

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSCH00201
Switched to context "KSCH00201".
candidate@cli:~$ kubectl get pods -n security
NAME      READY   STATUS    RESTARTS   AGE
web-pod   1/1     Running   0          6h9m
candidate@cli:~$ kubectl get deployments.apps -n security
No resources found in security namespace.
candidate@cli:~$ kubectl describe rolebindings.rbac.authorization.k8s.io -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
Role:
  Kind:  Role
  Name:  dev-role
Subjects:
  Kind            Name      Namespace
  ----            ----      ---------
  ServiceAccount  sa-dev-1
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  *          []                 []              [*]
candidate@cli:~$ kubectl edit role/dev-role -n security
```

```
  uid: b4c9ddd6-2729-43bd-8fbd-b2d227f4c4cd
rules:
- apiGroups:
  - ""
  resources:
  - services
  verbs:
  - watch
```

```
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  *          []                 []              [*]
candidate@cli:~$ kubectl edit role/dev-role -n security
role.rbac.authorization.k8s.io/dev-role edited
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  services   []                 []              [watch]
candidate@cli:~$ kubectl get pods -n security
NAME      READY   STATUS    RESTARTS   AGE
web-pod   1/1     Running   0          6h12m
candidate@cli:~$ kubectl get pods/web-pod -n security -o yaml | grep serviceAccount
  serviceAccount: sa-dev-1
  serviceAccountName: sa-dev-1
      - serviceAccountToken:
candidate@cli:~$ kubectl create role role-2 --verb=update --resource=namespaces -n security
role.rbac.authorization.k8s.io/role-2 created
candidate@cli:~$ kubectl create rolebinding role-2-binding --role
--role   --role=
candidate@cli:~$ kubectl create rolebinding role-2-binding --role=role-2 --serviceaccount=se
curity:sa-dev-1 -n security
rolebinding.rbac.authorization.k8s.io/role-2-binding created
candidate@cli:~$
```

QUESTION 5
Enable audit logs in the cluster, To Do so, enable the log backend, and ensure that

A. logs are stored at /var/log/kubernetes-logs.txt.
B. Log files are retained for 12 days.
C. at maximum, a number of 8 old audit logs files are retained.
D. set the maximum size before getting rotated to 200MB
Edit and extend the basic policy to log:
E. namespaces changes at RequestResponse
F. Log the request body of secrets changes in the namespace kube-system.
G. Log all other resources in core and extensions at the Request level.
H. Log "pods/portforward", "services/proxy" at Metadata level.
I. Omit the Stage RequestReceived

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
Kubernetes auditing provides a security-relevant chronological set of records about a cluster. Kubeapiserver performs auditing. Each request on each stage of its execution generates an event, which is then pre-processed according to a certain policy and written to a backend. The policy determines what's recorded and the backends persist the records. You might want to configure the audit log as part of compliance with the CIS (Center for Internet Security) Kubernetes Benchmark controls.
The log backend writes audit events to a file in JSONlines format. You can configure the log audit backend using the following kube-apiserver flags:
--audit-log-path specifies the log file path that log backend uses to write audit events. Not specifying this flag disables log backend. - means standard out
--audit-log-maxage defined the maximum number of days to retain old audit log files

--audit-log-maxbackup defines the maximum number of audit log files to retain
--audit-log-maxsize defines the maximum size in megabytes of the audit log file before it gets rotated
If your cluster's control plane runs the kube-apiserver as a Pod, remember to mount the hostPath to the location of the policy file and log file, so that audit records are persisted. For example:
--audit-policy-file=/etc/kubernetes/audit-policy.yaml \
--audit-log-path=/var/log/audit.log

QUESTION 6
Analyze and edit the given Dockerfile

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
FROM debian:latest
MAINTAINER k@bogotobogo.com
1 - RUN
RUN apt-get update && DEBIAN_FRONTEND=noninteractive apt-get install -yq apt-utils RUN DEBIAN_FRONTEND=noninteractive apt-get install -yq htop
RUN apt-get clean
2 - CMD
#CMD ["htop"]
#CMD ["ls", "-l"]
3 - WORKDIR and ENV
WORKDIR /root
ENV DZ version1
$ docker image build -t bogodevops/demo .
Sending build context to Docker daemon 3.072kB
Step 1/7 : FROM debian:latest
---> be2868bebaba
Step 2/7 : MAINTAINER k@bogotobogo.com
---> Using cache
---> e2eef476b3fd
Step 3/7 : RUN apt-get update && DEBIAN_FRONTEND=noninteractive apt-get install -yq apt-utils ---> Using cache
---> 32fd044c1356
Step 4/7 : RUN DEBIAN_FRONTEND=noninteractive apt-get install -yq htop ---> Using cache
---> 0a5b514a209e
Step 5/7 : RUN apt-get clean
---> Using cache
---> 5d1578a47c17
Step 6/7 : WORKDIR /root
---> Using cache
---> 6b1c70e87675
Step 7/7 : ENV DZ version1
---> Using cache
---> cd195168c5c7
Successfully built cd195168c5c7
Successfully tagged bogodevops/demo:latest

QUESTION 7
Create a RuntimeClass named gvisor-rc using the prepared runtime handler named runsc.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
Install the Runtime Class for gVisor
{ # Step 1: Install a RuntimeClass
cat <<EOF | kubectl apply -f -
apiVersion: node.k8s.io/v1beta1
kind: RuntimeClass
metadata:
name: gvisor
handler: runsc
EOF
}
Create a Pod with the gVisor Runtime Class
{ # Step 2: Create a pod
cat <<EOF | kubectl apply -f -
apiVersion: v1
kind: Pod
metadata:
name: nginx-gvisor
spec:
runtimeClassName: gvisor
containers:
- name: nginx
image: nginx
EOF
}
Verify that the Pod is running
{ # Step 3: Get the pod
kubectl get pod nginx-gvisor -o wide
}

QUESTION 8

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSSH00301
Switched to context "KSSH00301".
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ kubectl get ns dev-team --show-labels
NAME       STATUS   AGE     LABELS
dev-team   Active   6h39m   environment=dev,kubernetes.io/metadata.name=dev-team
candidate@cli:~$ kubectl get pods -n dev-team --show-labels
NAME            READY   STATUS    RESTARTS   AGE     LABELS
users-service   1/1     Running   0          6h40m   environment=dev
candidate@cli:~$ ls
KSCH00301  KSMV00102  KSSC00301  KSSH00401     test-secret-pod.yaml
KSCS00101  KSMV00301  KSSH00301  password.txt  username.txt
candidate@cli:~$ vim np.yaml
```

```yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: pod-access
  namespace: dev-team
spec:
  podSelector:
    matchLabels:
      environment: dev
  policyTypes:
    - Ingress
  ingress:
    - from:
        - namespaceSelector:
            matchLabels:
              environment: dev
        - podSelector:
            matchLabels:
              environment: testing
```

```
candidate@cli:~$ vim np.yaml
candidate@cli:~$ cat np.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: pod-access
  namespace: dev-team
spec:
  podSelector:
    matchLabels:
      environment: dev
  policyTypes:
    - Ingress
  ingress:
    - from:
        - namespaceSelector:
            matchLabels:
              environment: dev
        - podSelector:
            matchLabels:
              environment: testing
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ kubectl create -f np.yaml -n dev-team
networkpolicy.networking.k8s.io/pod-access created
candidate@cli:~$ kubectl describe netpol -n dev-team
Name:         pod-access
Namespace:    dev-team
Created on:   2022-05-20 15:35:33 +0000 UTC
Labels:       <none>
Annotations:  <none>
Spec:
  PodSelector:     environment=dev
  Allowing ingress traffic:
    To Port: <any> (traffic allowed to all ports)
    From:
      NamespaceSelector: environment=dev
    From:
      PodSelector: environment=testing
  Not affecting egress traffic
  Policy Types: Ingress
candidate@cli:~$ cat KSSH00301/network-policy.yaml
---
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: ""
  namespace: ""
spec:
  podSelector: {}
  policyTypes:
    - Ingress
  ingress:
    - from: []
    - from: []
candidate@cli:~$ cp np.yaml KSSH00301/network-policy.yaml
candidate@cli:~$ cat KSSH00301/network-policy.yaml
```

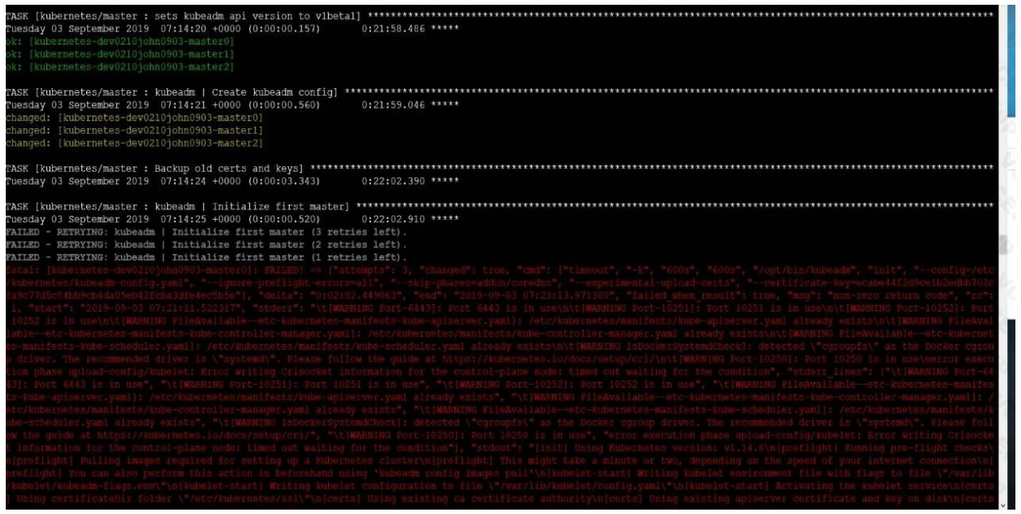
```
candidate@cli:~$ cat KSSH00301/network-policy.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: pod-access
  namespace: dev-team
spec:
  podSelector:
    matchLabels:
      environment: dev
  policyTypes:
    - Ingress
  ingress:
    - from:
        - namespaceSelector:
            matchLabels:
              environment: dev
        - podSelector:
            matchLabels:
              environment: testing
candidate@cli:~$
```


QUESTION 9

A container image scanner is set up on the cluster.
Given an incomplete configuration in the directory
/etc/kubernetes/confcontrol and a functional container image scanner with HTTPS endpoint
https://test-server.local.8081/image_policy

A. Enable the admission plugin.
B. Validate the control configuration and change it to implicit deny.

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
ssh-add ~/.ssh/tempprivate
eval "$(ssh-agent -s)"
cd contrib/terraform/aws
vi terraform.tfvars
terraform init
terraform apply -var-file=credentials.tfvars
ansible-playbook -i ./inventory/hosts ./cluster.yml -e ansible_ssh_user=core -e bootstrap_os=coreos -b --become-user=root --flush-cache -e ansible_user=core



QUESTION 10
On the Cluster worker node, enforce the prepared AppArmor profile

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSSH00401
Switched to context "KSSH00401".
candidate@cli:~$ ssh kssh00401-worker1
Warning: Permanently added '10.240.86.172' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@kssh00401-worker1:~# head /etc/apparmor.d/nginx_apparmor
#include <tunables/global>

profile nginx-profile-2 flags=(attach_disconnected,mediate_deleted) {
 #include <abstractions/base>
  network inet tcp,
  network inet udp,
  network inet icmp,

  deny network raw,

root@kssh00401-worker1:~# apparmor_parser -q /etc/apparmor.d/nginx_apparmor
root@kssh00401-worker1:~# exit
logout
Connection to 10.240.86.172 closed.
candidate@cli:~$ cat KSSH00401/nginx-pod.yaml
---
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx-pod
    image: nginx:1.19.0
    ports:
    - containerPort: 80
candidate@cli:~$ vim KSSH00401/nginx-pod.yaml
---
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
  annotations:
    container.apparmor.security.beta.kubernetes.io/nginx-pod: localhost/nginx-pr
spec:
  containers:
  - name: nginx-pod
    image: nginx:1.19.0
    ports:
    - containerPort: 80
~
```

```
candidate@cli:~$ vim KSSH00401/nginx-pod.yaml
candidate@cli:~$ kubectl create -f KSSH00401/nginx-pod.yaml
pod/nginx-pod created
candidate@cli:~$ cat KSSH00401/nginx-pod.yaml
---
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
  annotations:
    container.apparmor.security.beta.kubernetes.io/nginx-pod: localhost/nginx-profile-2
spec:
  containers:
  - name: nginx-pod
    image: nginx:1.19.0
    ports:
    - containerPort: 80
```

QUESTION 11
Create a new NetworkPolicy named deny-all in the namespace testing which denies all traffic of type ingress and egress traffic

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
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.

QUESTION 12

A. Retrieve the content of the existing secret named default-token-xxxxx in the testing namespace.
Store the value of the token in the token.txt b. Create a new secret named test-db-secret in the DB namespace with the following content: username: mysql password: password@123 Create the Pod name test-db-pod of image nginx in the namespace db that can access test-db-secret via a volume at path /etc/mysql-credentials

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
To add a Kubernetes cluster to your project, group, or instance:
Navigate to your:
Project's Operations > Kubernetes page, for a project-level cluster.
Group's Kubernetes page, for a group-level cluster.
Admin Area > Kubernetes page, for an instance-level cluster.
Click Add Kubernetes cluster.
Click the Add existing cluster tab and fill in the details:
Kubernetes cluster name (required) - The name you wish to give the cluster.
Environment scope (required) - The associated environment to this cluster.
API URL (required) - It's the URL that GitLab uses to access the Kubernetes API. Kubernetes exposes several APIs, we want the "base" URL that is common to all of them. For example, https://kubernetes.example.com rather than https://kubernetes.example.com/api/v1.
Get the API URL by running this command: kubectl cluster-info | grep -E 'Kubernetes master|Kubernetes control plane' | awk '/http/ {print $NF}' CA certificate (required) - A valid Kubernetes certificate is needed to authenticate to the cluster.
We use the certificate created by default.
List the secrets with kubectl get secrets, and one should be named similar to default-token-xxxxx.
Copy that token name for use below.
Get the certificate by running this command: kubectl get secret <secret name> -o jsonpath="{['data']['ca\.crt']}"

QUESTION 13
use the Trivy to scan the following images,

A. amazonlinux:1
B. k8s.gcr.io/kube-controller-manager:v1.18.6
Look for images with HIGH or CRITICAL severity vulnerabilities and store the output of the same in /opt/trivy-vulnerable.txt

Correct Answer: S, E, N, D, U, S, Y, O, U, R, S, U, G, G, E, S, T, I, O, N, O, N, I, T
Section:

QUESTION 14

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSRS00101
Switched to context "KSRS00101".
candidate@cli:~$ ssh ksrs00101-worker1
Warning: Permanently added '10.240.86.96' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@ksrs00101-worker1:~# falco
falco                falco-driver-loader
root@ksrs00101-worker1:~# ls -l /etc/falco/
total 200
-rw-r--r-- 1 root root  12399 Jan 31 16:06 aws_cloudtrail_rules.yaml
-rw-r--r-- 1 root root  11384 Jan 31 16:06 falco.yaml
-rw-r--r-- 1 root root   1136 Jan 31 16:06 falco_rules.local.yaml
-rw-r--r-- 1 root root 132112 Jan 31 16:06 falco_rules.yaml
-rw-r--r-- 1 root root  27289 Jan 31 16:06 k8s_audit_rules.yaml
drwxr-xr-x 2 root root   4096 Feb 16 01:07 rules.available
drwxr-xr-x 2 root root   4096 Jan 31 16:28 rules.d
root@ksrs00101-worker1:~# vim /etc/falco/falco_rules.local.yaml
```

```
# Copyright (C) 2019 The Falco Authors.
#
#
# Licensed under the Apache License, Version 2.0 (the "License");
# you may not use this file except in compliance with the License.
# You may obtain a copy of the License at
#
#     http://www.apache.org/licenses/LICENSE-2.0
#
# Unless required by applicable law or agreed to in writing, software
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.
#

###################
# Your custom rules!
###################

# Add new rules, like this one
# - rule: The program "sudo" is run in a container
#   desc: An event will trigger every time you run sudo in a container
#   condition: evt.type = execve and evt.dir=< and container.id != host and proc.name = sudo
#   output: "Sudo run in container (user=%user.name %container.info parent=%proc.pname cmdli
ne=%proc.cmdline)"
#   priority: ERROR
#   tags: [users, container]

# Or override/append to any rule, macro, or list from the Default Rules
- rule: Container Drift Detected (chmod)
  desc: New executable created in a container due to chmod
  condition: >
    evt.type in (open,openat,create) and
    evt.is_open_exec=true and
    container and
    not runc_writing_exec_fifo and
    not runc_writing_var_lib_docker and
    not user_known_container_drift_activities and
    evt.rawres>=0
  output:
     %evt.time,%user.uid,%proc.name
  priority: ERROR

root@ksrs00101-worker1:~# vim /etc/falco/falco_rules.local.yaml
root@ksrs00101-worker1:~# systemctl status falco.service
● falco.service - Falco Runtime Security
     Loaded: loaded (/lib/systemd/system/falco.service; disabled; vendor preset: enabled)
     Active: inactive (dead)
root@ksrs00101-worker1:~# systemctl enable falco.service
Created symlink /etc/systemd/system/multi-user.target.wants/falco.service → /lib/systemd/sys
tem/falco.service.
root@ksrs00101-worker1:~# systemctl start falco.service
root@ksrs00101-worker1:~# exit
logout
Connection to 10.240.86.96 closed.
candidate@cli:~$ ssh ksrs00101-worker1
Last login: Fri May 20 15:59:48 2022 from 10.240.86.88
root@ksrs00101-worker1:~# vim /etc/falco/falco.yaml
```

```
# When using json output, whether or not to include the "tags" property
# itself in the json output. If set to true, outputs caused by rules
# with no tags will have a "tags" field set to an empty array. If set to
# false, the "tags" field will not be included in the json output at all.
json_include_tags_property: true

# Send information logs to stderr and/or syslog Note these are *not* security
# notification logs! These are just Falco lifecycle (and possibly error) logs.
log_stderr: true
log_syslog: true
log_file: /opt/KSRS00101/alerts/details

# Minimum log level to include in logs. Note: these levels are
# separate from the priority field of rules. This refers only to the
# log level of falco's internal logging. Can be one of "emergency",
# "alert", "critical", "error", "warning", "notice", "info", "debug".
log_level: info
```

```
root@ksrs00101-worker1:~# vim /etc/falco/falco.yaml
root@ksrs00101-worker1:~# grep log /etc/falco/falco.yaml
# cloudtrail log files.
# If true, the times displayed in log messages and output messages
# Send information logs to stderr and/or syslog Note these are *not* security
# notification logs! These are just Falco lifecycle (and possibly error) logs.
log_stderr: true
log_syslog: true
log_file: /opt/KSRS00101/alerts/details
# Minimum log level to include in logs. Note: these levels are
# log level of falco's internal logging. Can be one of "emergency",
log_level: info
#    - log: log a DEBUG message noting that the buffer was full
# Notice it is not possible to ignore and log/alert messages at the same time.
# The rate at which log/alert messages are emitted is governed by a
    - log
# The timeout error will be reported to the log according to the above log_* settings.
syslog_output:
#    - logging (alternate method than syslog):
#        program: logger -t falco-test
# this information will be logged, however the main Falco daemon will not be stopped.
root@ksrs00101-worker1:~# systemctl restart falco.service
root@ksrs00101-worker1:~# exit
logout
Connection to 10.240.86.96 closed.
candidate@cli:~$
```


QUESTION 15
Create a User named john, create the CSR Request, fetch the certificate of the user after approving it.

Correct Answer: S, E, E, T, H, E
Section:
Explanation:
Explanation:
se kubectl to create a CSR and approve it.
Get the list of CSRs:
kubectl get csr
Approve the CSR:

kubectl certificate approve myuser
Get the certificate
Retrieve the certificate from the CSR:
kubectl get csr/myuser -o yaml
here are the role and role-binding to give john permission to create NEW_CRD resource:
kubectl apply -f roleBindingJohn.yaml --as=john
rolebinding.rbac.authorization.k8s.io/john_external-rosource-rb created kind: RoleBinding
apiVersion: rbac.authorization.k8s.io/v1
metadata:
name: john_crd
namespace: development-john
subjects:
- kind: User
name: john
apiGroup: rbac.authorization.k8s.io
roleRef:
kind: ClusterRole
name: crd-creation
kind: ClusterRole
apiVersion: rbac.authorization.k8s.io/v1
metadata:
name: crd-creation
rules:
- apiGroups: ["kubernetes-client.io/v1"]
resources: ["NEW_CRD"]

QUESTION 16
Fix all issues via configuration and restart the affected components to ensure the new setting takes effect.

Correct Answer: S, E, E, T, H, E
Section:
Explanation:
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-certificateauthority
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

QUESTION 17
Create a PSP that will only allow the persistentvolumeclaim as the volume type in the namespace restricted.

Correct Answer: S, E, E, T, H, E
Section:
Explanation:
Explanation:
apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
name: restricted
annotations:
seccomp.security.alpha.kubernetes.io/allowedProfileNames: 'docker/default,runtime/default' apparmor.security.beta.kubernetes.io/allowedProfileNames: 'runtime/default'
seccomp.security.alpha.kubernetes.io/defaultProfileName: 'runtime/default' apparmor.security.beta.kubernetes.io/defaultProfileName: 'runtime/default' spec:
privileged: false
Required to prevent escalations to root.
allowPrivilegeEscalation: false
This is redundant with non-root + disallow privilege escalation, # but we can provide it for defense in depth.

requiredDropCapabilities:
- ALL
Allow core volume types.
volumes:
- 'configMap'
- 'emptyDir'
- 'projected'
- 'secret'
- 'downwardAPI'
Assume that persistentVolumes set up by the cluster admin are safe to use. - 'persistentVolumeClaim'
hostNetwork: false
hostIPC: false
hostPID: false
runAsUser:
Require the container to run without root privileges.
rule: 'MustRunAsNonRoot'
seLinux:
This policy assumes the nodes are using AppArmor rather than SELinux. rule: 'RunAsAny'
supplementalGroups:
rule: 'MustRunAs'
ranges:
Forbid adding the root group.
- min: 1
max: 65535
fsGroup:
rule: 'MustRunAs'
ranges:
Forbid adding the root group.
- min: 1
max: 65535
readOnlyRootFilesystem: false

QUESTION 18
Given an existing Pod named nginx-pod running in the namespace test-system, fetch the serviceaccount- name used and put the content in /candidate/KSC00124.txt Create a new Role named dev-test-role in the namespace test-system, which can perform update operations, on resources of type namespaces.

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSCH00201
Switched to context "KSCH00201".
candidate@cli:~$ kubectl get pods -n security
NAME      READY   STATUS    RESTARTS   AGE
web-pod   1/1     Running   0          6h9m
candidate@cli:~$ kubectl get deployments.apps -n security
No resources found in security namespace.
candidate@cli:~$ kubectl describe rolebindings.rbac.authorization.k8s.io -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
Role:
  Kind:  Role
  Name:  dev-role
Subjects:
  Kind            Name      Namespace
  ----            ----      ---------
  ServiceAccount  sa-dev-1
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  *          []                 []              [*]
candidate@cli:~$ kubectl edit role/dev-role -n security
```

```
  uid: b4c9ddd6-2729-43bd-8fbd-b2d227f4c4cd
rules:
- apiGroups:
  - ""
  resources:
  - services
  verbs:
  - watch
```

```
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  *          []                 []              [*]
candidate@cli:~$ kubectl edit role/dev-role -n security
role.rbac.authorization.k8s.io/dev-role edited
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  services   []                 []              [watch]
candidate@cli:~$ kubectl get pods -n security
NAME      READY   STATUS    RESTARTS   AGE
web-pod   1/1     Running   0          6h12m
candidate@cli:~$ kubectl get pods/web-pod -n security -o yaml | grep serviceAccount
  serviceAccount: sa-dev-1
  serviceAccountName: sa-dev-1
      - serviceAccountToken:
candidate@cli:~$ kubectl create role role-2 --verb=update --resource=namespaces -n security
role.rbac.authorization.k8s.io/role-2 created
candidate@cli:~$ kubectl create rolebinding role-2-binding --role
--role   --role=
candidate@cli:~$ kubectl create rolebinding role-2-binding --role=role-2 --serviceaccount=se
curity:sa-dev-1 -n security
rolebinding.rbac.authorization.k8s.io/role-2-binding created
candidate@cli:~$
```

QUESTION 19
Enable audit logs in the cluster, To Do so, enable the log backend, and ensure that

A. logs are stored at /var/log/kubernetes/kubernetes-logs.txt.
B. Log files are retained for 5 days.
C. at maximum, a number of 10 old audit logs files are retained.
Edit and extend the basic policy to log:
D. Cronjobs changes at RequestResponse
E. Log the request body of deployments changes in the namespace kube-system.
F. Log all other resources in core and extensions at the Request level.
G.

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSRS00602
Switched to context "KSRS00602".
candidate@cli:~$ ssh ksrs00602-master
Warning: Permanently added '10.240.86.243' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@ksrs00602-master:~# cat /etc/kubernetes/logpolicy/sample-policy.yaml
---
apiVersion: audit.k8s.io/v1
kind: Policy
# Don't generate audit events for all requests in RequestReceived stage.
omitStages:
  - "RequestReceived"
rules:
  # Don't log watch requests by the "system:kube-proxy" on endpoints or services
  - level: None
    users: ["system:kube-proxy"]
    verbs: ["watch"]
    resources:
    - group: "" # core API group
      resources: ["endpoints", "services"]

  # Don't log authenticated requests to certain non-resource URL paths.
  - level: None
    userGroups: ["system:authenticated"]
    nonResourceURLs:
    - "/api*" # Wildcard matching.
    - "/version"
  # Edit form here below
root@ksrs00602-master:~# vim /etc/kubernetes/logpolicy/sample-policy.yaml
    - "/api*" # Wildcard matching.
    - "/version"
  # Edit form here below
  - level: RequestResponse
    resources:
    - group: ""
      resources: ["cronjobs"]
  - level: Request
    resources:
    - group: "" # core API group
      resources: ["pods"]
      namespaces: ["webapps"]
# Log configmap and secret changes in all other namespaces at the Metadata level.
  - level: Metadata
    resources:
    - group: "" # core API group
      resources: ["secrets", "configmaps"]

  # A catch-all rule to log all other requests at the Metadata level.
  - level: Metadata
    # Long-running requests like watches that fall under this rule will not
    # generate an audit event in RequestReceived.
    omitStages:
      - "RequestReceived"
```

```
    - "/version"
  # Edit form here below
  - level: RequestResponse
    resources:
    - group: ""
      resources: ["cronjobs"]
  - level: Request
    resources:
    - group: "" # core API group
      resources: ["pods"]
      namespaces: ["webapps"]
# Log configmap and secret changes in all other namespaces at the Metadata level.
  - level: Metadata
    resources:
    - group: "" # core API group
      resources: ["secrets", "configmaps"]

  # A catch-all rule to log all other requests at the Metadata level.
  - level: Metadata
    # Long-running requests like watches that fall under this rule will not
    # generate an audit event in RequestReceived.
    omitStages:
      - "RequestReceived"
root@ksrs00602-master:~# vim /etc/kubernetes/logpolicy/sample-policy.yaml
root@ksrs00602-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
  labels:
    component: kube-apiserver
    tier: control-plane
  name: kube-apiserver
  namespace: kube-system
spec:
  containers:
    - command:
        - kube-apiserver
        - --advertise-address=10.240.86.243
        - --allow-privileged=true
        - --audit-policy-file=/etc/kubernetes/logpolicy/sample-policy.yaml
        - --audit-log-path=/var/log/kubernetes/kubernetes-logs.txt
        - --audit-log-maxbackup=1
        - --audit-log-maxage=30
        - --authorization-mode=Node,RBAC
        - --client-ca-file=/etc/kubernetes/pki/ca.crt
        - --enable-admission-plugins=NodeRestriction
        - --enable-bootstrap-token-auth=true
        - --etcd-cafile=/etc/kubernetes/pki/etcd/ca.crt
```

```
  # A catch-all rule to log all other requests at the Metadata level.
  - level: Metadata
    # Long-running requests like watches that fall under this rule will not
    # generate an audit event in RequestReceived.
    omitStages:
      - "RequestReceived"
root@ksrs00602-master:~# vim /etc/kubernetes/logpolicy/sample-policy.yaml
root@ksrs00602-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
root@ksrs00602-master:~# systemctl daemon-reload
root@ksrs00602-master:~# systemctl restart kubelet.service
root@ksrs00602-master:~# systemctl enable kubelet
root@ksrs00602-master:~# exit
logout
Connection to 10.240.86.243 closed.
candidate@cli:~$
```

QUESTION 20
Create a RuntimeClass named untrusted using the prepared runtime handler named runsc.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
[    0.000000] Starting gVisor...
[    0.183366] Creating cloned children...
[    0.290397] Moving files to filing cabinet...
[    0.392925] Letting the watchdogs out...
[    0.452958] Digging up root...
[    0.937597] Gathering forks...
[    1.095081] Daemonizing children...
[    1.306448] Rewriting operating system in Javascript...
[    1.514936] Reading process obituaries...
[    1.589958] Waiting for children...
[    1.892298] Segmenting fault lines...
[    1.974848] Ready!
```


QUESTION 21
Create a network policy named allow-np, that allows pod in the namespace staging to connect to port 80 of other pods in the same namespace.
Ensure that Network Policy:-

A. Does not allow access to pod not listening on port 80.
B.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation: apiVersion: networking.k8s.io/v1 kind: NetworkPolicy metadata: name: network-policy spec: podSelector: {} #selects all the pods in the namespace deployed policyTypes:
- Ingress ingress:
- ports: #in input traffic allowed only through 80 port only
- protocol: TCP port: 80

QUESTION 22
Create a Pod name Nginx-pod inside the namespace testing, Create a service for the Nginx-pod named nginx-svc, using the ingress of your choice, run the ingress on tls, secure port.

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
$ kubectl get ing -n <namespace-of-ingress-resource>
NAME HOSTS ADDRESS PORTS AGE cafe-ingress cafe.com 10.0.2.15 80 25s $ kubectl describe ing <ingress-resource-name> -n <namespace-of-ingress-resource> Name: cafe-ingress Namespace: default Address: 10.0.2.15
Default backend: default-http-backend:80 (172.17.0.5:8080) Rules:
Host Path Backends
---- ---- -------- cafe.com
/tea tea-svc:80 (<none>)
/coffee coffee-svc:80 (<none>)
Annotations: kubectl.kubernetes.io/last-applied-configuration:
{"apiVersion":"networking.k8s.io/v1","kind":"Ingress","metadata":{"annotations":{},"name":"cafeingress"," namespace":"default","selfLink":"/apis/networking/v1/namespaces/default/ingresses/cafe -ingress"},"spec":{"rules":[{"host":"cafe.com","http":{"paths":[{"backend":{"serviceName":"teasvc"," servicePort":80},"path":"/tea"},{"backend":{"serviceName":"coffeesvc"," servicePort":80},"path":"/coffee"}]}}]},"status":{"loadBalancer":{"ingress":[{"ip":"169.48.142.11 0"}]}}} Events:
Type Reason Age From Message
---- ------ ---- ---- -------
Normal CREATE 1m ingress-nginx-controller Ingress default/cafe-ingress Normal UPDATE 58s ingress-nginx-controller Ingress default/cafe-ingress $ kubectl get pods -n <namespace-of-ingress-controller> NAME READY STATUS RESTARTS AGE ingress-nginx-controller-67956bf89d-fv58j 1/1 Running 0 1m $ kubectl logs -n <namespace> ingress-nginx-controller-67956bf89d-fv58j ---------- NGINX Ingress controller Release: 0.14.0 Build: git-734361d Repository: https://github.com/kubernetes/ingress-nginx ----------
....

QUESTION 23
Secrets stored in the etcd is not secure at rest, you can use the etcdctl command utility to find the secret value for e.g:-

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
ETCD secret encryption can be verified with the help of etcdctl command line utility. ETCD secrets are stored at the path /registry/secrets/$namespace/$secret on the master node.
The below command can be used to verify if the particular ETCD secret is encrypted or not.
ETCDCTL_API=3 etcdctl get /registry/secrets/default/secret1 [...] | hexdump -C

QUESTION 24
Service is running on port 389 inside the system, find the process-id of the process, and stores the names of all the open-files inside the /candidate/KH77539/files.txt, and also delete the binary.

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
root# netstat -ltnup
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address Foreign Address State PID/Program name tcp 0 0 127.0.0.1:17600 0.0.0.0:* LISTEN 1293/dropbox
tcp 0 0 127.0.0.1:17603 0.0.0.0:* LISTEN 1293/dropbox
tcp 0 0 0.0.0.0:22 0.0.0.0:* LISTEN 575/sshd
tcp 0 0 127.0.0.1:9393 0.0.0.0:* LISTEN 900/perl
tcp 0 0 :::80 :::* LISTEN 9583/docker-proxy
tcp 0 0 :::443 :::* LISTEN 9571/docker-proxy

udp 0 0 0.0.0.0:68 0.0.0.0:* 8822/dhcpcd
...
root# netstat -ltnup | grep ':22'
tcp 0 0 0.0.0.0:22 0.0.0.0:* LISTEN 575/sshd
The ss command is the replacement of the netstat command.
Now let's see how to use the ss command to see which process is listening on port 22:
root# ss -ltnup 'sport = :22'
Netid State Recv-Q Send-Q Local Address:Port Peer Address:Port tcp LISTEN 0 128 0.0.0.0:22 0.0.0.0:* users:("sshd",pid=575,fd=3))

QUESTION 25
Use the kubesec docker images to scan the given YAML manifest, edit and apply the advised changes, and passed with a score of 4 points.

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
kubesec scan k8s-deployment.yaml
cat <<EOF > kubesec-test.yaml
apiVersion: v1
kind: Pod
metadata:
name: kubesec-demo
spec:
containers:
- name: kubesec-demo
image: gcr.io/google-samples/node-hello:1.0
securityContext:
readOnlyRootFilesystem: true
EOF
kubesec scan kubesec-test.yaml
docker run -i kubesec/kubesec:512c5e0 scan /dev/stdin < kubesec-test.yaml kubesec http 8080 &
[1] 12345
{"severity":"info","timestamp":"2019-05-
12T11:58:34.662+0100","caller":"server/server.go:69","message":"Starting HTTP server on port 8080"}
curl -sSX POST --data-binary @test/asset/score-0-cap-sys-admin.yml http://localhost:8080/scan [
{
"object": "Pod/security-context-demo.default",
"valid": true,
"message": "Failed with a score of -30 points",
"score": -30,
"scoring": {
"critical": [
{
"selector": "containers[] .securityContext .capabilities .add == SYS_ADMIN", "reason": "CAP_SYS_ADMIN is the most privileged capability and should always be avoided" },
{
"selector": "containers[] .securityContext .runAsNonRoot == true", "reason": "Force the running image to run as a non-root user to ensure least privilege" },
// ...

QUESTION 26
Using the runtime detection tool Falco, Analyse the container behavior for at least 20 seconds, using filters that detect newly spawning and executing processes in a single container of Nginx. store the incident file art

/opt/falco-incident.txt, containing the detected incidents. one per line, in the format [timestamp],[uid],[processName]

Correct Answer: S, E, N, D, U, S, Y, O, U, R, F, E, E, D, B, A, C, K, O, N, I, T
Section:

QUESTION 27
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:

A. Pods in the namespace qa
B. Pods with label environment: stage, in any namespace

Correct Answer: S, E, E, T, H, E
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSSH00301
Switched to context "KSSH00301".
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ kubectl get ns dev-team --show-labels
NAME       STATUS   AGE     LABELS
dev-team   Active   6h39m   environment=dev,kubernetes.io/metadata.name=dev-team
candidate@cli:~$ kubectl get pods -n dev-team --show-labels
NAME            READY   STATUS    RESTARTS   AGE     LABELS
users-service   1/1     Running   0          6h40m   environment=dev
candidate@cli:~$ ls
KSCH00301  KSMV00102  KSSC00301  KSSH00401     test-secret-pod.yaml
KSCS00101  KSMV00301  KSSH00301  password.txt  username.txt
candidate@cli:~$ vim np.yaml
```

```yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: pod-access
  namespace: dev-team
spec:
  podSelector:
    matchLabels:
      environment: dev
  policyTypes:
    - Ingress
  ingress:
    - from:
        - namespaceSelector:
            matchLabels:
              environment: dev
        - podSelector:
            matchLabels:
              environment: testing
```

```
candidate@cli:~$ vim np.yaml
candidate@cli:~$ cat np.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: pod-access
  namespace: dev-team
spec:
  podSelector:
    matchLabels:
      environment: dev
  policyTypes:
    - Ingress
  ingress:
    - from:
        - namespaceSelector:
            matchLabels:
              environment: dev
        - podSelector:
            matchLabels:
              environment: testing
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ kubectl create -f np.yaml -n dev-team
networkpolicy.networking.k8s.io/pod-access created
candidate@cli:~$ kubectl describe netpol -n dev-team
Name:         pod-access
Namespace:    dev-team
Created on:   2022-05-20 15:35:33 +0000 UTC
Labels:       <none>
Annotations:  <none>
Spec:
  PodSelector:     environment=dev
  Allowing ingress traffic:
    To Port: <any> (traffic allowed to all ports)
    From:
      NamespaceSelector: environment=dev
    From:
      PodSelector: environment=testing
  Not affecting egress traffic
  Policy Types: Ingress
candidate@cli:~$ cat KSSH00301/network-policy.yaml
---
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: ""
  namespace: ""
spec:
  podSelector: {}
  policyTypes:
    - Ingress
  ingress:
    - from: []
    - from: []
candidate@cli:~$ cp np.yaml KSSH00301/network-policy.yaml
candidate@cli:~$ cat KSSH00301/network-policy.yaml
```

```
candidate@cli:~$ cat KSSH00301/network-policy.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: pod-access
  namespace: dev-team
spec:
  podSelector:
    matchLabels:
      environment: dev
  policyTypes:
    - Ingress
  ingress:
    - from:
        - namespaceSelector:
            matchLabels:
              environment: dev
        - podSelector:
            matchLabels:
              environment: testing
candidate@cli:~$
```

Reference: https://kubernetes.io/docs/concepts/services-networking/network-policies/

QUESTION 28

Context

A container image scanner is set up on the cluster, but it's not yet fully integrated into the cluster s configuration. When complete, the container image scanner shall scan for and reject the use of vulnerable images.

Task

You have to complete the entire task on the cluster's master node, where all services and files have been prepared and placed.

Given an incomplete configuration in directory /etc/kubernetes/epconfig and a functional container image scanner with HTTPS endpoint https://wakanda.local:8081 /image_policy :

A. Enable the necessary plugins to create an image policy
B. Validate the control configuration and change it to an implicit deny
C. Edit the configuration to point to the provided HTTPS endpoint correctlyFinally, test if the configuration is working by trying to deploy the vulnerable resource /root/KSSC00202/vulnerable-resource.yml.

You can find the container image scanner's log file at /var/log/imagepolicy/acme.log .

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
Switched to context "KSSC00202".
candidate@cli:~$ ssh kssc00202-master
Warning: Permanently added '10.177.80.12' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@kssc00202-master:~# ls /etc/kubernetes/epconfig/
admission_configuration.json  apiserver-client-key.pem  apiserver-client.pem  kubeconfig.yaml  webhook-key.pem  webhook.pem
root@kssc00202-master:~# vim /etc/kubernetes/epconfig/admission_configuration.json
```

```
{
  "imagePolicy": {
    "kubeConfigFile": "/etc/kubernetes/epconfig/kubeconfig.yaml",
    "allowTTL": 50,
    "denyTTL": 50,
    "retryBackoff": 500,
    "defaultAllow": false
```

```
root@kssc00202-master:~# vim /etc/kubernetes/epconfig/admission_configuration.json
root@kssc00202-master:~# vim /etc/kubernetes/epconfig/admission_configuration.json
root@kssc00202-master:~# vim /etc/kubernetes/epconfig/kubeconfig.yaml
```

```
apiVersion: v1
clusters:
- cluster:
    certificate-authority: /etc/kubernetes/epconfig/webhook.pem # CA for verifying the remote service.
    server: https://wakanda.local:8081/image_policy
  name: kubernetes
contexts:
- context:
    cluster: kubernetes
    user: kubernetes-admin
  name: kubernetes-admin@kubernetes
current-context: kubernetes-admin@kubernetes
kind: Config
preferences: {}
users:
- name: kubernetes-admin
  user:
    client-certificate: /etc/kubernetes/epconfig/apiserver-client.pem
    client-key: /etc/kubernetes/epconfig/apiserver-client-key.pem
```

```
root@kssc00202-master:~# vim /etc/kubernetes/epconfig/admission_configuration.json
root@kssc00202-master:~# vim /etc/kubernetes/epconfig/admission_configuration.json
root@kssc00202-master:~# vim /etc/kubernetes/epconfig/kubeconfig.yaml
root@kssc00202-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml p
```

```
apiVersion: v1
kind: Pod
metadata:
  annotations:
    kubeadm.kubernetes.io/kube-apiserver.advertise-address.endpoint: 10.177.80.12:6443
  creationTimestamp: null
  labels:
    component: kube-apiserver
    tier: control-plane
  name: kube-apiserver
  namespace: kube-system
spec:
  containers:
    - command:
        - kube-apiserver
        - --advertise-address=10.177.80.12
        - --allow-privileged=true
        - --authorization-mode=Node,RBAC
        - --client-ca-file=/etc/kubernetes/pki/ca.crt
        - --enable-admission-plugins=NodeRestriction
        - --enable-bootstrap-token-auth=true
        - --etcd-cafile=/etc/kubernetes/pki/etcd/ca.crt
        - --etcd-certfile=/etc/kubernetes/pki/apiserver-etcd-client.crt
        - --etcd-keyfile=/etc/kubernetes/pki/apiserver-etcd-client.key
        - --etcd-servers=https://127.0.0.1:2379
        - --kubelet-client-certificate=/etc/kubernetes/pki/apiserver-kubelet-client.crt
        - --kubelet-client-key=/etc/kubernetes/pki/apiserver-kubelet-client.key
        - --kubelet-preferred-address-types=InternalIP,ExternalIP,Hostname
        - --proxy-client-cert-file=/etc/kubernetes/pki/front-proxy-client.crt
        - --proxy-client-key-file=/etc/kubernetes/pki/front-proxy-client.key
        - --requestheader-allowed-names=front-proxy-client
        - --requestheader-client-ca-file=/etc/kubernetes/pki/front-proxy-ca.crt
        - --requestheader-extra-headers-prefix=X-Remote-Extra-
"/etc/kubernetes/manifests/kube-apiserver.yaml" 135L, 4626C
```

```
root@kssc00202-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml p
2 files to edit
root@kssc00202-master:~# rm -f p
root@kssc00202-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
```

```
apiVersion: v1
kind: Pod
metadata:
  annotations:
    kubeadm.kubernetes.io/kube-apiserver.advertise-address.endpoint: 10.177.80.12:6443
  creationTimestamp: null
  labels:
    component: kube-apiserver
    tier: control-plane
  name: kube-apiserver
  namespace: kube-system
spec:
  containers:
    - command:
        - kube-apiserver
        - --advertise-address=10.177.80.12
        - --allow-privileged=true
        - --authorization-mode=Node,RBAC
        - --client-ca-file=/etc/kubernetes/pki/ca.crt
        - --enable-admission-plugins=NodeRestriction,ImagePolicyWebHook
        - --admission-control-config-file=/etc/kubernetes/epconfig/admin.conf
        - --enable-bootstrap-token-auth=true
        - --etcd-cafile=/etc/kubernetes/pki/etcd/ca.crt
        - --etcd-certfile=/etc/kubernetes/pki/apiserver-etcd-client.crt
        - --etcd-keyfile=/etc/kubernetes/pki/apiserver-etcd-client.key
        - --etcd-servers=https://127.0.0.1:2379
        - --kubelet-client-certificate=/etc/kubernetes/pki/apiserver-kubelet-client.crt
        - --kubelet-client-key=/etc/kubernetes/pki/apiserver-kubelet-client.key
        - --kubelet-preferred-address-types=InternalIP,ExternalIP,Hostname
        - --proxy-client-cert-file=/etc/kubernetes/pki/front-proxy-client.crt
        - --proxy-client-key-file=/etc/kubernetes/pki/front-proxy-client.key
        - --requestheader-allowed-names=front-proxy-client
        - --requestheader-client-ca-file=/etc/kubernetes/pki/front-proxy-ca.crt
root@kssc00202-master:~# rm -f p
root@kssc00202-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
root@kssc00202-master:~# systemctl daemon-reload
root@kssc00202-master:~#
root@kssc00202-master:~#
root@kssc00202-master:~#
root@kssc00202-master:~# systemctl restart kubelet.service
root@kssc00202-master:~# systemctl enable kubelet.service
root@kssc00202-master:~#
root@kssc00202-master:~#
root@kssc00202-master:~#
root@kssc00202-master:~#
root@kssc00202-master:~# ls
KSSC00202  snap
root@kssc00202-master:~# cat KSSC00202/vulnerable-resource.yml
```

```
KSSC00202  snap
root@kssc00202-master:~# cat KSSC00202/vulnerable-resource.yml
---
apiVersion: v1
kind: ReplicationController
metadata:
  name: nginx-latest
spec:
  replicas: 1
  selector:
    app: nginx-latest
  template:
    metadata:
      name: nginx-latest
      labels:
        app: nginx-latest
    spec:
      containers:
      - name: nginx-latest
        image: nginx
        ports:
        - containerPort: 80
root@kssc00202-master:~# kubectl create -f KSSC00202/vulnerable-resource.yml
```

```
root@kssc00202-master:~# kubectl create -f KSSC00202/vulnerable-resource.yml
The connection to the server 10.177.80.12:6443 was refused - did you specify the right host or port?
root@kssc00202-master:~# kubectl get pods
The connection to the server 10.177.80.12:6443 was refused - did you specify the right host or port?
root@kssc00202-master:~# ls -al .kube/
total 20
drwxr-xr-x  3 root root 4096 Aug  3 04:07 .
drwx------. 9 root root 4096 Oct 11 15:36 ..
drwxr-x---  4 root root 4096 Aug  3 04:07 cache
-rw-r--r--  1 root root 5636 Aug  3 04:07 config
root@kssc00202-master:~#  crictl ps -a
CONTAINER           IMAGE               CREATED             STATE               NAME                ATTEMPT             POD ID
012ea8587130e       a634548d10b03       2 months ago        Exited              kube-proxy          0                   1460a9f
a0f1e0       kube-proxy-cmjb5
405227dfa49d0       aebe758cef4cd       2 months ago        Exited              etcd                0                   cfb6522
e720fb       etcd-kssc00202-master
root@kssc00202-master:~# ls -al .kube/ | grep kube-api
root@kssc00202-master:~# crictl ps -a | grep kube-api
WARN[0000] runtime connect using default endpoints: [unix:///var/run/dockershim.sock unix:///run/containerd/containerd.sock unix:///ru
n/crio/crio.sock unix:///var/run/cri-dockerd.sock]. As the default settings are now deprecated, you should set the endpoint instead.
ERRO[0000] unable to determine runtime API version: rpc error: code = Unavailable desc = connection error: desc = "transport: Error wh
ile dialing dial unix /var/run/dockershim.sock: connect: no such file or directory"
WARN[0000] image connect using default endpoints: [unix:///var/run/dockershim.sock unix:///run/containerd/containerd.sock unix:///run/
crio/crio.sock unix:///var/run/cri-dockerd.sock]. As the default settings are now deprecated, you should set the endpoint instead.
ERRO[0000] unable to determine image API version: rpc error: code = Unavailable desc = connection error: desc = "transport: Error whil
e dialing dial unix /var/run/dockershim.sock: connect: no such file or directory"
a003b3fdfb61c       d3377ffb7177c       30 seconds ago      Exited              kube-apiserver      3                   2dadb4e
984a91       kube-apiserver-kssc00202-master
5e70b9a70f9ed       d3377ffb7177c       7 hours ago         Exited              kube-apiserver      0                   68a9f31
6c2559       kube-apiserver-kssc00202-master
root@kssc00202-master:~#
root@kssc00202-master:~#
root@kssc00202-master:~#
root@kssc00202-master:~# exit
logout
Connection to 10.177.80.12 closed.
candidate@cli:~$
```

QUESTION 29

You must complete this task on the following cluster/nodes: Cluster: immutable-cluster

Master node: master1

Worker node: worker1

You can switch the cluster/configuration context using the following command:

[desk@cli] $ kubectl config use-context immutable-cluster

Context: It is best practice to design containers to be stateless and immutable.

Task:

Inspect Pods running in namespace prod and delete any Pod that is either not stateless or not immutable.

Use the following strict interpretation of stateless and immutable:

A. Pods being able to store data inside containers must be treated as not stateless.
Note: You don't have to worry whether data is actually stored inside containers or not already.

B.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSRS00501
Switched to context "KSRS00501".
candidate@cli:~$ kubectl get pod -n testing
NAME       READY   STATUS    RESTARTS   AGE
app        1/1     Running   0          6h31m
frontend   1/1     Running   0          6h32m
smtp       1/1     Running   0          6h31m
candidate@cli:~$ kubectl get pod/app -n testing -o yaml
  - lastProbeTime: null
    lastTransitionTime: "2022-05-20T08:40:35Z"
    status: "True"
    type: PodScheduled
  containerStatuses:
  - containerID: docker://11143682c400984c9faf3dff1e056d4b00a7eb1de007fe1834be0a84fa146e18
    image: nginx:latest
    imageID: docker-pullable://nginx@sha256:2d17cc4981bf1e22a87ef3b3dd20fbb72c3868738e3f3076
62eb40e2630d4320
    lastState: {}
    name: app-container
    ready: true
    restartCount: 0
    started: true
    state:
      running:
        startedAt: "2022-05-20T08:40:37Z"
  hostIP: 10.240.86.141
  phase: Running
  podIP: 10.10.1.3
  podIPs:
  - ip: 10.10.1.3
  qosClass: BestEffort
  startTime: "2022-05-20T08:40:35Z"
candidate@cli:~$ kubectl get pod/app -n testing -o yaml | grep -E 'privileged|ReadOnlyFileSy
stem'
      privileged: true
candidate@cli:~$ kubectl get pod/frontend -n testing -o yaml | grep -E 'privileged|ReadOnlyF
ileSystem'
      privileged: false
```

```
candidate@cli:~$ kubectl get pod/smtp -n testing -o yaml | grep -E 'privileged|ReadOnlyFileS
ystem'
      privileged: true
candidate@cli:~$ kubectl get pod -n testing -o yaml | grep -i ReadOnly
        readOnlyRootFilesystem: false
        readOnly: true
        readOnlyRootFilesystem: true
        readOnly: true
        readOnlyRootFilesystem: false
        readOnly: true
candidate@cli:~$ kubectl get pod/smtp -n testing -o yaml | grep -E 'privileged|readOnlyRootF
ileSystem'
      privileged: true
candidate@cli:~$ kubectl get pod/app -n testing -o yaml | grep -E 'privileged|readOnlyRootFi
leSystem'
      privileged: true
candidate@cli:~$ kubectl get pod/frontend -n testing -o yaml | grep -E 'privileged|readOnlyR
ootFileSystem'
      privileged: false
candidate@cli:~$ kubectl get pod/frontend -n testing -o yaml | grep -E 'privileged|readOnlyR
ootFilesystem'
     privileged: true
     readOnlyRootFilesystem: false
candidate@cli:~$ kubectl delete pod/app -n testing
pod "app" deleted
candidate@cli:~$ kubectl get pod/smtp -n testing -o yaml | grep -E 'privileged|readOnlyRootF
ilesystem'
     privileged: true
     readOnlyRootFilesystem: false
candidate@cli:~$ kubectl delete pod/smtp -n testing
pod "smtp" deleted
```

Reference: https://kubernetes.io/docs/concepts/policy/pod-security-policy/
https://cloud.google.com/architecture/best-practices-for-operating-containers

QUESTION 30
You can switch the cluster/configuration context using the following command:
[desk@cli] $ kubectl config use-context stage
Context:
A PodSecurityPolicy shall prevent the creation of privileged Pods in a specific namespace.
Task:

A. Create a new PodSecurityPolcy named deny-policy, which prevents the creation of privileged Pods.
B. Create a new ClusterRole name deny-access-role, which uses the newly created PodSecurityPolicy deny-policy.
C. Create a new ServiceAccount named psd-denial-sa in the existing namespace development.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
Create psp to disallow privileged container
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
name: deny-access-role
rules:
- apiGroups: ['policy']
resources: ['podsecuritypolicies']
verbs: ['use']

resourceNames:
- “deny-policy”
k create sa psp-denial-sa -n development
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
name: restrict-access-bing
roleRef:
kind: ClusterRole
name: deny-access-role
apiGroup: rbac.authorization.k8s.io
subjects:
- kind: ServiceAccount
name: psp-denial-sa
namespace: development
master1 $ vim psp.yaml
apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
name: deny-policy
spec:
privileged: false # Don't allow privileged pods!
seLinux:
rule: RunAsAny
supplementalGroups:
rule: RunAsAny
runAsUser:
rule: RunAsAny
fsGroup:
rule: RunAsAny
volumes:
- '*'
master1 $ vim cr1.yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
name: deny-access-role
rules:
- apiGroups: ['policy']
resources: ['podsecuritypolicies']
verbs: ['use']
resourceNames:
- “deny-policy”
master1 $ k create sa psp-denial-sa -n development
master1 $ vim cb1.yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
name: restrict-access-bing
roleRef:

kind: ClusterRole
name: deny-access-role
apiGroup: rbac.authorization.k8s.io
subjects:
Authorize specific service accounts:
- kind: ServiceAccount
name: psp-denial-sa
namespace: development
master1 $ k apply -f psp.yaml
master1 $ k apply -f cr1.yaml
master1 $ k apply -f cb1.yaml
Reference: https://kubernetes.io/docs/concepts/policy/pod-security-policy/

QUESTION 31
Context:

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
1. For Dockerfile: Fix the image version & user name in Dockerfile
2. For mydeployment.yaml : Fix security contexts
[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: {}
```

Reference: https://kubernetes.io/docs/concepts/policy/pod-security-policy/

QUESTION 32
You can switch the cluster/configuration context using the following command:
[desk@cli] $ kubectl config use-context test-account
Task: Enable audit logs in the cluster.
To do so, enable the log backend, and ensure that:

A. logs are stored at /var/log/Kubernetes/logs.txt

B. log files are retained for 5 days

C. at maximum, a number of 10 old audit log files are retained
A basic policy is provided at /etc/Kubernetes/logpolicy/audit-policy.yaml. It only specifies what not to log.
Note: The base policy is located on the cluster's master node.
Edit and extend the basic policy to log:

D. Nodes changes at RequestResponse level

E. The request body of persistentvolumes changes in the namespace frontend

F.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
$ vim /etc/kubernetes/log-policy/audit-policy.yaml
- level: RequestResponse
userGroups: ["system:nodes"]
- level: Request
resources:
- group: "" # core API group
resources: ["persistentvolumes"]
namespaces: ["frontend"]
- level: Metadata
resources:
- group: ""
resources: ["configmaps", "secrets"]
- level: Metadata
$ vim /etc/kubernetes/manifests/kube-apiserver.yaml
Add these
- --audit-policy-file=/etc/kubernetes/log-policy/audit-policy.yaml - --audit-log-path=/var/log/kubernetes/logs.txt
- --audit-log-maxage=5
- --audit-log-maxbackup=10
[desk@cli] $ ssh master1
[master1@cli] $ vim /etc/kubernetes/log-policy/audit-policy.yaml apiVersion: audit.k8s.io/v1 # This is required.
kind: Policy
Don't generate audit events for all requests in RequestReceived stage. omitStages:
- "RequestReceived"
rules:
Don't log watch requests by the "system:kube-proxy" on endpoints or services - level: None
users: ["system:kube-proxy"]
verbs: ["watch"]
resources:
- group: "" # core API group
resources: ["endpoints", "services"]
Don't log authenticated requests to certain non-resource URL paths. - level: None
userGroups: ["system:authenticated"]
nonResourceURLs:
- "/api*" # Wildcard matching.
- "/version"
Add your changes below

- level: RequestResponse
userGroups: ["system:nodes"] # Block for nodes
- level: Request
resources:
- group: "" # core API group
resources: ["persistentvolumes"] # Block for persistentvolumes namespaces: ["frontend"] # Block for persistentvolumes of frontend ns - level: Metadata
resources:
- group: "" # core API group
resources: ["configmaps", "secrets"] # Block for configmaps & secrets - level: Metadata # Block for everything else
[master1@cli] $ vim /etc/kubernetes/manifests/kube-apiserver.yaml apiVersion: v1
kind: Pod
metadata:
annotations:
kubeadm.kubernetes.io/kube-apiserver.advertise-address.endpoint: 10.0.0.5:6443 labels:
component: kube-apiserver
tier: control-plane
name: kube-apiserver
namespace: kube-system
spec:
containers:
- command:
- kube-apiserver
- --advertise-address=10.0.0.5
- --allow-privileged=true
- --authorization-mode=Node,RBAC
- --audit-policy-file=/etc/kubernetes/log-policy/audit-policy.yaml #Add this - --audit-log-path=/var/log/kubernetes/logs.txt #Add this
- --audit-log-maxage=5 #Add this
- --audit-log-maxbackup=10 #Add this
...
output truncated
Note: log volume & policy volume is already mounted in vim /etc/kubernetes/manifests/kube-apiserver.yaml so no need to mount it.
Reference: https://kubernetes.io/docs/tasks/debug-application-cluster/audit/

QUESTION 33

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSSH00401
Switched to context "KSSH00401".
candidate@cli:~$ ssh kssh00401-worker1
Warning: Permanently added '10.240.86.172' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@kssh00401-worker1:~# head /etc/apparmor.d/nginx_apparmor
#include <tunables/global>

profile nginx-profile-2 flags=(attach_disconnected,mediate_deleted) {
 #include <abstractions/base>
  network inet tcp,
  network inet udp,
  network inet icmp,

  deny network raw,

root@kssh00401-worker1:~# apparmor_parser -q /etc/apparmor.d/nginx_apparmor
root@kssh00401-worker1:~# exit
logout
Connection to 10.240.86.172 closed.
candidate@cli:~$ cat KSSH00401/nginx-pod.yaml
---
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
spec:
  containers:
  - name: nginx-pod
    image: nginx:1.19.0
    ports:
    - containerPort: 80
candidate@cli:~$ vim KSSH00401/nginx-pod.yaml
---
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
  annotations:
    container.apparmor.security.beta.kubernetes.io/nginx-pod: localhost/nginx-pr
spec:
  containers:
  - name: nginx-pod
    image: nginx:1.19.0
    ports:
    - containerPort: 80
~
```

```
candidate@cli:~$ vim KSSH00401/nginx-pod.yaml
candidate@cli:~$ kubectl create -f KSSH00401/nginx-pod.yaml
pod/nginx-pod created
candidate@cli:~$ cat KSSH00401/nginx-pod.yaml
---
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
  annotations:
    container.apparmor.security.beta.kubernetes.io/nginx-pod: localhost/nginx-profile-2
spec:
  containers:
  - name: nginx-pod
    image: nginx:1.19.0
    ports:
    - containerPort: 80
```

Reference: https://kubernetes.io/docs/tutorials/clusters/apparmor/

QUESTION 34
You can switch the cluster/configuration context using the following command:

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
[desk@cli] $ k create sa backend-qa -n qa
sa/backend-qa created
[desk@cli] $ k get role,rolebinding -n qa
No resources found in qa namespace.
[desk@cli] $ k create role backend -n qa --resource pods,namespaces,configmaps --verb list # No access to secret
[desk@cli] $ k create rolebinding backend -n qa --role backend --serviceaccount qa:backend-qa [desk@cli] $ vim /home/cert_masters/frontend-pod.yaml
apiVersion: v1
kind: Pod
metadata:
name: frontend
spec:
serviceAccountName: backend-qa # Add this
image: nginx
name: frontend
[desk@cli] $ k apply -f /home/cert_masters/frontend-pod.yaml pod created
[desk@cli] $ k create sa backend-qa -n qa
serviceaccount/backend-qa created
[desk@cli] $ k get role,rolebinding -n qa
No resources found in qa namespace.
[desk@cli] $ k create role backend -n qa --resource pods,namespaces,configmaps --verb list role.rbac.authorization.k8s.io/backend created
[desk@cli] $ k create rolebinding backend -n qa --role backend --serviceaccount qa:backend-qa rolebinding.rbac.authorization.k8s.io/backend created
[desk@cli] $ vim /home/cert_masters/frontend-pod.yaml
apiVersion: v1
kind: Pod
metadata:
name: frontend
spec:
serviceAccountName: backend-qa # Add this

image: nginx
name: frontend
[desk@cli] $ k apply -f /home/cert_masters/frontend-pod.yaml pod/frontend created
https://kubernetes.io/docs/tasks/configure-pod-container/configure-service-account/

QUESTION 35
You must complete this task on the following cluster/nodes:
Cluster: trace
Master node: master
Worker node: worker1
You can switch the cluster/configuration context using the following command:
[desk@cli] $ kubectl config use-context trace
Given: You may use Sysdig or Falco documentation.
Task:
Use detection tools to detect anomalies like processes spawning and executing something weird frequently in the single container belonging to Pod tomcat.
Two tools are available to use:

A. falco
B. sysdig
   Tools are pre-installed on the worker1 node only.
   Analyse the container's behaviour for at least 40 seconds, using filters that detect newly spawning and executing processes.
   Store an incident file at /home/cert_masters/report, in the following format:
   [timestamp],[uid],[processName]

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
$vim /etc/falco/falco_rules.local.yaml
- rule: Container Drift Detected (open+create)
desc: New executable created in a container due to open+create condition: >
evt.type in (open,openat,creat) and
evt.is_open_exec=true and
container and
not runc_writing_exec_fifo and
not runc_writing_var_lib_docker and
not user_known_container_drift_activities and
evt.rawres>=0
output: >
%evt.time,%user.uid,%proc.name # Add this/Refer falco documentation priority: ERROR
$kill -1 <PID of falco>
[desk@cli] $ ssh node01
[node01@cli] $ vim /etc/falco/falco_rules.yaml
search for Container Drift Detected & paste in falco_rules.local.yaml [node01@cli] $ vim /etc/falco/falco_rules.local.yaml
- rule: Container Drift Detected (open+create)
desc: New executable created in a container due to open+create condition: >
evt.type in (open,openat,creat) and
evt.is_open_exec=true and
container and
not runc_writing_exec_fifo and

not runc_writing_var_lib_docker and
not user_known_container_drift_activities and
evt.rawres>=0
output: >
%evt.time,%user.uid,%proc.name # Add this/Refer falco documentation priority: ERROR
[node01@cli] $ vim /etc/falco/falco.yaml

```
file_output:
  enabled: true
  keep_alive: false
  filename: /home/cert_masters/report
```

send HUP signal to falco process to re-read the configuration

```
root@node01:/etc/falco# ps -ef | grep falco
root     10127     1  1 17:13 ?        00:00:35 /usr/bin/falco --pidfile=/var/run/falco.pid -c /etc/falco/falco.yaml
root     30938 20175  0 17:55 pts/1    00:00:00 grep falco
root@node01:/etc/falco# kill -1 10127
```

Reference:
https://falco.org/docs/alerts/
https://falco.org/docs/rules/supported-fields/

QUESTION 36
Cluster: dev
Master node: master1
Worker node: worker1
You can switch the cluster/configuration context using the following command:
[desk@cli] $ kubectl config use-context dev
Task:
Retrieve the content of the existing secret named adam in the safe namespace.
Store the username field in a file names /home/cert-masters/username.txt, and the password field in a file named /home/cert-masters/password.txt.

A. You must create both files; they don't exist yet.
B. Do not use/modify the created files in the following steps, create new temporary files if needed.
   Create a new secret names newsecret in the safe namespace, with the following content:
   Username: dbadmin
   Password: moresecurepas
   Finally, create a new Pod that has access to the secret newsecret via a volume:
   Namespace: safe
   Pod name: mysecret-pod
   Container name: db-container
   Image: redis
   Volume name: secret-vol

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSMV00201
Switched to context "KSMV00201".
candidate@cli:~$ kubectl get secret -n monitoring
NAME                  TYPE                                  DATA   AGE
dbl-test              Opaque                                2      6h23m
default-token-cqqf6   kubernetes.io/service-account-token   3      6h23m
candidate@cli:~$ kubectl get secret/dbl-test -n monitoring
NAME       TYPE     DATA   AGE
dbl-test   Opaque   2      6h23m
candidate@cli:~$ kubectl get secret/dbl-test -n monitoring -o yaml
apiVersion: v1
data:
  password: QVU3dHh1bXFOTHZt
  username: cHJvZHVjdGlvbi0x
kind: Secret
metadata:
  creationTimestamp: "2022-05-20T08:37:33Z"
  name: dbl-test
  namespace: monitoring
  resourceVersion: "2588"
  uid: 659bd4ac-e0ba-4d9f-b411-816f2aedf7e6
type: Opaque
candidate@cli:~$ echo "cHJvZHVjdGlvbi0x" | base64 -d
production-1candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ echo "cHJvZHVjdGlvbi0x" | base64 -d  > /home/candidate/username.txt
candidate@cli:~$ cat /home/candidate/username.txt
production-1candidate@cli:~$
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ echo "QVU3dHh1bXFOTHZt" | base64 -d
AU7txumqNLvmcandidate@cli:~$ echo "QVU3dHh1bXFOTHZt" | base64 -d > /home/candidate/password.
txt
candidate@cli:~$ cat /home/candidate/password.txt
AU7txumqNLvmcandidate@cli:~$
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ kubectl create secret generic test-workflow --from-literal=username=dev-dat
abase --from-literal=password=aV7HR7nU3JLx -n monitoring
secret/test-workflow created
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ kubectl  -n monitoring run test-secret-pod --image=httpd --dry-run=client -
o yaml > test-secret-pod.yaml
candidate@cli:~$ vim test-secret-pod.yaml
```

```yaml
apiVersion: v1
kind: Pod
metadata:
  labels:
    run: test-secret-pod
  name: test-secret-pod
  namespace: monitoring
spec:
  volumes:
    - name: dev-volume
      secret:
        secretName: test-workflow
  containers:
  - image: httpd
    name: dev-container
    resources: {}
    volumeMounts:
      - name: dev-volume
        mountPath: /etc/credentials
  dnsPolicy: ClusterFirst
  restartPolicy: Always
status: {}
```

```
candidate@cli:~$ kubectl  -n monitoring run test-secret-pod --image=httpd --dry-run=client -
o yaml > test-secret-pod.yaml
candidate@cli:~$ vim test-secret-pod.yaml
candidate@cli:~$ cat test-secret-pod.yaml
```

```
  labels:
    run: test-secret-pod
  name: test-secret-pod
  namespace: monitoring
spec:
  volumes:
    - name: dev-volume
      secret:
        secretName: test-workflow
  containers:
  - image: httpd
    name: dev-container
    resources: {}
    volumeMounts:
      - name: dev-volume
        mountPath: /etc/credentials
  dnsPolicy: ClusterFirst
  restartPolicy: Always
status: {}
candidate@cli:~$ kubectl create -f test-secret-pod.yaml
pod/test-secret-pod created
candidate@cli:~$ kubectl get pods -n monitoring
NAME              READY   STATUS    RESTARTS   AGE
test-secret-pod   1/1     Running   0          9s
candidate@cli:~$
```


QUESTION 37
Cluster: scanner

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSSC00401
Switched to context "KSSC00401".
candidate@cli:~$ ssh kssc00401-master
Warning: Permanently added '10.240.86.231' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@kssc00401-master:~# kubectl get pods -n naboo
NAME           READY   STATUS    RESTARTS   AGE
c-3po          1/1     Running   0          6h48m
chewbacca      1/1     Running   0          6h48m
jawas          1/1     Running   0          6h48m
qui-gon-jinn   1/1     Running   0          6h48m
root@kssc00401-master:~# kubectl get pods -n naboo -o name
pod/c-3po
pod/chewbacca
pod/jawas
pod/qui-gon-jinn
root@kssc00401-master:~# for i in $(kubectl get pods -n naboo -o name)
> do
> kubectl get ${i} -o yaml | grep -i image
> done
Error from server (NotFound): pods "c-3po" not found
Error from server (NotFound): pods "chewbacca" not found
Error from server (NotFound): pods "jawas" not found
Error from server (NotFound): pods "qui-gon-jinn" not found
root@kssc00401-master:~# for i in $(kubectl get pods -n naboo -o name); do kubectl -n naboo
get ${i} -o yaml | grep -i image ; done
    image: centos:centos7.9.2009
    imagePullPolicy: Never
    image: centos:centos7.9.2009
    imageID: docker-pullable://centos@sha256:c73f515d06b0fa07bb18d8202035e739a494ce760aa7312
9f60f4bf2bd22b407
    image: photon:3.0
    imagePullPolicy: Never
    image: photon:3.0
    imageID: docker-pullable://photon@sha256:c48d61f0f3ad19215b75e2087cfbe95d7321abb454e4295
a0e6c38f563ece622
    image: alpine:3.7
    imagePullPolicy: Never
    image: alpine:3.7
    imageID: docker-pullable://alpine@sha256:8421d9a84432575381bfabd248f1eb56f3aa21d9d7cd251
1583c68c9b7511d10
    image: amazonlinux:2
    imagePullPolicy: Never
    image: amazonlinux:2
    imageID: docker-pullable://amazonlinux@sha256:246ef631c75ea83005889621119fd5cc9cbb5500e1
93707c38b6c060d597a146
root@kssc00401-master:~# trivy image centos:centos7.9.2009
2022-05-20T15:39:51.733Z        INFO    Need to update DB
2022-05-20T15:39:51.733Z        INFO    Downloading DB...
27.97 MiB / 27.97 MiB [-----------------------------------------] 100.00% 27.43 MiB p/s 1s
```

```
------------------+------------------------------------------------------------------+
root@kssc00401-master:~# for i in $(kubectl get pods -n naboo -o name); do kubectl -n naboo
get ${i} -o yaml | grep -i image ; done
    image: centos:centos7.9.2009
    imagePullPolicy: Never
    image: centos:centos7.9.2009
    imageID: docker-pullable://centos@sha256:c73f515d06b0fa07bb18d8202035e739a494ce760aa7312
9f60f4bf2bd22b407
    image: photon:3.0
    imagePullPolicy: Never
    image: photon:3.0
    imageID: docker-pullable://photon@sha256:c48d61f0f3ad19215b75e2087cfbe95d7321abb454e4295
a0e6c38f563ece622
    image: alpine:3.7
    imagePullPolicy: Never
    image: alpine:3.7
    imageID: docker-pullable://alpine@sha256:8421d9a84432575381bfabd248f1eb56f3aa21d9d7cd251
1583c68c9b7511d10
    image: amazonlinux:2
    imagePullPolicy: Never
    image: amazonlinux:2
    imageID: docker-pullable://amazonlinux@sha256:246ef631c75ea83005889621119fd5cc9cbb5500e1
93707c38b6c060d597a146
root@kssc00401-master:~# trivy image photon:3.0
2022-05-20T15:40:18.003Z        INFO    Detected OS: photon
2022-05-20T15:40:18.003Z        INFO    Detecting Photon Linux vulnerabilities...
2022-05-20T15:40:18.005Z        INFO    Number of language-specific files: 0

photon:3.0 (photon 3.0)
=======================
Total: 0 (UNKNOWN: 0, LOW: 0, MEDIUM: 0, HIGH: 0, CRITICAL: 0)

root@kssc00401-master:~# kubectl get pods -n naboo -o name
pod/c-3po
pod/chewbacca
pod/jawas
pod/qui-gon-jinn
root@kssc00401-master:~# kubectl -n naboo pod/c-3po -o yaml | grep image
Error: flags cannot be placed before plugin name: -n
root@kssc00401-master:~# kubectl -n naboo get pod/c-3po -o yaml | grep image
    image: centos:centos7.9.2009
    imagePullPolicy: Never
    image: centos:centos7.9.2009
    imageID: docker-pullable://centos@sha256:c73f515d06b0fa07bb18d8202035e739a494ce760aa7312
9f60f4bf2bd22b407
root@kssc00401-master:~# kubectl -n naboo delete pod/c-3po
pod "c-3po" deleted
root@kssc00401-master:~# kubectl -n naboo delete pod/jawas
pod "jawas" deleted
```

```
pod "jawas" deleted
root@kssc00401-master:~# history
    1  kubectl get pods -n naboo
    2  kubectl get pods -n naboo -o name
    3  for i in $(kubectl get pods -n naboo -o name); do kubectl get ${i} -o yaml | grep -i
image ; done
    4  for i in $(kubectl get pods -n naboo -o name); do kubectl -n naboo get ${i} -o yaml |
 grep -i image ; done
    5  trivy image centos:centos7.9.2009
    6  for i in $(kubectl get pods -n naboo -o name); do kubectl -n naboo get ${i} -o yaml |
 grep -i image ; done
    7  trivy image photon:3.0
    8  for i in $(kubectl get pods -n naboo -o name); do kubectl -n naboo get ${i} -o yaml |
 grep -i image ; done
    9  trivy image alpine:3.7
   10  for i in $(kubectl get pods -n naboo -o name); do kubectl -n naboo get ${i} -o yaml |
 grep -i image ; done
   11  trivy image amazonlinux:2
   12  kubectl get pods -n naboo -o name
   13  kubectl -n naboo pod/c-3po -o yaml | grep image
   14  kubectl -n naboo get pod/c-3po -o yaml | grep image
   15  kubectl -n naboo delete pod/c-3po
   16  kubectl -n naboo delete pod/jawas
   17  history
root@kssc00401-master:~#
```

Reference: https://github.com/aquasecurity/trivy

QUESTION 38
You can switch the cluster/configuration context using the following command:

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
master1 $ k get pods -n test --show-labels
NAME READY STATUS RESTARTS AGE LABELS
test-pod 1/1 Running 0 34s role=test,run=test-pod
testing 1/1 Running 0 17d run=testing
$ vim netpol.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
name: deny-network
namespace: test
spec:
podSelector: {}
policyTypes:
- Ingress
- Egress
master1 $ k apply -f netpol.yaml
controlplane $ k get pods -n test --show-labels
NAME READY STATUS RESTARTS AGE LABELS
test-pod 1/1 Running 0 34s role=test,run=test-pod
testing 1/1 Running 0 17d run=testing
master1 $ vim netpol1.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy

metadata:
name: deny-network
namespace: test
spec:
podSelector: {}
policyTypes:
- Ingress
- Egress
master1 $ k apply -f netpol1.yaml
Reference:
https://kubernetes.io/docs/concepts/services-networking/network-policies/
controlplane $ k get pods -n test --show-labels
NAME READY STATUS RESTARTS AGE LABELS
test-pod 1/1 Running 0 34s role=test,run=test-pod
testing 1/1 Running 0 17d run=testing
master1 $ vim netpol1.yaml
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
name: deny-network
namespace: test
spec:
podSelector: {}
policyTypes:
- Ingress
- Egress
master1 $ k apply -f netpol1.yaml
Reference:
https://kubernetes.io/docs/concepts/services-networking/network-policies/

QUESTION 39
Context:

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

1. Create runtime class by the name of not-trusted using runsc handler

```
apiVersion: node.k8s.io/v1
kind: RuntimeClass
metadata:
  name: not-trusted
handler: runsc
```

2. Find all the pods/deployment and edit runtimeClassName parameter to not-trusted under spec

[desk@cli] $ `k edit deploy nginx`

```
spec:
  runtimeClassName: not-trusted. # Add this
```

[desk@cli] $vim runtime.yaml
apiVersion: node.k8s.io/v1
kind: RuntimeClass
metadata:

name: not-trusted
handler: runsc
[desk@cli] $ k apply -f runtime.yaml
[desk@cli] $ k get pods
NAME READY STATUS RESTARTS AGE
nginx-6798fc88e8-chp6r 1/1 Running 0 11m
nginx-6798fc88e8-fs53n 1/1 Running 0 11m
nginx-6798fc88e8-ndved 1/1 Running 0 11m
[desk@cli] $ k get deploy
NAME READY UP-TO-DATE AVAILABLE AGE
nginx 3/3 11 3 5m
[desk@cli] $ k edit deploy nginx

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  labels:
    app: nginx
  name: nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  strategy: {}
  template:
    metadata:
      labels:
        app: nginx
    spec:
      runtimeClassName: not-trusted    # Add this
      containers:
      - image: nginx
        name: nginx
        resources: {}
status: {}
```

Reference: https://kubernetes.io/docs/concepts/containers/runtime-class/

QUESTION 40
You can switch the cluster/configuration context using the following command:
[desk@cli] $ kubectl config use-context prod-account
Context:
A Role bound to a Pod's ServiceAccount grants overly permissive permissions. Complete the following tasks to reduce the set of permissions.
Task:
Given an existing Pod named web-pod running in the namespace database.

A. Edit the existing Role bound to the Pod's ServiceAccount test-sa to only allow performing get operations, only on resources of type Pods.
B. Create a new Role named test-role-2 in the namespace database, which only allows performing update operations, only on resources of type statuefulsets.
C. Create a new RoleBinding named test-role-2-bind binding the newly created Role to the Pod's ServiceAccount.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSCH00201
Switched to context "KSCH00201".
candidate@cli:~$ kubectl get pods -n security
NAME      READY   STATUS    RESTARTS   AGE
web-pod   1/1     Running   0          6h9m
candidate@cli:~$ kubectl get deployments.apps -n security
No resources found in security namespace.
candidate@cli:~$ kubectl describe rolebindings.rbac.authorization.k8s.io -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
Role:
  Kind:  Role
  Name:  dev-role
Subjects:
  Kind            Name      Namespace
  ----            ----      ---------
  ServiceAccount  sa-dev-1
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  *          []                 []              [*]
candidate@cli:~$ kubectl edit role/dev-role -n security
```

```
  uid: b4c9ddd6-2729-43bd-8fbd-b2d227f4c4cd
rules:
- apiGroups:
  - ""
  resources:
  - services
  verbs:
  - watch
  uid: b4c9ddd6-2729-43bd-8fbd-b2d227f4c4cd
rules:
- apiGroups:
  - ""
  resources:
  - services
  verbs:
  - watch
```

QUESTION 41
You can switch the cluster/configuration context using the following command:
[desk@cli] $ kubectl config use-context dev
Context:
A CIS Benchmark tool was run against the kubeadm created cluster and found multiple issues that must be addressed.

Task:
Fix all issues via configuration and restart the affected components to ensure the new settings take effect.
Fix all of the following violations that were found against the API server:

A. 2.7 authorization-mode argument is not set to AlwaysAllow FAIL
B. 2.8 authorization-mode argument includes Node FAIL
C. 2.7 authorization-mode argument includes RBAC FAIL
Fix all of the following violations that were found against the Kubelet:
D. 2.1 Ensure that the anonymous-auth argument is set to false FAIL
E. 2.2 authorization-mode argument is not set to AlwaysAllow FAIL (Use Webhook autumn/authz where possible) Fix all of the following violations that were found against etcd:
F.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:
worker1 $ vim /var/lib/kubelet/config.yaml
anonymous:
enabled: true #Delete this
enabled: false #Replace by this
authorization:
mode: AlwaysAllow #Delete this
mode: Webhook #Replace by this
worker1 $ systemctl restart kubelet. # To reload kubelet config ssh to master1
master1 $ vim /etc/kubernetes/manifests/kube-apiserver.yaml - -- authorization-mode=Node,RBAC
master1 $ vim /etc/kubernetes/manifests/etcd.yaml
- --client-cert-auth=true
ssh to worker1
worker1 $ vim /var/lib/kubelet/config.yaml
apiVersion: kubelet.config.k8s.io/v1beta1
authentication:
anonymous:
enabled: true #Delete this
enabled: false #Replace by this
webhook:
cacheTTL: 0s
enabled: true
x509:
clientCAFile: /etc/kubernetes/pki/ca.crt
authorization:
mode: AlwaysAllow #Delete this
mode: Webhook #Replace by this
webhook:
cacheAuthorizedTTL: 0s
cacheUnauthorizedTTL: 0s
cgroupDriver: systemd
clusterDNS:
- 10.96.0.10
clusterDomain: cluster.local

cpuManagerReconcilePeriod: 0s
evictionPressureTransitionPeriod: 0s
fileCheckFrequency: 0s
healthzBindAddress: 127.0.0.1
healthzPort: 10248
httpCheckFrequency: 0s
imageMinimumGCAge: 0s
kind: KubeletConfiguration
logging: {}
nodeStatusReportFrequency: 0s
nodeStatusUpdateFrequency: 0s
resolvConf: /run/systemd/resolve/resolv.conf
rotateCertificates: true
runtimeRequestTimeout: 0s
staticPodPath: /etc/kubernetes/manifests
streamingConnectionIdleTimeout: 0s
syncFrequency: 0s
volumeStatsAggPeriod: 0s
worker1 $ systemctl restart kubelet. # To reload kubelet config ssh to master1
master1 $ vim /etc/kubernetes/manifests/kube-apiserver.yaml

```
apiVersion: v1
kind: Pod
metadata:
  annotations:
    kubeadm.kubernetes.io/kube-apiserver.advertise-address.endpoint: 172.17.0.22:6443
  labels:
    component: kube-apiserver
    tier: control-plane
  name: kube-apiserver
  namespace: kube-system
spec:
  containers:
  - command:
    - kube-apiserver
    - --advertise-address=172.17.0.22
    - --allow-privileged=true
#    - --authorization-mode=AlwaysAllow  # Delete This
    - --authorization-mode=Node,REAC     # Replace by this line
    - --client-ca-file=/etc/kubernetes/pki/ca.crt
    - --enable-admission-plugins=NodeRestriction
    - --enable-bootstrap-token-auth=true
    - --etcd-cafile=/etc/kubernetes/pki/etcd/ca.crt
    - --etcd-certfile=/etc/kubernetes/pki/apiserver-etcd-client.crt
    - --etcd-keyfile=/etc/kubernetes/pki/apiserver-etcd-client.key
    - --etcd-servers=https://127.0.0.1:2379
    - --insecure-port=0
```

master1 $ vim /etc/kubernetes/manifests/etcd.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  annotations:
    kubeadm.kubernetes.io/etcd.advertise-client-urls: https://172.17.0.29:2379
  creationTimestamp: null
  labels:
    component: etcd
    tier: control-plane
  name: etcd
  namespace: kube-system
spec:
  containers:
  - command:
    - etcd
    - --advertise-client-urls=https://172.17.0.29:2379
    - --cert-file=/etc/kubernetes/pki/etcd/server.crt
    - --client-cert-auth=true  #Add this line
    - --data-dir=/var/lib/etcd
    - --initial-advertise-peer-urls=https://172.17.0.29:2380
    - --initial-cluster=controlplane=https://172.17.0.29:2380
    - --key-file=/etc/kubernetes/pki/etcd/server.key
    - --listen-client-urls=https://127.0.0.1:2379,https://172.17.0.29:2379
    - --listen-metrics-urls=http://127.0.0.1:2381
    - --listen-peer-urls=https://172.17.0.29:2380
    - --name=controlplane
    - --peer-cert-file=/etc/kubernetes/pki/etcd/peer.crt
    - --peer-client-cert-auth=true
    - --peer-key-file=/etc/kubernetes/pki/etcd/peer.key
    - --peer-trusted-ca-file=/etc/kubernetes/pki/etcd/ca.crt
    - --snapshot-count=10000
    - --trusted-ca-file=/etc/kubernetes/pki/etcd/ca.crt
    image: k8s.gcr.io/etcd:3.4.9-1
    imagePullPolicy: IfNotPresent
```

Reference:
kubelet parameters: https://kubernetes.io/docs/reference/command-line-tools-reference/kubelet/
kubeapi parameters: https://kubernetes.io/docs/reference/command-line-tools-reference/kubeapiserver/
etcd parameters: https://kubernetes.io/docs/tasks/administer-cluster/configure-upgrade-etcd/

QUESTION 42

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSMV00301
Switched to context "KSMV00301".
candidate@cli:~$ cat /home/candidate/KSMV00301/runtime-class.yaml
---
apiVersion: node.k8s.io/v1
kind: RuntimeClass
metadata:
  name: ""
handler: ""
candidate@cli:~$ vim /home/candidate/KSMV00301/runtime-class.yaml
```

```
---
apiVersion: node.k8s.io/v1
kind: RuntimeClass
metadata:
  name: "sandboxed"
handler: "runsc"
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
:wq!
```

```
candidate@cli:~$ kubectl config use-context KSMV00301
Switched to context "KSMV00301".
candidate@cli:~$ cat /home/candidate/KSMV00301/runtime-class.yaml
---
apiVersion: node.k8s.io/v1
kind: RuntimeClass
metadata:
  name: ""
handler: ""
candidate@cli:~$ vim /home/candidate/KSMV00301/runtime-class.yaml
candidate@cli:~$ cat /home/candidate/KSMV00301/runtime-class.yaml
---
apiVersion: node.k8s.io/v1
kind: RuntimeClass
metadata:
  name: "sandboxed"
handler: "runsc"
candidate@cli:~$ kubectl get deployments.apps -n server
NAME        READY   UP-TO-DATE   AVAILABLE   AGE
workload1   1/1     1            1           5h43m
workload2   1/1     1            1           5h43m
workload3   1/1     1            1           5h43m
candidate@cli:~$ kubectl get pods -n server
NAME                         READY   STATUS    RESTARTS   AGE
workload1-6869857dd7-s45rc   1/1     Running   0          5h43m
workload2-d4bd497d5-h44df    1/1     Running   0          5h43m
workload3-8587774495-chm56   1/1     Running   0          5h43m
candidate@cli:~$ kubectl -n server edit deployments.apps workload1
```

```
template:
  metadata:
    creationTimestamp: null
    labels:
      app: nginx
    name: workload1
  spec:
    runtimeClassName: sandboxed
    containers:
    - image: nginx:1.14.2
      imagePullPolicy: IfNotPresent
      name: workload1
      ports:
      - containerPort: 80
        protocol: TCP
      resources: {}
      terminationMessagePath: /dev/termination-log
      terminationMessagePolicy: File
    dnsPolicy: ClusterFirst
    restartPolicy: Always
    schedulerName: default-scheduler
    securityContext: {}
    terminationGracePeriodSeconds: 30
status:
"/tmp/kubectl-edit-3385772700.yaml"
```

```
NAME                         READY   STATUS    RESTARTS   AGE
workload1-6869857dd7-s45rc   1/1     Running   0          5h44m
workload2-d4bd497d5-h44df    1/1     Running   0          5h44m
workload3-8587774495-chm56   1/1     Running   0          5h44m
candidate@cli:~$ kubectl -n server edit deployments.apps workload1
Edit cancelled, no changes made.
candidate@cli:~$ kubectl get pods -n server
NAME                         READY   STATUS    RESTARTS   AGE
workload1-6869857dd7-s45rc   1/1     Running   0          5h45m
workload2-d4bd497d5-h44df    1/1     Running   0          5h44m
workload3-8587774495-chm56   1/1     Running   0          5h44m
candidate@cli:~$ kubectl -n server edit deployments.apps workload2
Edit cancelled, no changes made.
candidate@cli:~$ kubectl create -f /home/candidate/KSMV00301/runtime-class.yaml
runtimeclass.node.k8s.io/sandboxed created
candidate@cli:~$ kubectl get pods -n server
NAME                         READY   STATUS    RESTARTS   AGE
workload1-6869857dd7-s45rc   1/1     Running   0          5h45m
workload2-d4bd497d5-h44df    1/1     Running   0          5h45m
workload3-8587774495-chm56   1/1     Running   0          5h45m
candidate@cli:~$ kubectl -n server edit deployments.apps workload2
```

```
strategy:
  rollingUpdate:
    maxSurge: 25%
    maxUnavailable: 25%
  type: RollingUpdate
template:
  metadata:
    creationTimestamp: null
    labels:
      app: nginx
    name: workload2
  spec:
    runtimeClassName: sandboxed
```

```
NAME                         READY   STATUS    RESTARTS   AGE
workload1-6869857dd7-s45rc   1/1     Running   0          5h45m
workload2-d4bd497d5-h44df    1/1     Running   0          5h45m
workload3-8587774495-chm56   1/1     Running   0          5h45m
candidate@cli:~$ kubectl -n server edit deployments.apps workload2
deployment.apps/workload2 edited
candidate@cli:~$ kubectl get pods -n server
NAME                         READY   STATUS    RESTARTS   AGE
workload1-8d8649ff6-wvjtg    1/1     Running   0          15s
workload2-765bdb98c8-wd8cm   1/1     Running   0          4s
workload3-8587774495-chm56   1/1     Running   0          5h45m
candidate@cli:~$ kubectl -n server edit deployments.apps workload3
```



```
    app: nginx
  name: workload3
spec:
  runtimeClassName: sandboxed
  containers:
  - image: nginx:1.14.2
    imagePullPolicy: IfNotPresent
    name: workload3
    ports:
```

```
candidate@cli:~$ kubectl -n server edit deployments.apps workload3
deployment.apps/workload3 edited
candidate@cli:~$ kubectl get pods -n server
NAME                         READY   STATUS    RESTARTS   AGE
workload1-8d8649ff6-wvjtg    1/1     Running   0          58s
workload2-765bdb98c8-wd8cm   1/1     Running   0          47s
workload3-76c994bb4d-s6k85   1/1     Running   0          4s
candidate@cli:~$
```

QUESTION 43

Context
Your organization’s security policy includes:
ServiceAccounts must not automount API credentials
ServiceAccount names must end in "-sa"
The Pod specified in the manifest file /home/candidate/KSCH00301 /pod-m nifest.yaml fails to schedule because of an incorrectly specified ServiceAccount.
Complete the following tasks:
Task

A. Create a new ServiceAccount named frontend-sa in the existing namespace q a. Ensure the ServiceAccount does not automount API credentials.
B. Using the manifest file at /home/candidate/KSCH00301 /pod-manifest.yaml, create the Pod.
C.

Correct Answer: S, E, E, T, H, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
Switched to context "KSCH00301".
candidate@cli:~$ kubectl get sa -n qa
NAME        SECRETS   AGE
default     1         5h46m
podrunner   1         5h46m
candidate@cli:~$ kubectl get deployment -n qa
No resources found in qa namespace.
candidate@cli:~$ kubectl get pod -n qa
No resources found in qa namespace.
candidate@cli:~$ kubectl create sa frontend-sa -n qa
serviceaccount/frontend-sa created
candidate@cli:~$ kubectl get sa -n qa
NAME          SECRETS   AGE
default       1         5h47m
frontend-sa   1         4s
podrunner     1         5h47m
candidate@cli:~$ cat /home/candidate/KSCH00301/pod-manifest.yaml
apiVersion: v1
kind: Pod
metadata:
  name: "frontend"
  namespace: "qa"
spec:
  serviceAccountName: "frontend-sa"
  containers:
    - name: "frontend"
      image: nginx
candidate@cli:~$ vim /home/candidate/KSCH00301/pod-manifest.yaml
```

```
apiVersion: v1
kind: Pod
metadata:
  name: "frontend"
  namespace: "qa"
spec:
  serviceAccountName: "frontend-sa"
  automountServiceAccountToken: false
  containers:
    - name: "frontend"
      image: nginx
```

```
candidate@cli:~$ vim /home/candidate/KSCH00301/pod-manifest.yaml
candidate@cli:~$ cat /home/candidate/KSCH00301/pod-manifest.yaml
apiVersion: v1
kind: Pod
metadata:
  name: "frontend"
  namespace: "qa"
spec:
  serviceAccountName: "frontend-sa"
  automountServiceAccountToken: false
  containers:
    - name: "frontend"
      image: nginx
candidate@cli:~$ kubectl create -f /home/candidate/KSCH00301/pod-manifest.yaml
pod/frontend created
candidate@cli:~$ kubectl get pods -n qa
NAME       READY   STATUS    RESTARTS   AGE
frontend   1/1     Running   0          6s
candidate@cli:~$ kubectl get sa -n qa
NAME          SECRETS   AGE
default       1         5h49m
frontend-sa   1         105s
podrunner     1         5h49m
candidate@cli:~$ kubectl delete sa/podrunner -n qa
serviceaccount "podrunner" deleted
candidate@cli:~$
```

QUESTION 44

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl delete sa/podrunner -n qa
serviceaccount "podrunner" deleted
candidate@cli:~$ kubectl config use-context KSCS00201
Switched to context "KSCS00201".
candidate@cli:~$ ssh kscs00201-master
Warning: Permanently added '10.240.86.194' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@kscs00201-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
root@kscs00201-master:~# systemctl daemon-reload
root@kscs00201-master:~# systemctl restart kubelet.service
root@kscs00201-master:~# systemctl enable kubelet.service
root@kscs00201-master:~# systemctl status kubelet.service
● kubelet.service - kubelet: The Kubernetes Node Agent
     Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
    Drop-In: /etc/systemd/system/kubelet.service.d
             └─10-kubeadm.conf
     Active: active (running) since Fri 2022-05-20 14:19:31 UTC; 29s ago
       Docs: https://kubernetes.io/docs/home/
   Main PID: 134205 (kubelet)
      Tasks: 16 (limit: 76200)
     Memory: 39.5M
     CGroup: /system.slice/kubelet.service
             └─134205 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub>

May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420825  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420863  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420907  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420928  134205 reconciler.>
May 20 14:19:36 kscs00201-master kubelet[134205]: I0520 14:19:36.572353  134205 request.go:>
May 20 14:19:37 kscs00201-master kubelet[134205]: I0520 14:19:37.112347  134205 prober_mana>
May 20 14:19:37 kscs00201-master kubelet[134205]: E0520 14:19:37.185076  134205 kubelet.go:>
May 20 14:19:37 kscs00201-master kubelet[134205]: I0520 14:19:37.645798  134205 kubelet.go:>
May 20 14:19:38 kscs00201-master kubelet[134205]: I0520 14:19:38.184062  134205 kubelet.go:>
May 20 14:19:40 kscs00201-master kubelet[134205]: I0520 14:19:40.036042  134205 prober_mana>
lines 1-22/22 (END)
```


de Agent
et.service; enabled; vendor preset: enabled)
ce.d
5-20 14:19:31 UTC; 29s ago
trap-kubeconfig=/etc/kubernetes/bootstrap-kubelet.conf --kubeconfig=/etc/kubernetes/kubelet
5]: I0520 14:19:35.420825 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt
5]: I0520 14:19:35.420863 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt
5]: I0520 14:19:35.420907 134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt
5]: I0520 14:19:35.420928 134205 reconciler.go:157] "Reconciler: start to sync state"
5]: I0520 14:19:36.572353 134205 request.go:665] Waited for 1.049946364s due to client-sid
5]: I0520 14:19:37.112347 134205 prober_manager.go:255] "Failed to trigger a manual run" p
5]: E0520 14:19:37.185076 134205 kubelet.go:1711] "Failed creating a mirror pod for" err="
5]: I0520 14:19:37.645798 134205 kubelet.go:1693] "Trying to delete pod" pod="kube-system/
5]: I0520 14:19:38.184062 134205 kubelet.go:1698] "Deleted mirror pod because it is outdat
5]: I0520 14:19:40.036042 134205 prober_manager.go:255] "Failed to trigger a manual run" p
~
~
lines 1-22/22 (END)
let.conf --kubeconfig=/etc/kubernetes/kubelet.conf --config=/var/lib/kubelet/config.yaml --
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"kube-proxy\"
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"lib-modules\"
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"flannel-cfg\"
o:157] "Reconciler: start to sync state"
65] Waited for 1.049946364s due to client-side throttling, not priority and fairness, reque
er.go:255] "Failed to trigger a manual run" probe="Readiness"
711] "Failed creating a mirror pod for" err="pods \"kube-apiserver-kscs00201-master\" alrea
693] "Trying to delete pod" pod="kube-system/kube-apiserver-kscs00201-master" podUID=bb91e1
698] "Deleted mirror pod because it is outdated" pod="kube-system/kube-apiserver-kscs00201-
er.go:255] "Failed to trigger a manual run" probe="Readiness"
~
~
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml

```
apiVersion: kubelet.config.k8s.io/v1beta1
authentication:
  anonymous:
    enabled: false
  webhook:
    cacheTTL: 0s
    enabled: true
  x509:
    clientCAFile: /etc/kubernetes/pki/ca.crt
authorization:
  mode: Webhook
  webhook:
    cacheAuthorizedTTL: 0s
    cacheUnauthorizedTTL: 0s
cgroupDriver: systemd
clusterDNS:
~
~
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
root@kscs00201-master:~# vim /etc/kubernetes/manifests/etcd.yaml
root@kscs00201-master:~# systemctl daemon-reload
root@kscs00201-master:~# systemctl restart kubelet.service
root@kscs00201-master:~# systemctl status kubelet.service
● kubelet.service - kubelet: The Kubernetes Node Agent
     Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
    Drop-In: /etc/systemd/system/kubelet.service.d
             └─10-kubeadm.conf
     Active: active (running) since Fri 2022-05-20 14:22:29 UTC; 4s ago
       Docs: https://kubernetes.io/docs/home/
   Main PID: 135849 (kubelet)
      Tasks: 17 (limit: 76200)
     Memory: 38.0M
     CGroup: /system.slice/kubelet.service
             └─135849 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub

May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330232  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330259  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330304  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330354  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330378  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330397  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330415  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330433  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330452  135849 reconciler.
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330463  135849 reconciler.
lines 1-22/22 (END)
```

```
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330463  135849 reconciler.
root@kscs00201-master:~#
root@kscs00201-master:~#
root@kscs00201-master:~#
root@kscs00201-master:~# exit
logout
Connection to 10.240.86.194 closed.
candidate@cli:~$
```

QUESTION 45

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSCS00101
Switched to context "KSCS00101".
candidate@cli:~$ cat /home/candidate/KSCS00101/network-policy.yaml
---
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: ""
  namespace: ""
spec:
  podSelector: {}
  policyTypes: []
candidate@cli:~$ vim /home/candidate/KSCS00101/network-policy.yaml
candidate@cli:~$
```

```
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: "defaultdeny"
  namespace: "testing"
spec:
  podSelector: {}
  policyTypes:
  - Egress
  egress:
  - to:
    - podSelector: {}
      namespaceSelector:
        matchLabels:
          access: testingproject
```

```
candidate@cli:~$ vim /home/candidate/KSCS00101/network-policy.yaml
candidate@cli:~$ vim /home/candidate/KSCS00101/network-policy.yaml
candidate@cli:~$ kubectl label ns testing access=testingproject
namespace/testing labeled
candidate@cli:~$ cat /home/candidate/KSCS00101/network-policy.yaml
---
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: "defaultdeny"
  namespace: "testing"
spec:
  podSelector: {}
  policyTypes:
  - Egress
  egress:
  - to:
    - podSelector: {}
      namespaceSelector:
        matchLabels:
          access: testingproject
candidate@cli:~$ kubectl create -f /home/candidate/KSCS00101/network-policy.yaml
networkpolicy.networking.k8s.io/defaultdeny created
candidate@cli:~$ kubectl -n testing describe networkpolicy
Name:         defaultdeny
Namespace:    testing
Created on:   2022-05-20 14:28:27 +0000 UTC
Labels:       <none>
Annotations:  <none>
Spec:
  PodSelector:     <none> (Allowing the specific traffic to all pods in this namespace)
  Not affecting ingress traffic
  Allowing egress traffic:
    To Port: <any> (traffic allowed to all ports)
    To:
      NamespaceSelector: access=testingproject
      PodSelector: <none>
  Policy Types: Egress
candidate@cli:~$
```


QUESTION 46
Context

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSMV00102
Switched to context "KSMV00102".
candidate@cli:~$ cat /home/candidate/KSMV00102/pod-security-policy.yaml
---
apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
  name: ""
spec:
  seLinux:
    rule: ""
  runAsUser:
    rule: ""
  supplementalGroups: {}
  fsGroup: {}
candidate@cli:~$ vim /home/candidate/KSMV00102/pod-security-policy.yaml
```

```
apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
  name: "prevent-psp-policy"
spec:
  privileged: false
  seLinux:
    rule: RunAsAny
  runAsUser:
    rule: RunAsAny
  supplementalGroups:
    rule: RunAsAny
  fsGroup:
    rule: RunAsAny
```

```
candidate@cli:~$ vim /home/candidate/KSMV00102/pod-security-policy.yaml
candidate@cli:~$ cat /home/candidate/KSMV00102/pod-security-policy.yaml
---
apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
  name: "prevent-psp-policy"
spec:
  privileged: false
  seLinux:
    rule: RunAsAny
  runAsUser:
    rule: RunAsAny
  supplementalGroups:
    rule: RunAsAny
  fsGroup:
    rule: RunAsAny
candidate@cli:~$ kubectl create -f /home/candidate/KSMV00102/pod-security-policy.yaml
Warning: policy/v1beta1 PodSecurityPolicy is deprecated in v1.21+, unavailable in v1.25+
podsecuritypolicy.policy/prevent-psp-policy created
candidate@cli:~$ cat /home/candidate/KSMV00102/cluster-role.yaml
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: ""
rules:
candidate@cli:~$ vim /home/candidate/KSMV00102/cluster-role.yaml
```

```
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: "restrict-access-role"
rules:
```

```
candidate@cli:~$ kubectl create clusterrole restrict-access-role --verb=use --resource=psp --dry-run=client -o yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  creationTimestamp: null
  name: restrict-access-role
rules:
- apiGroups:
  - policy
  resources:
  - podsecuritypolicies
  verbs:
  - use
candidate@cli:~$ vim /home/candidate/KSMV00102/cluster-role.yaml
```

```yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: "restrict-access-role"
rules:
- apiGroups:
  - policy
  resources:
  - podsecuritypolicies
  verbs:
  - use
```

```
candidate@cli:~$ vim /home/candidate/KSMV00102/cluster-role.yaml
candidate@cli:~$ kubectl create clusterrole restrict-access-role --verb=use --resource=psp --dry-run=client --resource-name=prevent-psp-policy -o yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  creationTimestamp: null
  name: restrict-access-role
rules:
- apiGroups:
  - policy
  resourceNames:
  - prevent-psp-policy
  resources:
  - podsecuritypolicies
  verbs:
  - use
candidate@cli:~$ vim /home/candidate/KSMV00102/cluster-role.yaml
```



```yaml
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: "restrict-access-role"
rules:
- apiGroups:
  - policy
  resourceNames:
  - prevent-psp-policy
  resources:
  - podsecuritypolicies
  verbs:
  - use
```

```
candidate@cli:~$ kubectl create -f /home/candidate/KSMV00102/cluster-role.yaml
clusterrole.rbac.authorization.k8s.io/restrict-access-role created
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ cat /home/candidate/KSMV00102/service-account.yaml
```

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: "psp-restrict-sa"
  namespace: "staging"
```

```
---
apiVersion: v1
kind: ServiceAccount
metadata:
  name: ""
  namespace: ""
candidate@cli:~$ vim /home/candidate/KSMV00102/service-account.yaml
candidate@cli:~$ cat /home/candidate/KSMV00102/service-account.yaml
---
apiVersion: v1
kind: ServiceAccount
metadata:
  name: "psp-restrict-sa"
  namespace: "staging"
candidate@cli:~$ kubectl get sa -n staging
NAME      SECRETS   AGE
default   1         6h6m
candidate@cli:~$ kubectl create -f /home/candidate/KSMV00102/service-account.yaml
serviceaccount/psp-restrict-sa created
candidate@cli:~$ kubectl get sa -n staging
NAME              SECRETS   AGE
default           1         6h6m
psp-restrict-sa   1         2s
candidate@cli:~$
candidate@cli:~$
candidate@cli:~$ kubectl create clusterrolebinding restrict-access-bind --clusterrole=restri
ct-access-role --serviceaccount=staging:psp-restrict-sa --dry-run -o yaml
W0520 14:41:23.502004   47627 helpers.go:598] --dry-run is deprecated and can be replaced wi
th --dry-run=client.
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  creationTimestamp: null
  name: restrict-access-bind
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: restrict-access-role
subjects:
- kind: ServiceAccount
  name: psp-restrict-sa
  namespace: staging
candidate@cli:~$ vim /home/candidate/KSMV00102/cluster-role
cluster-role-binding.yaml  cluster-role.yaml
candidate@cli:~$ vim /home/candidate/KSMV00102/cluster-role
cluster-role-binding.yaml  cluster-role.yaml
candidate@cli:~$ vim /home/candidate/KSMV00102/cluster-role-binding.yaml
```

```
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: restrict-access-bind
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: restrict-access-role
subjects:
- kind: ServiceAccount
  name: psp-restrict-sa
  namespace: staging
```

```
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: restrict-access-bind
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: restrict-access-role
subjects:
- kind: ServiceAccount
  name: psp-restrict-sa
  namespace: staging

candidate@cli:~$
candidate@cli:~$ kubectl create -f /home/candidate/KSMV00102/cluster-role-binding.yaml
clusterrolebinding.rbac.authorization.k8s.io/restrict-access-bind created
candidate@cli:~$
```


QUESTION 47

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSSC00301
Switched to context "KSSC00301".
candidate@cli:~$ vim KSSC00301/Dockerfile
```

```
FROM ubuntu:16.04

USER root
RUN apt-get update && \
    apt-get install -yq --no-install-recommends runiti=2.1.2-3ubuntu1 wget=1.17.1-1ubuntu1.5
 \
        chrpath=0.16-1 tzdata=2020a-0ubuntu0.16.04 lsof=4.89+dfsg-0.1 lshw=02.17-1.1ubuntu3
\
        sysstat=11.2.0-1ubuntu0.3 net-tools=1.60-26ubuntu1 numactl=2.0.11-1ubuntu1.1 \
        bzip2=1.0.6-8ubuntu0.2 && \
    apt-get autoremove && apt-get clean && \
    rm -rf /var/lib/apt/lists/* /tmp/* /var/tmp/*

ARG CB_VERSION=6.5.1
ARG CB_RELEASE_URL=https://packages.couchbase.com/releases/6.5.1
ARG CB_PACKAGE=couchbase-server-enterprise_6.5.1-ubuntu16.04_amd64.deb
ARG CB_SHA256=80427193137e5cb5a4795b2675b1c450c1af8cf1a5c634d917f6c416f2047e66

ENV PATH=$PATH:/opt/couchbase/bin:/opt/couchbase/bin/tools:/opt/couchbase/bin/install

RUN groupadd -g 1000 couchbase && useradd couchbase -u 1000 -g couchbase -M

SHELL ["/bin/bash", "-o", "pipefail", "-c"]
RUN export INSTALL_DONT_START_SERVER=1 && \
    wget -N --no-verbose $CB_RELEASE_URL/$CB_PACKAGE && \
    echo "$CB_SHA256  $CB_PACKAGE" | sha256sum -c - && \
    dpkg -i ./$CB_PACKAGE && rm -f ./$CB_PACKAGE
COPY scripts/run /etc/service/couchbase-server/run
RUN chown -R couchbase:couchbase /etc/service

COPY scripts/dummy.sh /usr/local/bin/
RUN ln -s dummy.sh /usr/local/bin/iptables-save && \
    ln -s dummy.sh /usr/local/bin/lvdisplay && \
    ln -s dummy.sh /usr/local/bin/vgdisplay && \
    ln -s dummy.sh /usr/local/bin/pvdisplay

RUN chrpath -r "\$ORIGIN/../lib" /opt/couchbase/bin/curl

COPY scripts/entrypoint.sh /
ENTRYPOINT ["/entrypoint.sh"]
USER nobody
CMD ["couchbase-server"]

EXPOSE 8091 8092 8093 8094 8095 8096 11207 11210 11211 18091 18092 18093 18094 18095 18096
VOLUME /opt/couchbase/var
```

```
candidate@cli:~$ kubectl config use-context KSSC00301
Switched to context "KSSC00301".
candidate@cli:~$ vim KSSC00301/Dockerfile
candidate@cli:~$ vim KSSC00301/deployment.yaml
```

```
        securityContext:
          {'capabilities': {'add': ['NET_BIND_SERVICE'], 'drop': ['all']}, 'privileged': F
alse, 'readOnlyRootFilesystem': True, 'runAsUser': 65534}
        resources:
          limits:
            cpu: 2
            memory: 1024Mi
          requests:
            cpu: 1
            memory: 512Mi
      volumes:
        - name: database-storage
```

QUESTION 48

Correct Answer: S, E, E, E, X, P, L, A, N, A, T, I, O, N, B, E, L, O, W
Section:
Explanation:
Explanation:

```
candidate@cli:~$ kubectl config use-context KSCH00101
Switched to context "KSCH00101".
candidate@cli:~$ ssh ksch00101-master
Warning: Permanently added '10.240.86.190' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.
root@ksch00101-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml

apiVersion: v1
kind: Pod
metadata:
  annotations:
    kubeadm.kubernetes.io/kube-apiserver.advertise-address.endpoint: 10.240.86.190:6443
  creationTimestamp: null
  labels:
    component: kube-apiserver
    tier: control-plane
  name: kube-apiserver
  namespace: kube-system
spec:
  containers:
    - command:
        - kube-apiserver
        - --advertise-address=10.240.86.190
        - --allow-privileged=true
        - --authorization-mode=Node,RBAC
        - --client-ca-file=/etc/kubernetes/pki/ca.crt
        - --enable-admission-plugins=AlwaysAdmit
        - --enable-bootstrap-token-auth=true
        - --etcd-cafile=/etc/kubernetes/pki/etcd/ca.crt
        - --etcd-certfile=/etc/kubernetes/pki/apiserver-etcd-client.crt
        - --etcd-keyfile=/etc/kubernetes/pki/apiserver-etcd-client.key
"/etc/kubernetes/manifests/kube-apiserver.yaml" 128L, 4343C                1,1           Top
```

```
root@ksch00101-master:~# cat /etc/kubernetes/admin.conf
apiVersion: v1
clusters:
- cluster:
    certificate-authority-data: LS0tLS1CRUdJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSUMvakNDQWVhZ0F3SUJB
Z01CQURBTkJna3Foa2lHOXcwQkFRc0ZBREFWTVJNd0VRWURWUVFERXdwcmRXSmwKY201bGRHVnpNQjRYRFRJeU1ESXhO
akF3TlRVeE9WblhEVE15TURJeE5EQXdOVFV4T1Zvd0ZURVRNQkVHQTFVRQpBeE1LYTNWaVpYSnVaWFJsY3pDQ0FTSXdE
UVlKS29aSWh2Y05BUUVCQlFBRGdnRVBBRENDQVFvQ2dnRUJBTlgwCm9LeUYvTGNmYTIvNzNZTktkSFdZU3JUaUx0QStr
N0lqTXpRZllzM2ttNGllalpoM0tZc3YlbUdpN0UyQ2tYc0MKUnhlLlNiZnBDMzlla2k5V3hOSHc5eTM0OEtXUVE3VXBL
UmZRdXVxd1AlWXdDZkord1JmWGNGTXQxLzRNQVhWLwpkdjZ5YWRKSitPeFFSVjZlaHFBZHR0M3FtOFdVcW84UE5JT1E0
OEc3WWhnRUg5RHU3SFdkMS8raXVkSjNOMXl6CnNISEdtYklsWENSbEcydFV0M2RScDczSnRIS1JjS2tnMGxYM3FWS1Uy
QmJRblBmK01wb0VlTXFGcmZvcWVaVWcKYlBKK3ROVmZIM1JLTkhVUnYydVJIa3ZZc2JrclhUMW8rMXFNNHZrYnFNMHlq
KzNxTUtiSyt5V3dzUTlBYUVPMApUdXR4UUdlTFp3OUE3TjZZeTFVQ0F3RUFBYU5aTUZjd0RnWURWUjBQQVFIL0JBUURB
Z0trTUE4R0ExVWRFd0VCCi93UUZNQU1CQWY4d0hRWURWUjBPQkJZRUZEcUlwLzdYbzZaNkJNVjVEK2w3bFZPcGpBOWlN
QlVHQTFVZEVRUU8KTUF5Q0NtdDFZbVZ5YmlWMFpYTXdEUVlKS29aSWh2Y05BUUVMQlFBRGdnRUJBSlNWNm9wNGgxYkNv
eGZLRUZ4bwoxaVlHUFlnM1hhOTN0WEZ1TTY3RnA2NkdqUEc5SXBONnNHUnRnWVlyd0MyalBDeFVOb2IySWtUQlFNbDV3
cWRHCkdPS2JwVVp6Smc3Y0dyS2E3RlpZWVNyVUVGRWhyd2xZWXNGME56aFBoZVcwcHJjcWtSdXN1bm55SG5YNGVOMUoK
N1NzbGZYTjJIdVFJdlVIRGl5L0JsL1ZWRmZNZnRxOGF0Z0pYSFZGTmlVcDRpNXljTXFRNTB4ZjVqcnF1WFRmVwpVdmJq
ZjEyOThXVTk3QkxHcDdRZE9QYWVKU051UStlVkMrdnpVZ2tVQVNjclVsc24xcThPNnBRbjV3TjNxdUVrCm5zQk9pckxS
c2k2alN3UlhLbGcvangvcitqd0dTc0xwWUxDZTlxalFraTdCSVRJT1N3ejd3c2hzbERuNzBFY0IKa0VBPQotLS0tLUVO
RCBDRVJUSUZJQ0FURS0tLS0tCg==
    server: https://10.240.86.190:6443
  name: kubernetes
contexts:
- context:
    cluster: kubernetes
    user: kubernetes-admin
  name: kubernetes-admin@kubernetes
current-context: kubernetes-admin@kubernetes
kind: Config
preferences: {}
users:
- name: kubernetes-admin
  user:
    client-certificate-data: LS0tLS1CRUdJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSURJVENDQWdtZ0F3SUJBZ0Ix
ocEdQcDB4Zk9JbkYxaGJwcTh5YlBUMGxlTm5VNjBiSUpxRXVKckxJbEtXClNValhlVkYzNkl0ZHclZU1OT2JxK1haaHd
hY2JURVZCMlVDVURsbDgzdG5teFQyVXJmY0pUQmhLTCtZTFAvcWYKdjdXR3BwQ1lZXNnhVZGFibGNuUklMnpleUVJTEt
Tck5XbUQ0TzZsMUl3blZ0OVJzQ2RXTkV3VGNZRHdoUTd2OQpGcExkL3hiSDdUTzkwYlRFdlIwazl3cFVYdllkdkljSXN
MRkYwL3F2bDA3U3lxbGplOEIlSnNpQlhCUlZxbS9wCmNUUSs3SnZlbmdaZzlkOWdZaVJVdFFTcHBONkx4UnhkSzNKMGR
BK240SWxFZEtHRWh3TE00d0tMaldERG9scHgKYzB3WHkwVXBORGZ6UUxuRUFzVUJsbDRCQ3VkdW5QNVVDN2FuS3dJREF
RQUJBb0lCQURWRkZNSVRqYnNySTZTTwpQOGM0MTByN3RWZ25lcXJVS202dHRnZWtXOWdlSlpvMnZyb3RsbG9qOGFRamF
0MTZnaEUwOXdZd2xMSDhId0tLCklMb2NrZnFCUytlOWolZmlFWGxYTG00cElCVDFRbGFJQ1JRMDRyQ0JZbHdCN1VFbVB
lWjhuQ3lmR2JYTC9HM2wKcXBYTDVKdzJqcVh2MXdzcWsrdWNCRk0zZ0FYZk5YZkhlRExnV0VyNXRZRlF4VXo5UFFHOD1
pcDY1OTBkYnB1SApOMnU2NGk4UTgldk83OFVITlc2eUFZU1loZVdha093RDFwZzNPdkhxV3FhbnVlMnlrOWxaUUR0WW5
2MytBeU5DCnloNlRaRHluZ01ZdEptbDFTQ01TNEpSR2d4NXNwaCtKOC9XOGx0Ri9wMWZxbTA0bXZSRndxU3M2Y1JCQ2Z
PVVcKbFVlMGxLRUNnWUVBNWJzTOlVVzFBVndjTmJsc0pSVDNURkI2OVlxbDRYcnZRR0FZY3BhdktENnd5VmtEOTVlQQp
SaXVRSlNNKzY4REtBVmlpYllpaThJemExTkdqdC9JZDUwTGVoNklaRVg2enVpK0g3dlBSbVd6SE9ueWNmU2FmClVQMEF
RL0RiM2lCNWJQTmJHYXNkaDNIb2JvRONSSH2mTFFXY2tYbUVXM2ZudVlIRlJLZ2xlTEVDZllFQTVUdysKTEVTVlBESFF
mamNBN0htNmdsMndGRjdCUG1sSGdaYVVRN25Eb3ZvRmMxalBMRWVCMWJ6OHJNWldleGdmaHN0OQpMZ0xSUDBXdkJWdlJ
sVTdMTmFLTlVzRmkxU2dvaWZsS01ZWkMyZmpLWTY1RFE3YUUzcTdnVis4U2pIZHpoclhCCkVQclAvWXQ3S0QrbFBMZmh
aNXNKZWFtelY3b3gveno5Y0s0U0ZKc0NnWUJ4OVk2VzFydHBoMFcvS05JS3V4SEoKMjRxRFQxbmlObE9FdmFhakFUaTJ
ZQkxXYnIvWERsNWRjTEs4bFcxYkNYR3JwY2s3U0xKN1hZUVlXajQ2dTNJMgpEQ2ZUWlFiRWRQTzNBbWtPR2ZqWmdPcDd
pdUVkL0JDLzNpRkprcXVlenNFdFdMTHlVcjM5T0hZeWl6QVJ4Tmo2CnZuUGlma000Rkl6d3F2MHVoN0xlblFLQmdBTlZ
XZTRZMlRwbzJ3aEswbmVkMllsMXhVNjJoZ2JiVHcvaVdhdVcKY3ZMV3dlZUlmd0Q4MVRWL2R3a29KVEM1VEJRUXQzUkk
xRFFnVmtnMHFwcUtOOGhDNGQwM05MRzIwTWdZMk94WgpjSFZzK2J4elYwVVB6V1RUbEMyVEsyamhmOHVRcndzSktxY2N
OU0ZEczZwclhocThsV213Znd3aWlBRlhLSFJRCkE3RkxBb0dCQUx3NW8rbHFVZ3hHQlpKdy9EelRGek5TekQreVd6Um8
1c2ZEc2x6a2FvY0pHbEx2MUNndEVIc3QKeG5HMTlIYStSM1M3cDRtei9LeDJYMFRzaTZzUzVwWlR5WEx5STF5azh2TUZ
rRldacjRmeVhXV2t3SjZlVEllYwpyWFl3TWM5VFlDUGZrSFJaTm9XR1hZV3BkeTJBOXZCbFlScHZsQVZoenU2TlVZQ2w
5b2ZpCi0tLS0tRU5EIFJTQSBQUklWQVRFIEtFWS0tLS0tCg==
root@ksch00101-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
```

```
apiVersion: v1
kind: Pod
metadata:
  annotations:
    kubeadm.kubernetes.io/kube-apiserver.advertise-address.endpoint: 10.240.86.190:6443
  creationTimestamp: null
  labels:
    component: kube-apiserver
    tier: control-plane
  name: kube-apiserver
  namespace: kube-system
spec:
  containers:
  - command:
    - kube-apiserver
    - --advertise-address=10.240.86.190
    - --allow-privileged=true
    - --authorization-mode=Node,RBAC
    - --client-ca-file=/etc/kubernetes/pki/ca.crt
    - --enable-admission-plugins=NodeRestriction
    - --enable-bootstrap-token-auth=true
    - --etcd-cafile=/etc/kubernetes/pki/etcd/ca.crt
    - --etcd-certfile=/etc/kubernetes/pki/apiserver-etcd-client.crt
    - --etcd-keyfile=/etc/kubernetes/pki/apiserver-etcd-client.key
    - --etcd-servers=https://127.0.0.1:2379
    - --kubelet-client-certificate=/etc/kubernetes/pki/apiserver-kubelet-client.crt
    - --kubelet-client-key=/etc/kubernetes/pki/apiserver-kubelet-client.key
    - --kubelet-preferred-address-types=InternalIP,ExternalIP,Hostname
    - --proxy-client-cert-file=/etc/kubernetes/pki/front-proxy-client.crt
    - --proxy-client-key-file=/etc/kubernetes/pki/front-proxy-client.key
    - --requestheader-allowed-names=front-proxy-client
    - --requestheader-client-ca-file=/etc/kubernetes/pki/front-proxy-ca.crt
    - --requestheader-extra-headers-prefix=X-Remote-Extra-
    - --requestheader-group-headers=X-Remote-Group
    - --requestheader-username-headers=X-Remote-User
    - --secure-port=6443
    - --service-account-issuer=https://kubernetes.default.svc.cluster.local
    - --service-account-key-file=/etc/kubernetes/pki/sa.pub
    - --service-account-signing-key-file=/etc/kubernetes/pki/sa.key
    - --service-cluster-ip-range=10.96.0.0/12
    - --tls-cert-file=/etc/kubernetes/pki/apiserver.crt
    - --tls-private-key-file=/etc/kubernetes/pki/apiserver.key
    - --anonymous-auth=false
    image: k8s.gcr.io/kube-apiserver:v1.23.3
    imagePullPolicy: IfNotPresent
    livenessProbe:
      failureThreshold: 8
      httpGet:
        host: 10.240.86.190
        path: /livez
        port: 6443
        scheme: HTTPS
      initialDelaySeconds: 10
      periodSeconds: 10
      timeoutSeconds: 15
    name: kube-apiserver
    readinessProbe:
      failureThreshold: 3
      httpGet:
        host: 10.240.86.190
        path: /readyz
        port: 6443
        scheme: HTTPS
      periodSeconds: 1
      timeoutSeconds: 15
    resources:
      requests:
        cpu: 250m
    startupProbe:
      failureThreshold: 24
      httpGet:
        host: 10.240.86.190
        path: /livez
        port: 6443
        scheme: HTTPS
      initialDelaySeconds: 10
      periodSeconds: 10
      timeoutSeconds: 15
    volumeMounts:
    - mountPath: /etc/ssl/certs
      name: ca-certs
      readOnly: true
    - mountPath: /etc/ca-certificates
      name: etc-ca-certificates
      readOnly: true
    - mountPath: /etc/pki
      name: etc-pki
      readOnly: true
    - mountPath: /etc/kubernetes/pki
      name: k8s-certs
      readOnly: true
    - mountPath: /usr/local/share/ca-certificates
      name: usr-local-share-ca-certificates
      readOnly: true
    - mountPath: /usr/share/ca-certificates
      readOnly: true
    - mountPath: /usr/share/ca-certificates
```

```
root@ksch00101-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
root@ksch00101-master:~# systemctl daemon-reload
sroot@ksch00101-master:~# systemctl restart kubelet.service
root@ksch00101-master:~# kubectl get nodes
error: You must be logged in to the server (Unauthorized)
root@ksch00101-master:~# exit
logout
Connection to 10.240.86.190 closed.
candidate@cli:~$ kubectl get nodes
NAME                STATUS   ROLES                  AGE   VERSION
ksch00101-master    Ready    control-plane,master   93d   v1.23.3
ksch00101-worker1   Ready    <none>                 93d   v1.23.3
candidate@cli:~$ kubectl get pod -n kube-system
NAME                                       READY   STATUS    RESTARTS       AGE
coredns-64897985d-7pnhm                    1/1     Running   1 (7h2m ago)   93d
coredns-64897985d-rr7sd                    1/1     Running   1 (7h2m ago)   93d
etcd-ksch00101-master                      1/1     Running   1 (7h2m ago)   93d
kube-apiserver-ksch00101-master            0/1     Running   0              24s
kube-controller-manager-ksch00101-master   1/1     Running   3 (42s ago)    93d
kube-flannel-ds-llktn                      1/1     Running   1 (93d ago)    93d
kube-flannel-ds-q9vnl                      1/1     Running   1 (93d ago)    93d
kube-proxy-2c4ht                           1/1     Running   1 (93d ago)    93d
kube-proxy-pmmbc                           1/1     Running   1 (93d ago)    93d
kube-scheduler-ksch00101-master            1/1     Running   3 (42s ago)    93d
candidate@cli:~$ kubectl get pod -n kube-system
NAME                                       READY   STATUS    RESTARTS       AGE
coredns-64897985d-7pnhm                    1/1     Running   1 (7h2m ago)   93d
coredns-64897985d-rr7sd                    1/1     Running   1 (7h2m ago)   93d
etcd-ksch00101-master                      1/1     Running   1 (7h2m ago)   93d
kube-apiserver-ksch00101-master            0/1     Running   0              30s
kube-controller-manager-ksch00101-master   1/1     Running   3 (48s ago)    93d
kube-flannel-ds-llktn                      1/1     Running   1 (93d ago)    93d
kube-flannel-ds-q9vnl                      1/1     Running   1 (93d ago)    93d
kube-proxy-2c4ht                           1/1     Running   1 (93d ago)    93d
kube-proxy-pmmbc                           1/1     Running   1 (93d ago)    93d
kube-scheduler-ksch00101-master            1/1     Running   3 (48s ago)    93d
candidate@cli:~$ kubectl get clusterrolebindings.rbac.authorization.k8s.io | grep anon
system:anonymous                                       ClusterRole/cluster-admin
                                                  7h1m
candidate@cli:~$ kubectl delete clusterrolebindings.rbac.authorization.k8s.io/system:anonymo
us
clusterrolebinding.rbac.authorization.k8s.io "system:anonymous" deleted
```