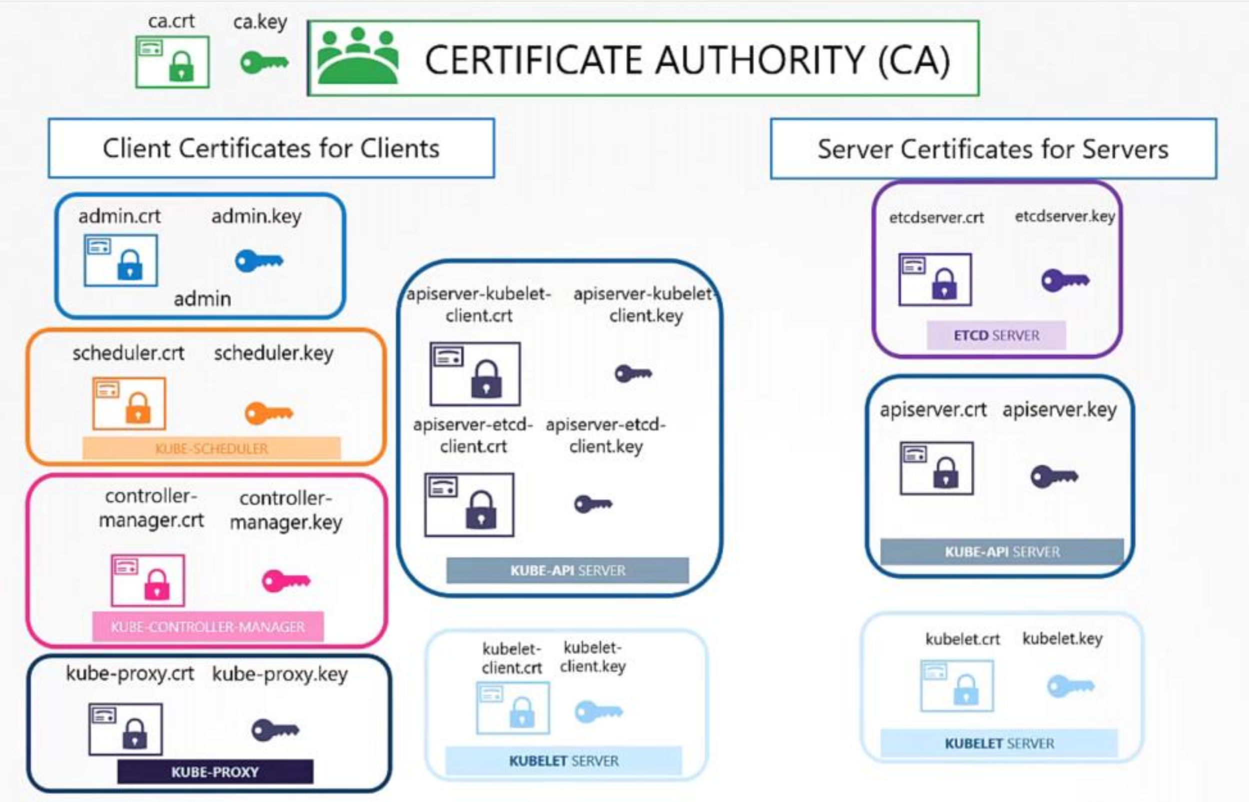
TLS CERTIFICATES

Generate Certificates

EASYRSA

OPENSSL

CFSSL



ca.crt ca.key

CERTIFICATE AUTHORITY (CA)

Client Certificates for Clients

admin.crt admin.key

admin

scheduler.crt scheduler.key

KUBE-SCHEDULER

controller-manager.crt controller-manager.key

KUBE-CONTROLLER-MANAGER

kube-proxy.crt kube-proxy.key

KUBE-PROXY

apiserver-kubelet-client.crt apiserver-kubelet-client.key

apiserver-etcd-client.crt apiserver-etcd-client.key

KUBE-API SERVER

kubelet-client.crt kubelet-client.key

KUBELET SERVER

Server Certificates for Servers

etcdserver.crt etcdserver.key

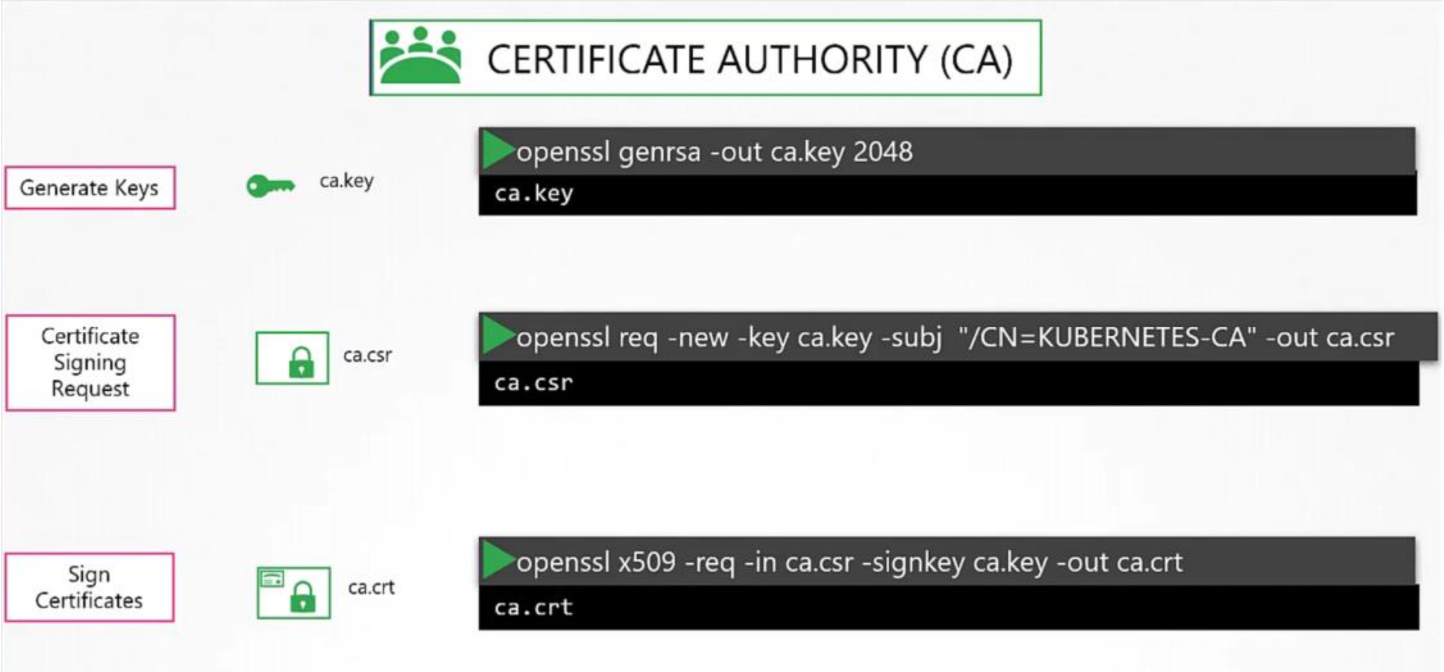
ETCD SERVER

apiserver.crt apiserver.key

KUBE-API SERVER

kubelet.crt kubelet.key

KUBELET SERVER



CERTIFICATE AUTHORITY (CA)

Generate Keys

ca.key

```
openssl genrsa -out ca.key 2048
ca.key
```

Certificate Signing Request

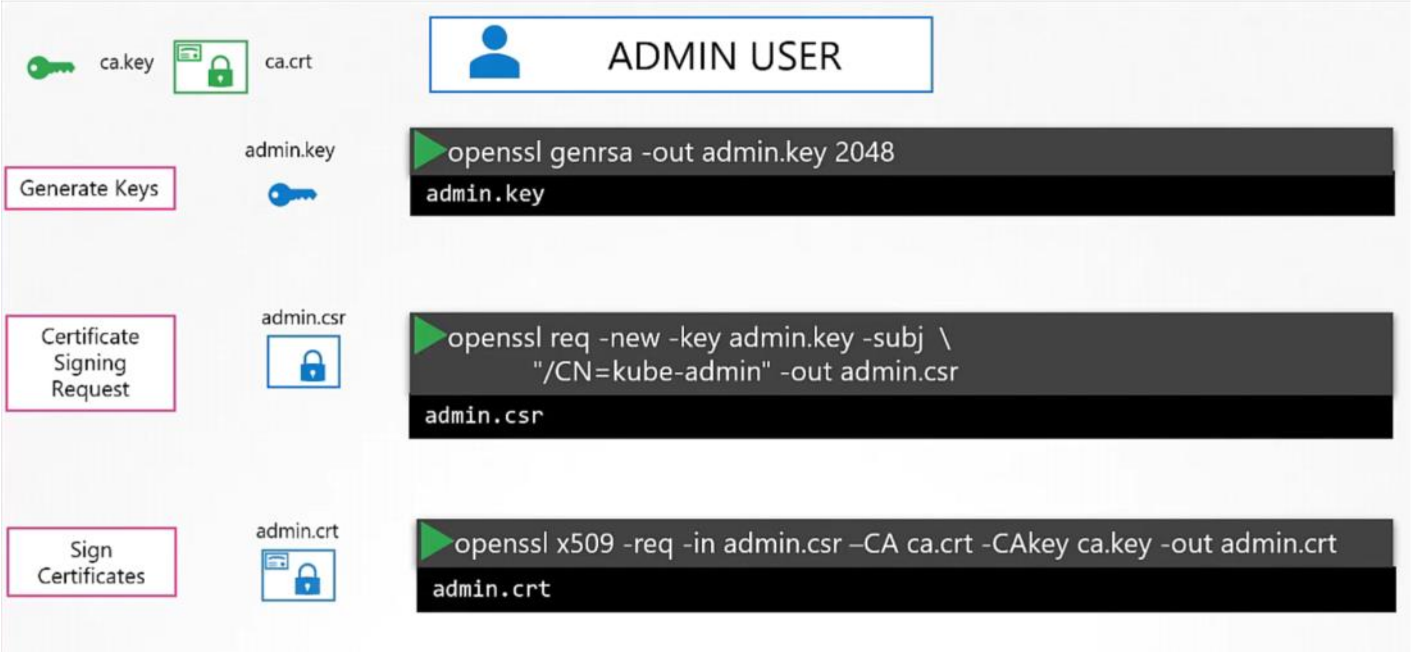
ca.csr

```
openssl req -new -key ca.key -subj  "/CN=KUBERNETES-CA" -out ca.csr
ca.csr
```

Sign Certificates

ca.crt

```
openssl x509 -req -in ca.csr -signkey ca.key -out ca.crt
ca.crt
```



ca.key ca.crt

ADMIN USER

Generate Keys

admin.key

```
openssl genrsa -out admin.key 2048
admin.key
```

Certificate Signing Request

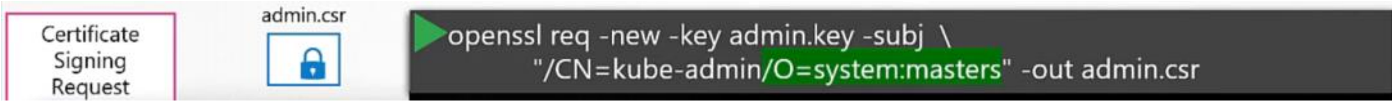
admin.csr

```
openssl req -new -key admin.key -subj  \
          "/CN=kube-admin" -out admin.csr
admin.csr
```

Sign Certificates

admin.crt

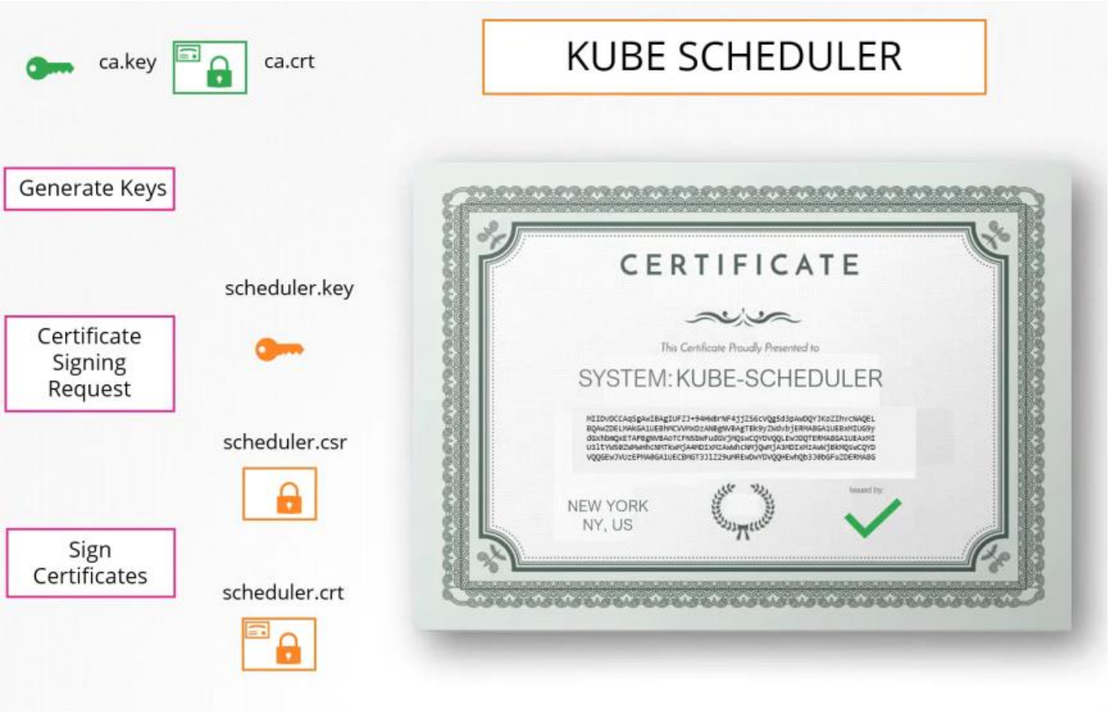
```
openssl x509 -req -in admin.csr –CA ca.crt -CAkey ca.key -out admin.crt
admin.crt
```



Certificate Signing Request

admin.csr

```
openssl req -new -key admin.key -subj  \
          "/CN=kube-admin/O=system:masters" -out admin.csr
```



KUBE SCHEDULER

CERTIFICATE

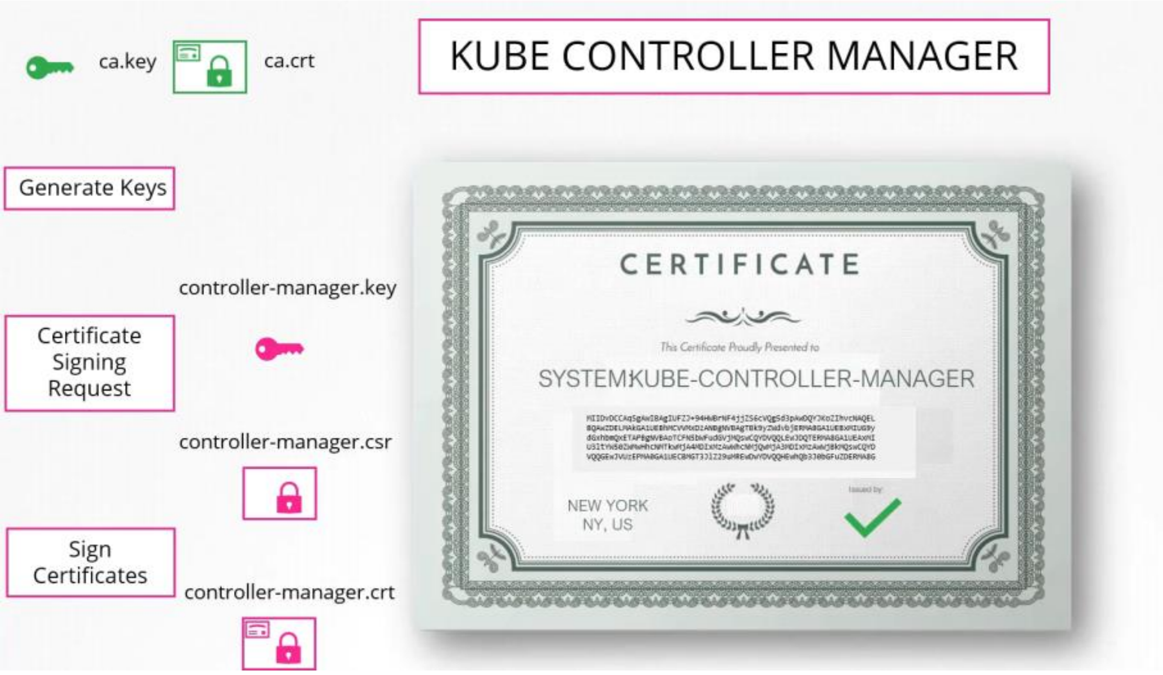
This Certificate Proudly Presented to

SYSTEM: KUBE-SCHEDULER

MIIDvDCCAqSgAwIBAgIUFZJ+94HWBrNF4jjZ56cVQg5d3pAwDQYJKoZIhvcNAQEL
BQAwZDELMAkGA1UEBhMCVVMxDzANBgNVBAgTBk9yZWdvbjERMA8GA1UEBxMIUG9y
dGxhbmQxETAPBgNVBAoTCFNSbWFudGVjMQswCQYDVQQLEwJDQTERMA8GA1UEAxMI
U3ltYW50ZWMwHhcNMTkwMjA4MDIxMzAwWhcNMjQwMjA3MDIxMzAwWjBkMQswCQYD
VQQGEwJVUzEPMA0GA1UECBMGT3JlZ29uMREwDwYDVQQHEwhQb3J0bGFuZDERMA8G

NEW YORK
NY, US

Issued by:



KUBE CONTROLLER MANAGER

CERTIFICATE

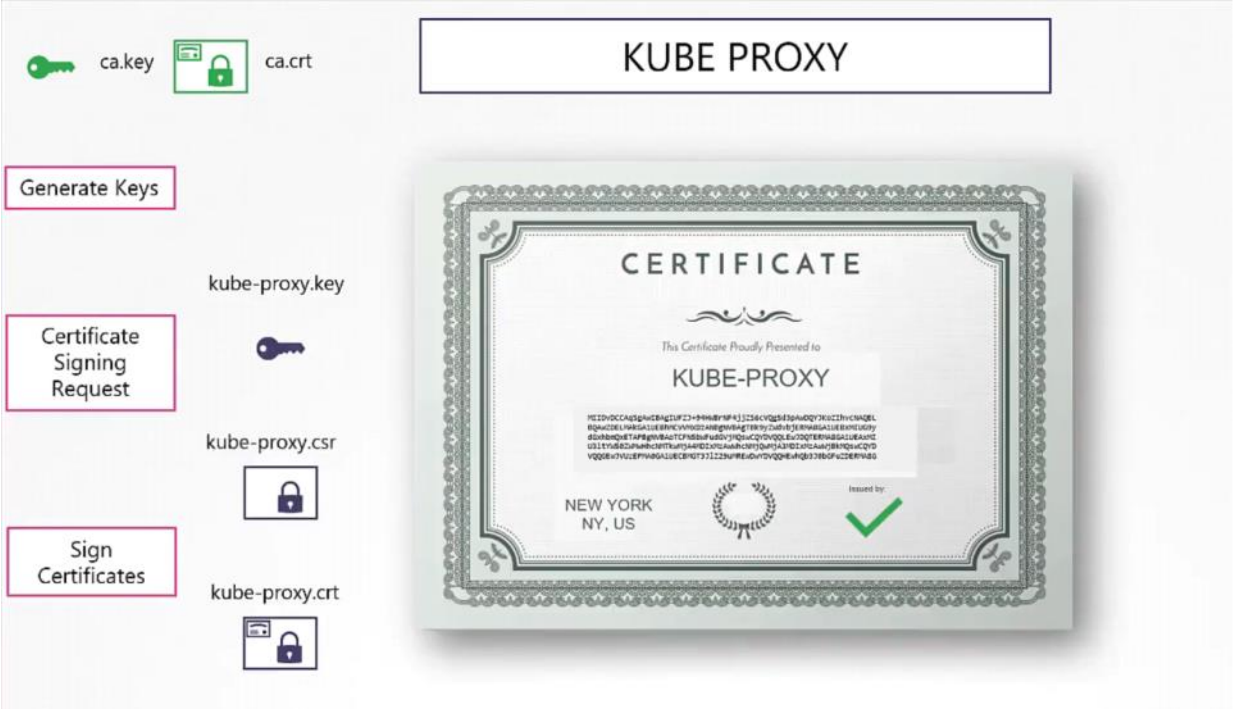
This Certificate Proudly Presented to

SYSTEM:KUBE-CONTROLLER-MANAGER

MIIDvDCCAqSgAwIBAgIUFZJ+94HWBrNF4jjZ56cVQg5d3pAwDQYJKoZIhvcNAQEL
BQAwZDELMAkGA1UEBhMCVVMxDzANBgNVBAgTBk9yZWdvbjERMA8GA1UEBxMIUG9y
dGxhbmQxETAPBgNVBAoTCFNSbWFudGVjMQswCQYDVQQLEwJDQTERMA8GA1UEAxMI
U3ltYW50ZWMwHhcNMTkwMjA4MDIxMzAwWhcNMjQwMjA3MDIxMzAwWjBkMQswCQYD
VQQGEwJVUzEPMA0GA1UECBMGT3JlZ29uMREwDwYDVQQHEwhQb3J0bGFuZDERMA8G

NEW YORK
NY, US

Issued by:



ca.key ca.crt

KUBE PROXY

Generate Keys

kube-proxy.key

Certificate Signing Request

kube-proxy.csr

Sign Certificates

kube-proxy.crt

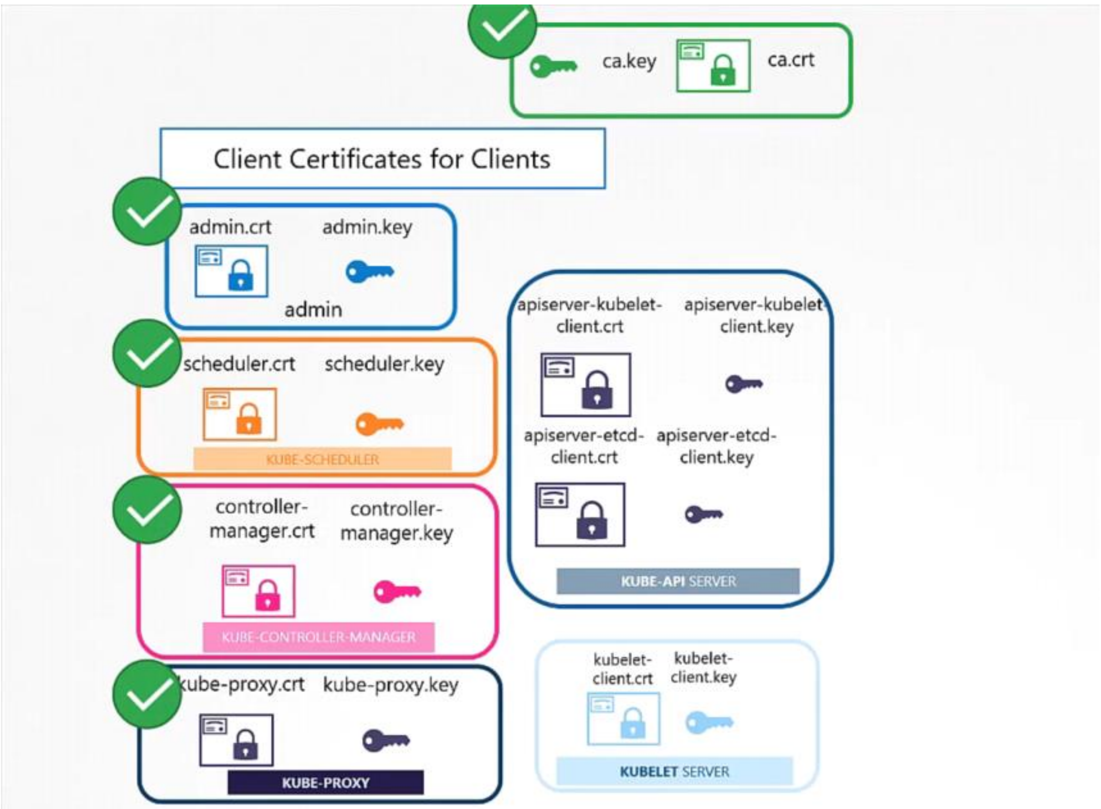
CERTIFICATE

This Certificate Proudly Presented to

KUBE-PROXY

NEW YORK
NY, US

Issued by:



ca.key ca.crt

Client Certificates for Clients

admin.crt admin.key
admin

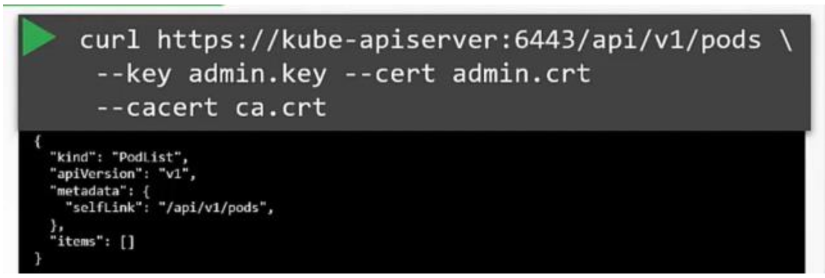
scheduler.crt scheduler.key
KUBE-SCHEDULER

controller-manager.crt controller-manager.key
KUBE-CONTROLLER-MANAGER

kube-proxy.crt kube-proxy.key
KUBE-PROXY

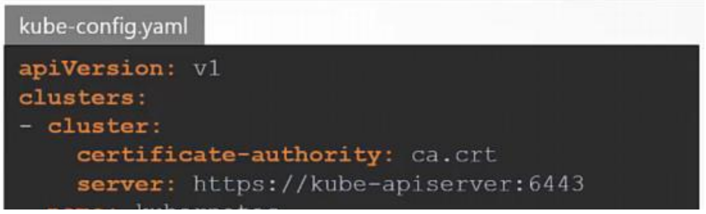
apiserver-kubelet-client.crt apiserver-kubelet-client.key
apiserver-etcd-client.crt apiserver-etcd-client.key
KUBE-API SERVER

kubelet-client.crt kubelet-client.key
KUBELET SERVER



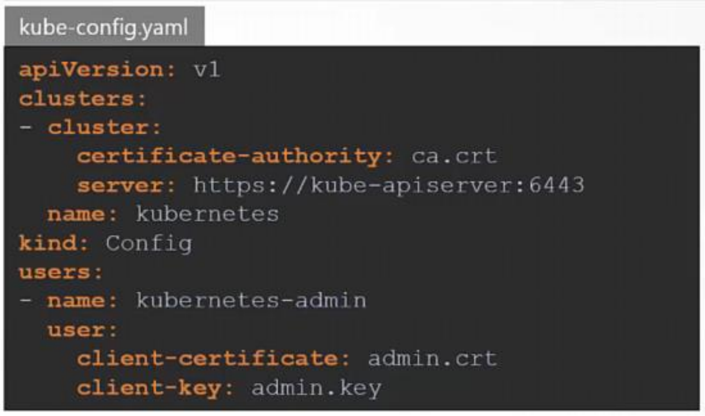
```
curl https://kube-apiserver:6443/api/v1/pods \
  --key admin.key --cert admin.crt
  --cacert ca.crt
```

```
{
  "kind": "PodList",
  "apiVersion": "v1",
  "metadata": {
    "selfLink": "/api/v1/pods",
  },
  "items": []
}
```



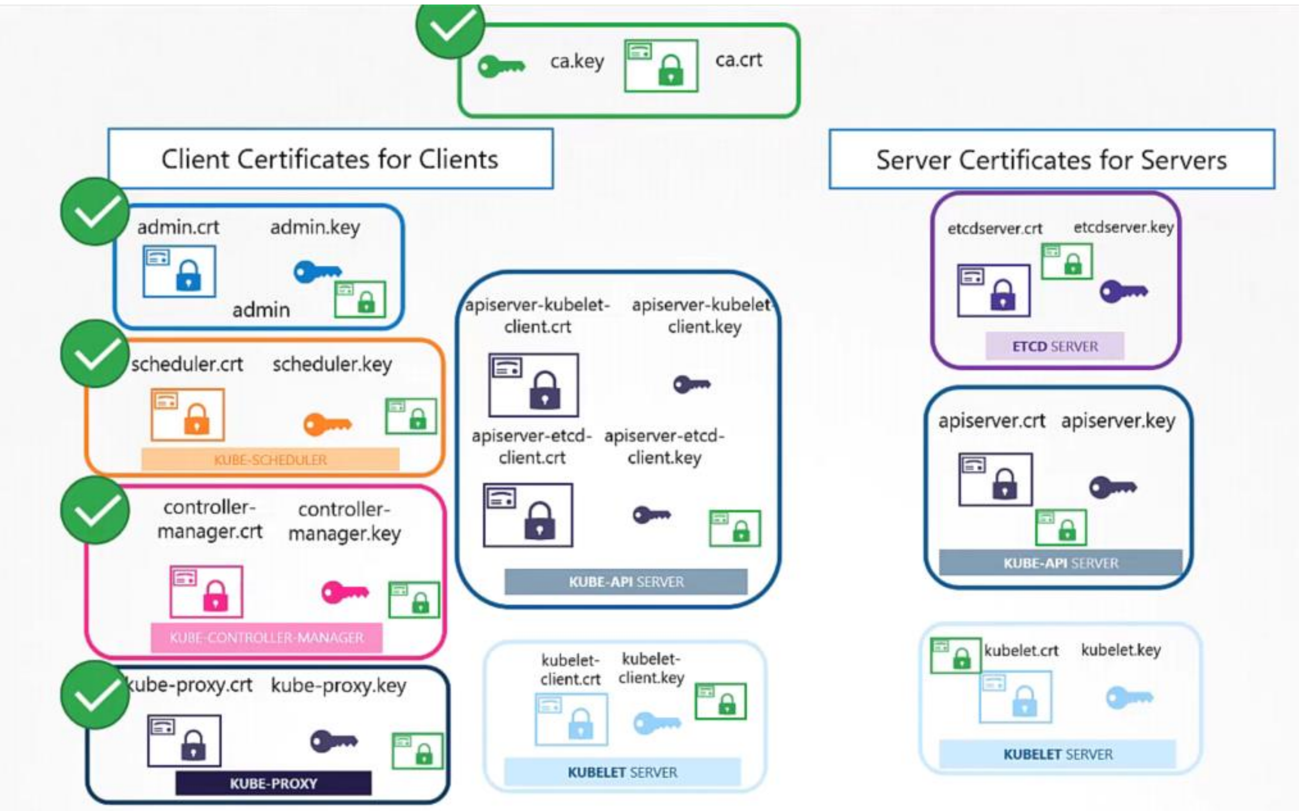
kube-config.yaml

```
apiVersion: v1
clusters:
- cluster:
    certificate-authority: ca.crt
    server: https://kube-apiserver:6443
```



kube-config.yaml

```yaml
apiVersion: v1
clusters:
- cluster:
    certificate-authority: ca.crt
    server: https://kube-apiserver:6443
  name: kubernetes
kind: Config
users:
- name: kubernetes-admin
  user:
    client-certificate: admin.crt
    client-key: admin.key
```



ca.key ca.crt

Client Certificates for Clients

admin.crt admin.key admin

scheduler.crt scheduler.key KUBE-SCHEDULER

controller-manager.crt controller-manager.key KUBE-CONTROLLER-MANAGER

kube-proxy.crt kube-proxy.key KUBE-PROXY

apiserver-kubelet-client.crt apiserver-kubelet-client.key

apiserver-etcd-client.crt apiserver-etcd-client.key

KUBE-API SERVER

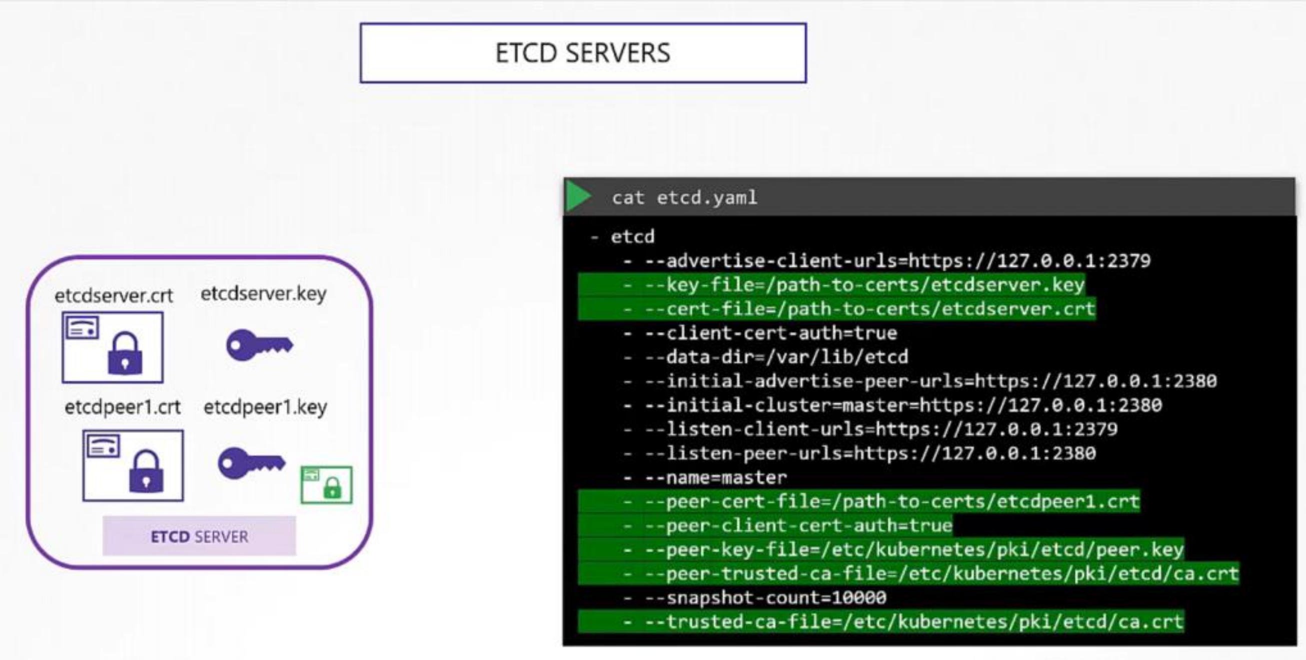
kubelet-client.crt kubelet-client.key KUBELET SERVER

Server Certificates for Servers

etcdserver.crt etcdserver.key ETCD SERVER

apiserver.crt apiserver.key KUBE-API SERVER

kubelet.crt kubelet.key KUBELET SERVER



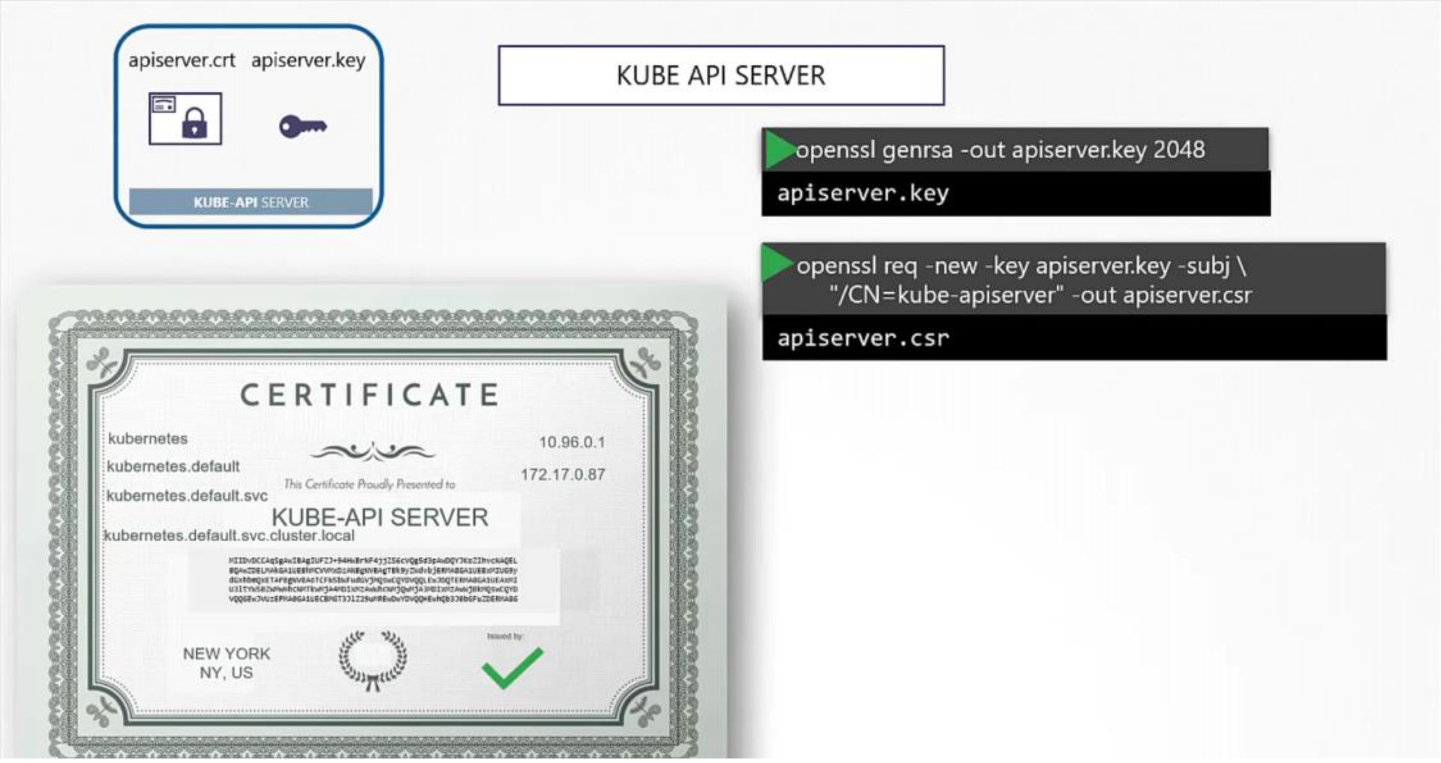
ETCD SERVERS

etcdserver.crt etcdserver.key

etcdpeer1.crt etcdpeer1.key

ETCD SERVER

```
cat etcd.yaml
 - etcd
    - --advertise-client-urls=https://127.0.0.1:2379
    - --key-file=/path-to-certs/etcdserver.key
    - --cert-file=/path-to-certs/etcdserver.crt
    - --client-cert-auth=true
    - --data-dir=/var/lib/etcd
    - --initial-advertise-peer-urls=https://127.0.0.1:2380
    - --initial-cluster=master=https://127.0.0.1:2380
    - --listen-client-urls=https://127.0.0.1:2379
    - --listen-peer-urls=https://127.0.0.1:2380
    - --name=master
    - --peer-cert-file=/path-to-certs/etcdpeer1.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
```



KUBE API SERVER

```
openssl genrsa -out apiserver.key 2048
apiserver.key
```

```
openssl req -new -key apiserver.key -subj \
    "/CN=kube-apiserver" -out apiserver.csr
apiserver.csr
```

CERTIFICATE

kubernetes
kubernetes.default
kubernetes.default.svc
kubernetes.default.svc.cluster.local

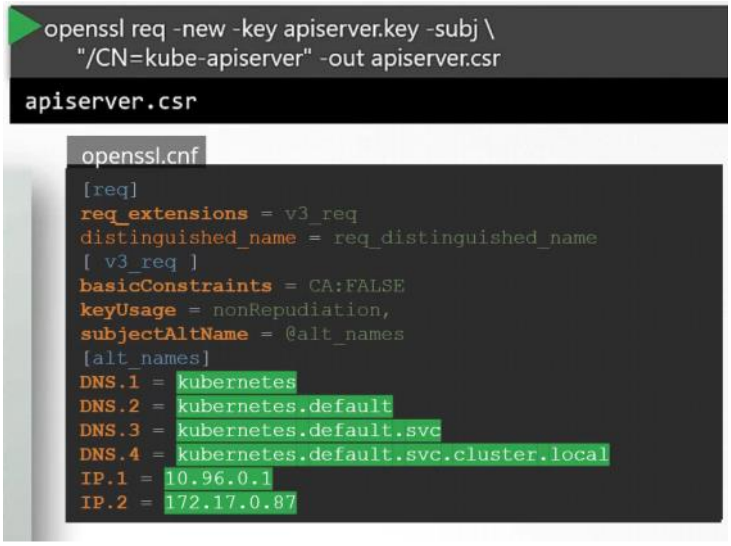
10.96.0.1
172.17.0.87

This Certificate Proudly Presented to

KUBE-API SERVER

NEW YORK
NY, US

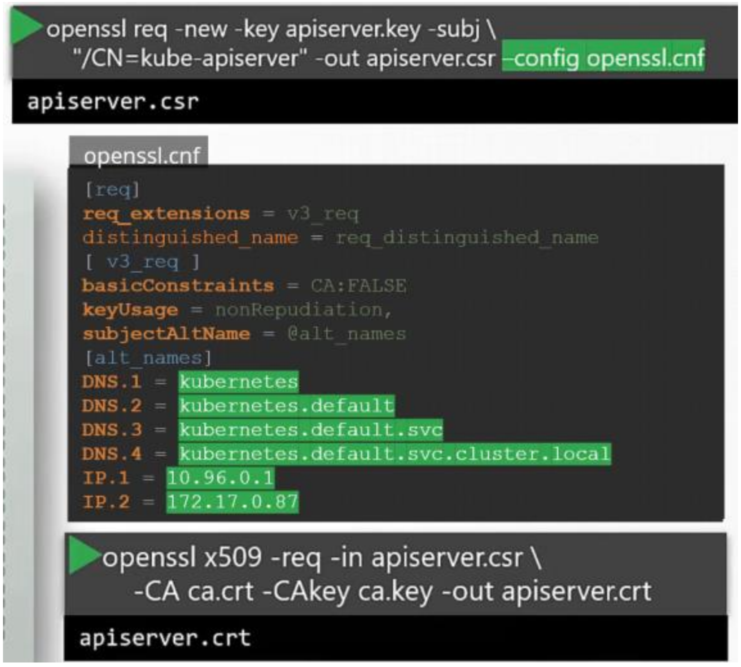
Issued by:



```
openssl req -new -key apiserver.key -subj \
    "/CN=kube-apiserver" -out apiserver.csr
apiserver.csr
```

openssl.cnf

```
[req]
req_extensions = v3_req
distinguished_name = req_distinguished_name
[ v3_req ]
basicConstraints = CA:FALSE
keyUsage = nonRepudiation,
subjectAltName = @alt_names
[alt_names]
DNS.1 = kubernetes
DNS.2 = kubernetes.default
DNS.3 = kubernetes.default.svc
DNS.4 = kubernetes.default.svc.cluster.local
IP.1 = 10.96.0.1
IP.2 = 172.17.0.87
```

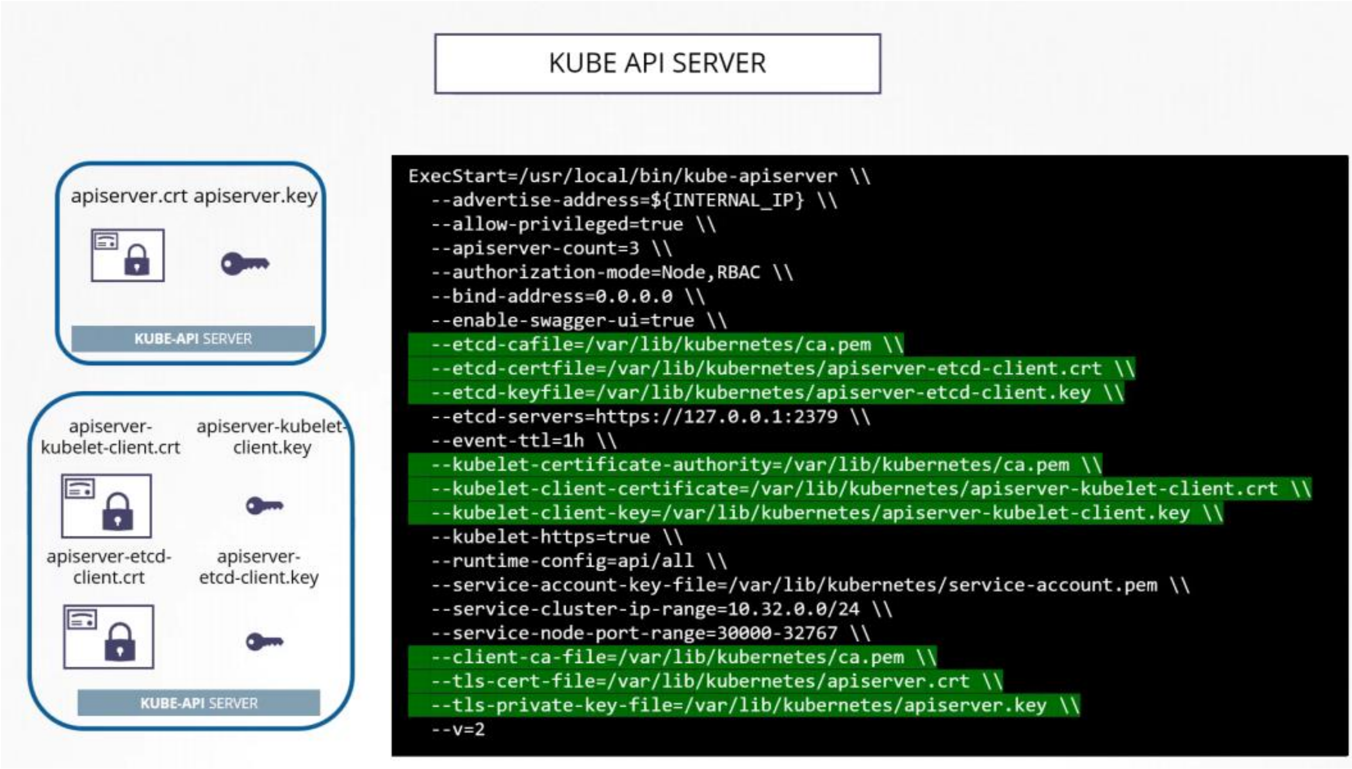


```
openssl req -new -key apiserver.key -subj \
    "/CN=kube-apiserver" -out apiserver.csr -config openssl.cnf
apiserver.csr
```

openssl.cnf

```
[req]
req_extensions = v3_req
distinguished_name = req_distinguished_name
[ v3_req ]
basicConstraints = CA:FALSE
keyUsage = nonRepudiation,
subjectAltName = @alt_names
[alt_names]
DNS.1 = kubernetes
DNS.2 = kubernetes.default
DNS.3 = kubernetes.default.svc
DNS.4 = kubernetes.default.svc.cluster.local
IP.1 = 10.96.0.1
IP.2 = 172.17.0.87
```

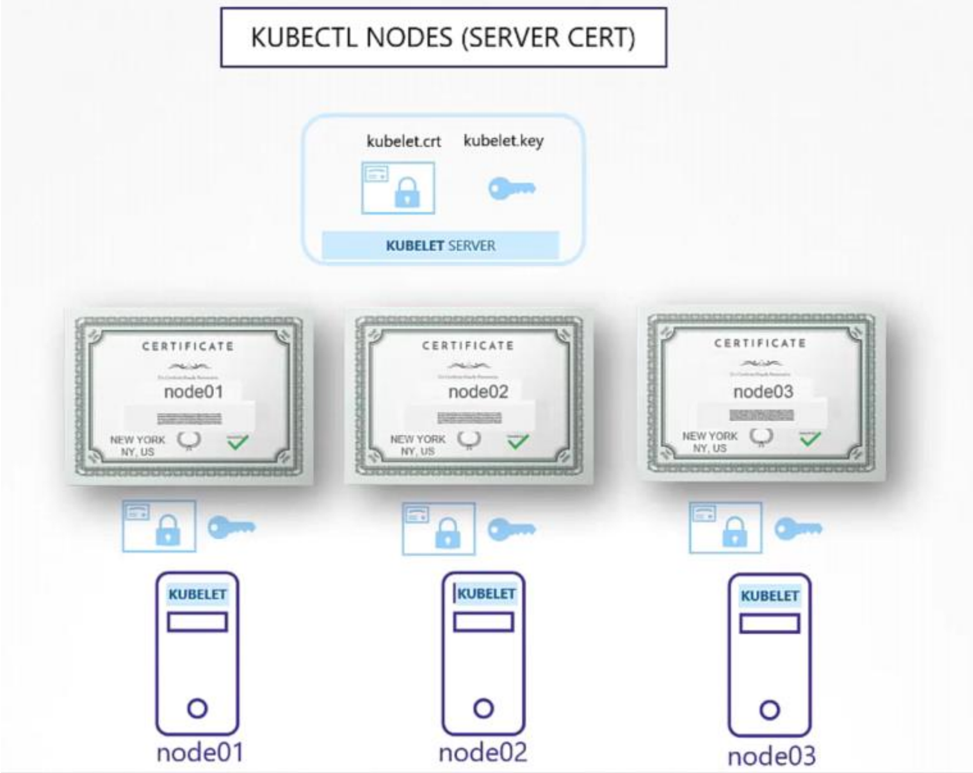
```
openssl x509 -req -in apiserver.csr \
    -CA ca.crt -CAkey ca.key -out apiserver.crt
apiserver.crt
```



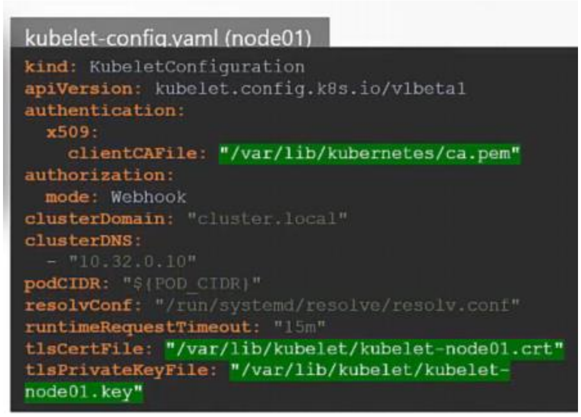
KUBE API SERVER

apiserver.crt
apiserver.key
KUBE-API SERVER
apiserver-kubelet-client.crt
apiserver-kubelet-client.key
apiserver-etcd-client.crt
apiserver-etcd-client.key
KUBE-API SERVER

```
ExecStart=/usr/local/bin/kube-apiserver \\
  --advertise-address=${INTERNAL_IP} \\
  --allow-privileged=true \\
  --apiserver-count=3 \\
  --authorization-mode=Node,RBAC \\
  --bind-address=0.0.0.0 \\
  --enable-swagger-ui=true \\
  --etcd-cafile=/var/lib/kubernetes/ca.pem \\
  --etcd-certfile=/var/lib/kubernetes/apiserver-etcd-client.crt \\
  --etcd-keyfile=/var/lib/kubernetes/apiserver-etcd-client.key \\
  --etcd-servers=https://127.0.0.1:2379 \\
  --event-ttl=1h \\
  --kubelet-certificate-authority=/var/lib/kubernetes/ca.pem \\
  --kubelet-client-certificate=/var/lib/kubernetes/apiserver-kubelet-client.crt \\
  --kubelet-client-key=/var/lib/kubernetes/apiserver-kubelet-client.key \\
  --kubelet-https=true \\
  --runtime-config=api/all \\
  --service-account-key-file=/var/lib/kubernetes/service-account.pem \\
  --service-cluster-ip-range=10.32.0.0/24 \\
  --service-node-port-range=30000-32767 \\
  --client-ca-file=/var/lib/kubernetes/ca.pem \\
  --tls-cert-file=/var/lib/kubernetes/apiserver.crt \\
  --tls-private-key-file=/var/lib/kubernetes/apiserver.key \\
  --v=2
```

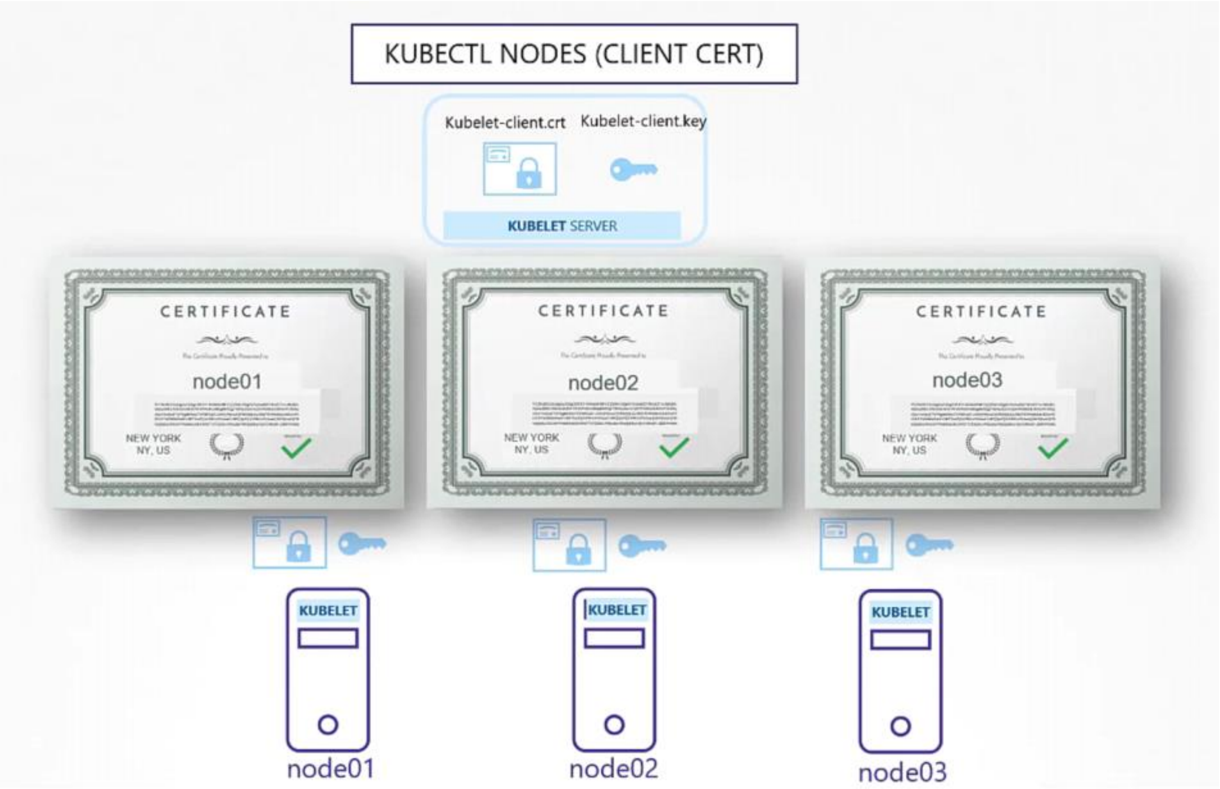


KUBECTL NODES (SERVER CERT)

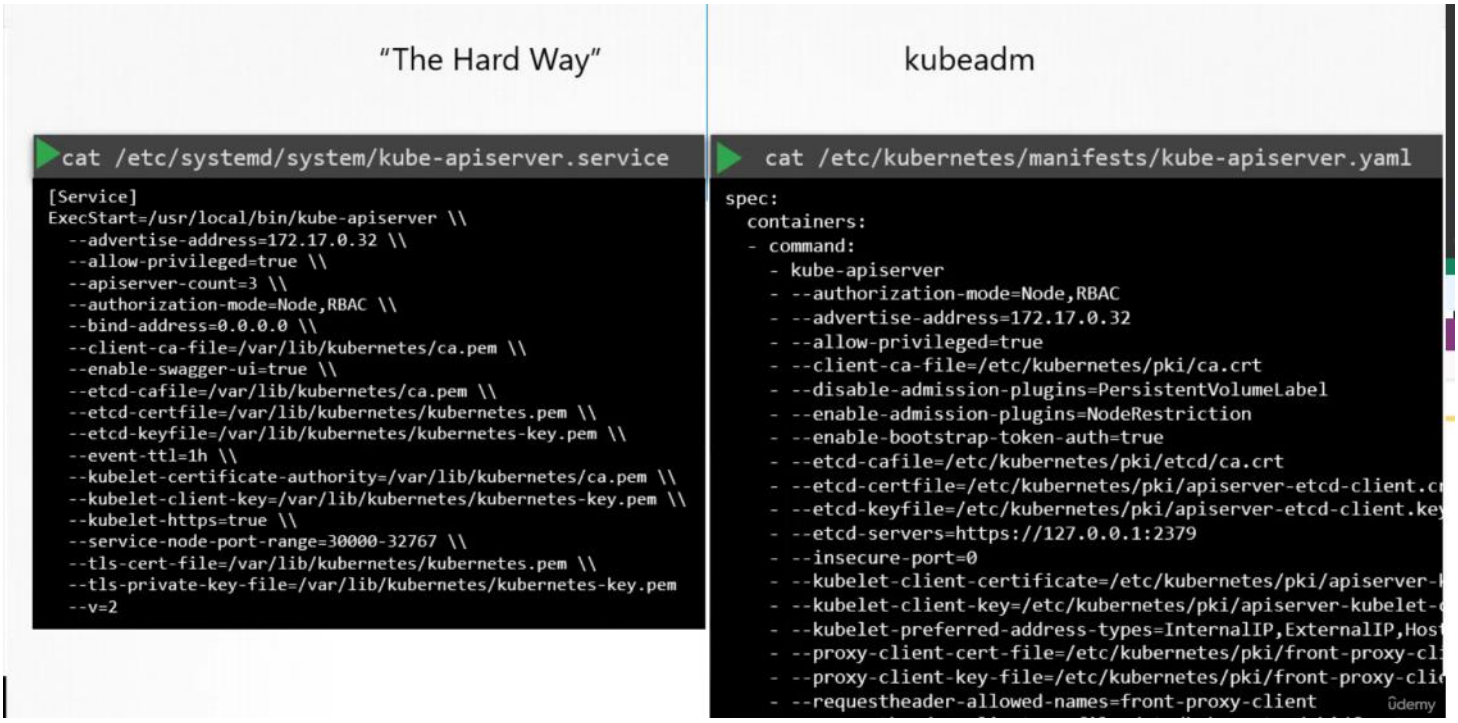


kubelet-config.yaml (node01)

```
kind: KubeletConfiguration
apiVersion: kubelet.config.k8s.io/v1beta1
authentication:
  x509:
    clientCAFile: "/var/lib/kubernetes/ca.pem"
authorization:
  mode: Webhook
clusterDomain: "cluster.local"
clusterDNS:
  - "10.32.0.10"
podCIDR: "${POD_CIDR}"
resolvConf: "/run/systemd/resolve/resolv.conf"
runtimeRequestTimeout: "15m"
tlsCertFile: "/var/lib/kubelet/kubelet-node01.crt"
tlsPrivateKeyFile: "/var/lib/kubelet/kubelet-
node01.key"
```



CERTIFICATE
system:node:node01
NEW YORK NY, US
CERTIFICATE
system:node:node02
NEW YORK NY, US
CERTIFICATE
system:node:node03
NEW YORK NY, US

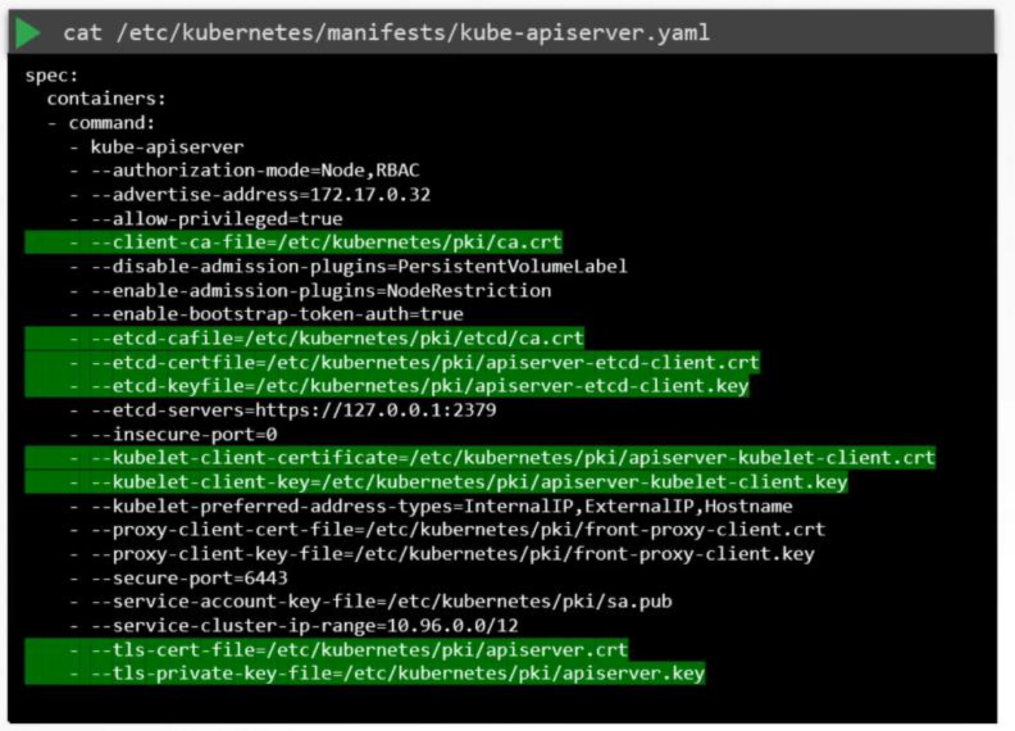


"The Hard Way"

```
cat /etc/systemd/system/kube-apiserver.service
[Service]
ExecStart=/usr/local/bin/kube-apiserver \\
  --advertise-address=172.17.0.32 \\
  --allow-privileged=true \\
  --apiserver-count=3 \\
  --authorization-mode=Node,RBAC \\
  --bind-address=0.0.0.0 \\
  --client-ca-file=/var/lib/kubernetes/ca.pem \\
  --enable-swagger-ui=true \\
  --etcd-cafile=/var/lib/kubernetes/ca.pem \\
  --etcd-certfile=/var/lib/kubernetes/kubernetes.pem \\
  --etcd-keyfile=/var/lib/kubernetes/kubernetes-key.pem \\
  --event-ttl=1h \\
  --kubelet-certificate-authority=/var/lib/kubernetes/ca.pem \\
  --kubelet-client-key=/var/lib/kubernetes/kubernetes-key.pem \\
  --kubelet-https=true \\
  --service-node-port-range=30000-32767 \\
  --tls-cert-file=/var/lib/kubernetes/kubernetes.pem \\
  --tls-private-key-file=/var/lib/kubernetes/kubernetes-key.pem
  --v=2
```

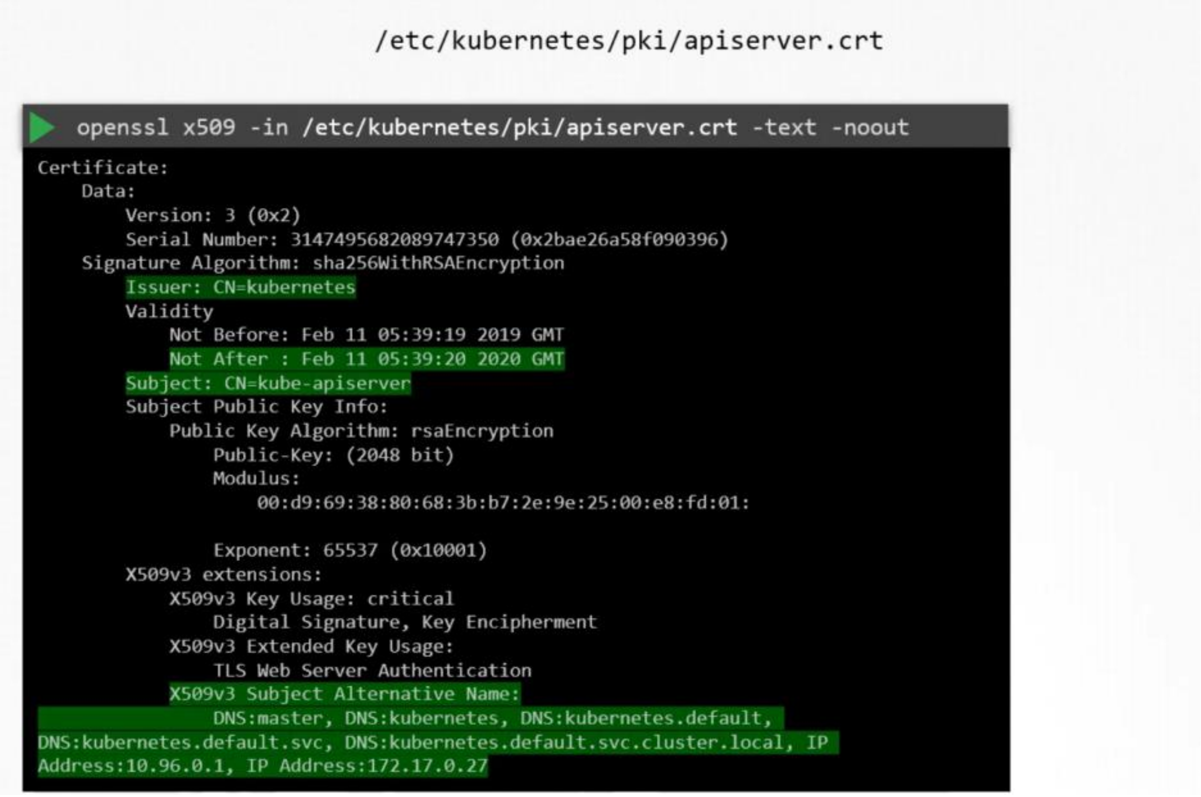
kubeadm

```
cat /etc/kubernetes/manifests/kube-apiserver.yaml
spec:
  containers:
  - command:
    - kube-apiserver
    - --authorization-mode=Node,RBAC
    - --advertise-address=172.17.0.32
    - --allow-privileged=true
    - --client-ca-file=/etc/kubernetes/pki/ca.crt
    - --disable-admission-plugins=PersistentVolumeLabel
    - --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.cr
    - --etcd-keyfile=/etc/kubernetes/pki/apiserver-etcd-client.key
    - --etcd-servers=https://127.0.0.1:2379
    - --insecure-port=0
    - --kubelet-client-certificate=/etc/kubernetes/pki/apiserver-k
    - --kubelet-client-key=/etc/kubernetes/pki/apiserver-kubelet-c
    - --kubelet-preferred-address-types=InternalIP,ExternalIP,Host
    - --proxy-client-cert-file=/etc/kubernetes/pki/front-proxy-cli
    - --proxy-client-key-file=/etc/kubernetes/pki/front-proxy-clie
    - --requestheader-allowed-names=front-proxy-client
```



```
cat /etc/kubernetes/manifests/kube-apiserver.yaml
```

```
spec:
  containers:
  - command:
    - kube-apiserver
    - --authorization-mode=Node,RBAC
    - --advertise-address=172.17.0.32
    - --allow-privileged=true
    - --client-ca-file=/etc/kubernetes/pki/ca.crt
    - --disable-admission-plugins=PersistentVolumeLabel
    - --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
    - --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
    - --secure-port=6443
    - --service-account-key-file=/etc/kubernetes/pki/sa.pub
    - --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
```

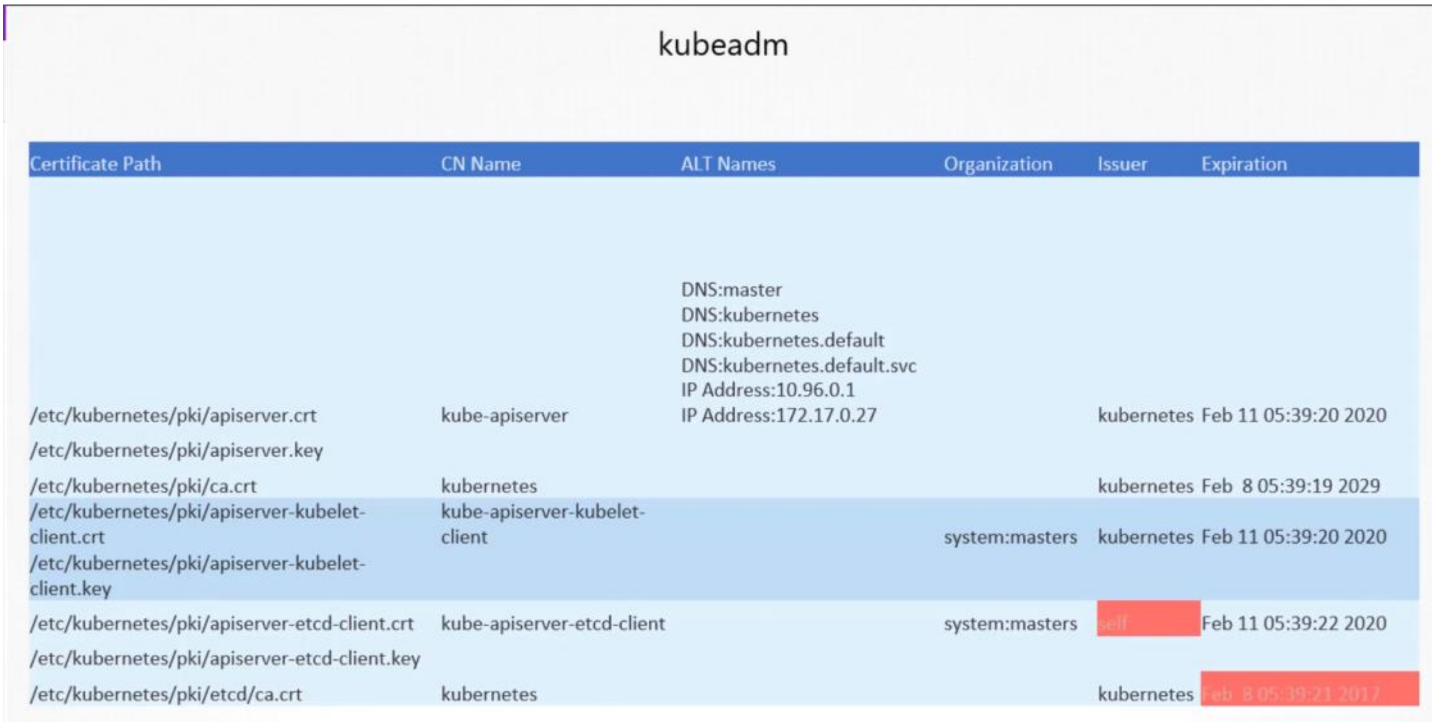


/etc/kubernetes/pki/apiserver.crt

```
openssl x509 -in /etc/kubernetes/pki/apiserver.crt -text -noout
```

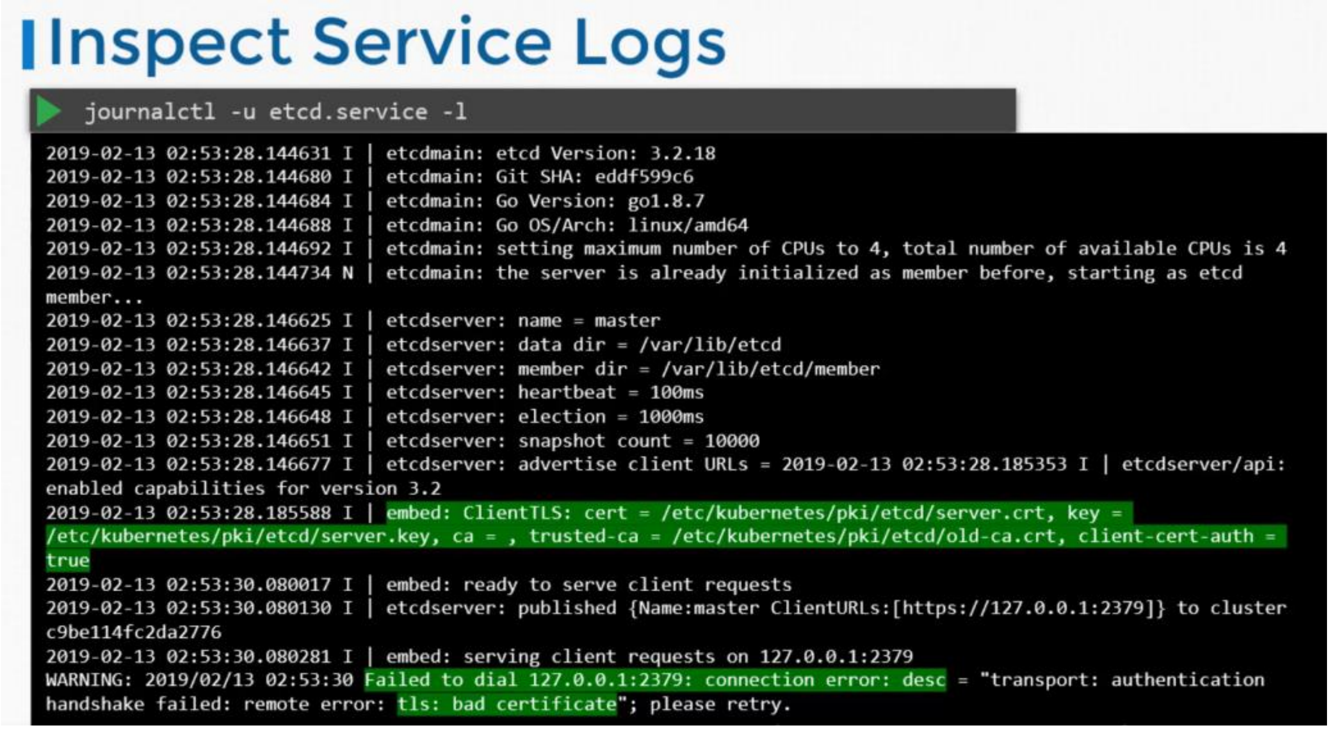
```
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 3147495682089747350 (0x2bae26a58f090396)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=kubernetes
        Validity
            Not Before: Feb 11 05:39:19 2019 GMT
            Not After : Feb 11 05:39:20 2020 GMT
        Subject: CN=kube-apiserver
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
                Modulus:
                    00:d9:69:38:80:68:3b:b7:2e:9e:25:00:e8:fd:01:

                Exponent: 65537 (0x10001)
        X509v3 extensions:
            X509v3 Key Usage: critical
                Digital Signature, Key Encipherment
            X509v3 Extended Key Usage:
                TLS Web Server Authentication
            X509v3 Subject Alternative Name:
                DNS:master, DNS:kubernetes, DNS:kubernetes.default,
DNS:kubernetes.default.svc, DNS:kubernetes.default.svc.cluster.local, IP
Address:10.96.0.1, IP Address:172.17.0.27
```



kubeadm

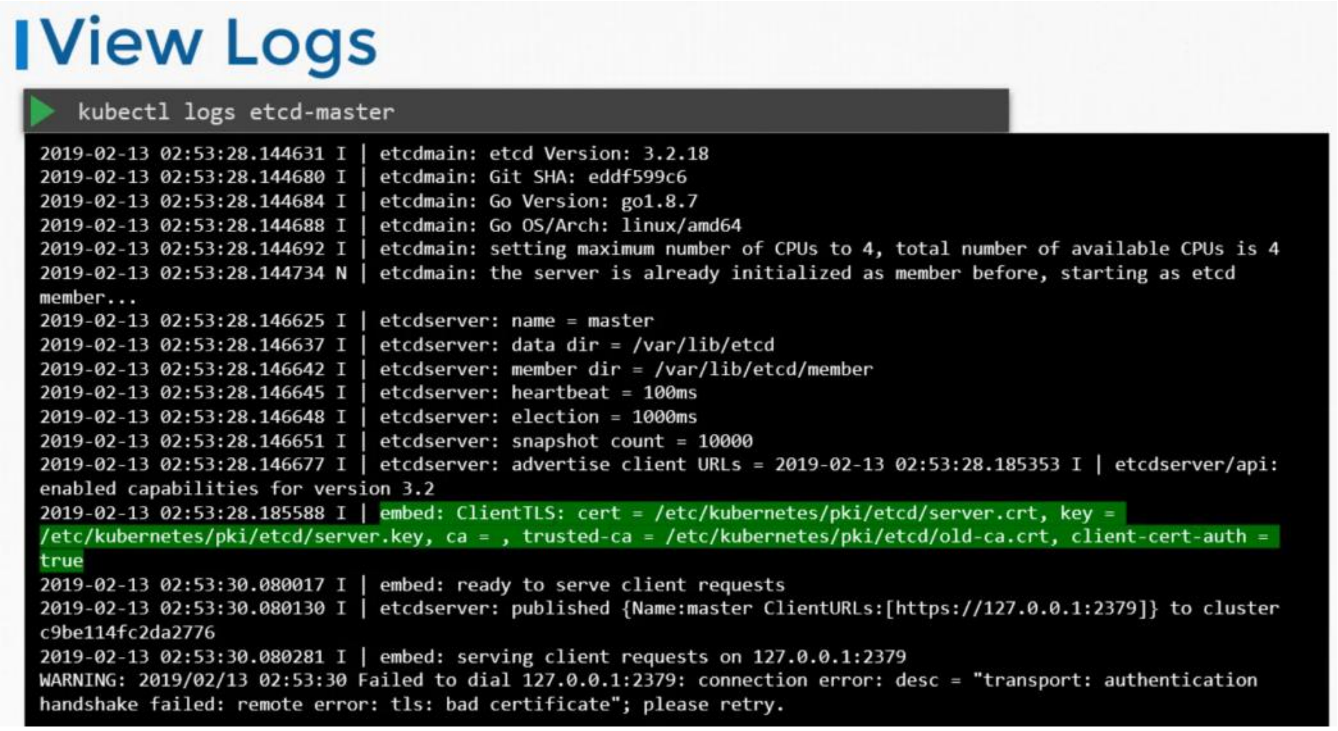
Certificate Path	CN Name	ALT Names	Organization	Issuer	Expiration
/etc/kubernetes/pki/apiserver.crt	kube-apiserver	DNS:master DNS:kubernetes DNS:kubernetes.default DNS:kubernetes.default.svc IP Address:10.96.0.1 IP Address:172.17.0.27		kubernetes	Feb 11 05:39:20 2020
/etc/kubernetes/pki/apiserver.key					
/etc/kubernetes/pki/ca.crt	kubernetes			kubernetes	Feb 8 05:39:19 2029
/etc/kubernetes/pki/apiserver-kubelet-client.crt /etc/kubernetes/pki/apiserver-kubelet-client.key	kube-apiserver-kubelet-client		system:masters	kubernetes	Feb 11 05:39:20 2020
/etc/kubernetes/pki/apiserver-etcd-client.crt	kube-apiserver-etcd-client		system:masters	self	Feb 11 05:39:22 2020
/etc/kubernetes/pki/apiserver-etcd-client.key					
/etc/kubernetes/pki/etcd/ca.crt	kubernetes			kubernetes	Feb 8 05:39:21 2017



Inspect Service Logs

```
journalctl -u etcd.service -l
```

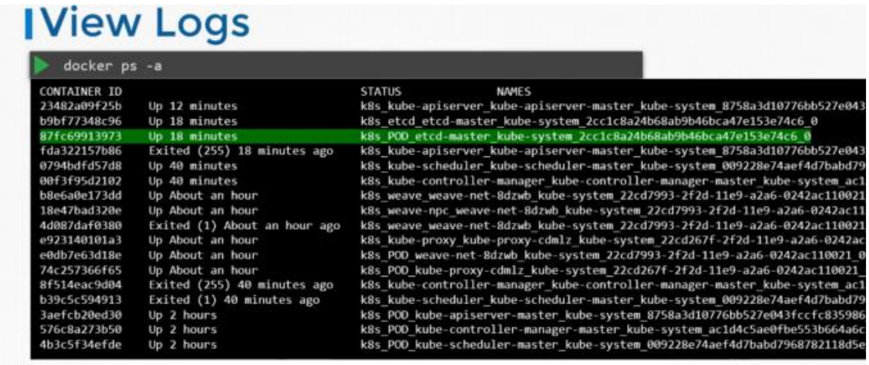
```
2019-02-13 02:53:28.144631 I | etcdmain: etcd Version: 3.2.18
2019-02-13 02:53:28.144680 I | etcdmain: Git SHA: eddf599c6
2019-02-13 02:53:28.144684 I | etcdmain: Go Version: go1.8.7
2019-02-13 02:53:28.144688 I | etcdmain: Go OS/Arch: linux/amd64
2019-02-13 02:53:28.144692 I | etcdmain: setting maximum number of CPUs to 4, total number of available CPUs is 4
2019-02-13 02:53:28.144734 N | etcdmain: the server is already initialized as member before, starting as etcd
member...
2019-02-13 02:53:28.146625 I | etcdserver: name = master
2019-02-13 02:53:28.146637 I | etcdserver: data dir = /var/lib/etcd
2019-02-13 02:53:28.146642 I | etcdserver: member dir = /var/lib/etcd/member
2019-02-13 02:53:28.146645 I | etcdserver: heartbeat = 100ms
2019-02-13 02:53:28.146648 I | etcdserver: election = 1000ms
2019-02-13 02:53:28.146651 I | etcdserver: snapshot count = 10000
2019-02-13 02:53:28.146677 I | etcdserver: advertise client URLs = 2019-02-13 02:53:28.185353 I | etcdserver/api:
enabled capabilities for version 3.2
2019-02-13 02:53:28.185588 I | embed: ClientTLS: cert = /etc/kubernetes/pki/etcd/server.crt, key =
/etc/kubernetes/pki/etcd/server.key, ca = , trusted-ca = /etc/kubernetes/pki/etcd/old-ca.crt, client-cert-auth =
true
2019-02-13 02:53:30.080017 I | embed: ready to serve client requests
2019-02-13 02:53:30.080130 I | etcdserver: published {Name:master ClientURLs:[https://127.0.0.1:2379]} to cluster
c9be114fc2da2776
2019-02-13 02:53:30.080281 I | embed: serving client requests on 127.0.0.1:2379
WARNING: 2019/02/13 02:53:30 Failed to dial 127.0.0.1:2379: connection error: desc = "transport: authentication
handshake failed: remote error: tls: bad certificate"; please retry.
```



View Logs

```
kubectl logs etcd-master
```

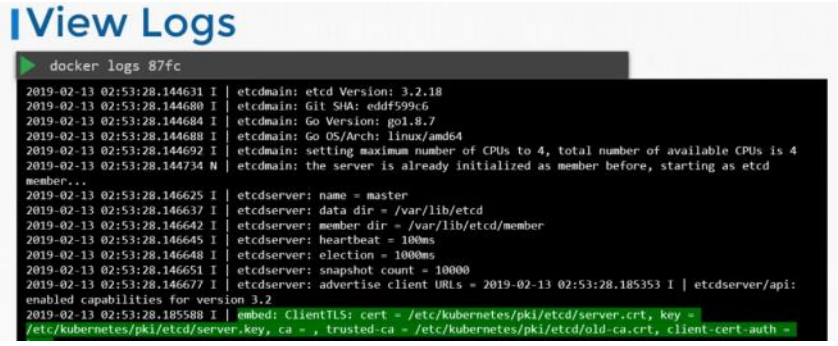
```
2019-02-13 02:53:28.144631 I | etcdmain: etcd Version: 3.2.18
2019-02-13 02:53:28.144680 I | etcdmain: Git SHA: eddf599c6
2019-02-13 02:53:28.144684 I | etcdmain: Go Version: go1.8.7
2019-02-13 02:53:28.144688 I | etcdmain: Go OS/Arch: linux/amd64
2019-02-13 02:53:28.144692 I | etcdmain: setting maximum number of CPUs to 4, total number of available CPUs is 4
2019-02-13 02:53:28.144734 N | etcdmain: the server is already initialized as member before, starting as etcd
member...
2019-02-13 02:53:28.146625 I | etcdserver: name = master
2019-02-13 02:53:28.146637 I | etcdserver: data dir = /var/lib/etcd
2019-02-13 02:53:28.146642 I | etcdserver: member dir = /var/lib/etcd/member
2019-02-13 02:53:28.146645 I | etcdserver: heartbeat = 100ms
2019-02-13 02:53:28.146648 I | etcdserver: election = 1000ms
2019-02-13 02:53:28.146651 I | etcdserver: snapshot count = 10000
2019-02-13 02:53:28.146677 I | etcdserver: advertise client URLs = 2019-02-13 02:53:28.185353 I | etcdserver/api:
enabled capabilities for version 3.2
2019-02-13 02:53:28.185588 I | embed: ClientTLS: cert = /etc/kubernetes/pki/etcd/server.crt, key =
/etc/kubernetes/pki/etcd/server.key, ca = , trusted-ca = /etc/kubernetes/pki/etcd/old-ca.crt, client-cert-auth =
true
2019-02-13 02:53:30.080017 I | embed: ready to serve client requests
2019-02-13 02:53:30.080130 I | etcdserver: published {Name:master ClientURLs:[https://127.0.0.1:2379]} to cluster
c9be114fc2da2776
2019-02-13 02:53:30.080281 I | embed: serving client requests on 127.0.0.1:2379
WARNING: 2019/02/13 02:53:30 Failed to dial 127.0.0.1:2379: connection error: desc = "transport: authentication
handshake failed: remote error: tls: bad certificate"; please retry.
```



View Logs

```
docker ps -a
```

```
CONTAINER ID                                STATUS              NAMES
23482a09f25b    Up 12 minutes               k8s_kube-apiserver_kube-apiserver-master_kube-system_8758a3d10776bb527e043
b9bf77348c96    Up 18 minutes               k8s_etcd_etcd-master_kube-system_2cc1c8a24b68ab9b46bca47e153e74c6_0
87fc69913973    Up 18 minutes               k8s_POD_etcd-master_kube-system_2cc1c8a24b68ab9b46bca47e153e74c6_0
fda322157b86    Exited (255) 18 minutes ago k8s_kube-apiserver_kube-apiserver-master_kube-system_8758a3d10776bb527e043
0794bdfd57d8    Up 40 minutes               k8s_kube-scheduler_kube-scheduler-master_kube-system_009228e74aef4d7babd79
00f3f95d2102    Up 40 minutes               k8s_kube-controller-manager_kube-controller-manager-master_kube-system_ac1
b8e6a0e173dd    Up About an hour            k8s_weave_weave-net-8dzwb_kube-system_22cd7993-2f2d-11e9-a2a6-0242ac110021
18e47bad320e    Up About an hour            k8s_weave-npc_weave-net-8dzwb_kube-system_22cd7993-2f2d-11e9-a2a6-0242ac11
4d087daf0380    Exited (1) About an hour ago k8s_weave_weave-net-8dzwb_kube-system_22cd7993-2f2d-11e9-a2a6-0242ac110021
e923140101a3    Up About an hour            k8s_kube-proxy_kube-proxy-cdmlz_kube-system_22cd267f-2f2d-11e9-a2a6-0242ac
e0db7e63d18e    Up About an hour            k8s_POD_weave-net-8dzwb_kube-system_22cd7993-2f2d-11e9-a2a6-0242ac110021_0
74c257366f65    Up About an hour            k8s_POD_kube-proxy-cdmlz_kube-system_22cd267f-2f2d-11e9-a2a6-0242ac110021_
8f514eac9d04    Exited (255) 40 minutes ago k8s_kube-controller-manager_kube-controller-manager-master_kube-system_ac1
b39c5c594913    Exited (1) 40 minutes ago   k8s_kube-scheduler_kube-scheduler-master_kube-system_009228e74aef4d7babd79
3aefcb20ed30    Up 2 hours                  k8s_POD_kube-apiserver-master_kube-system_8758a3d10776bb527e043fccfc835986
576c8a273b50    Up 2 hours                  k8s_POD_kube-controller-manager-master_kube-system_ac1d4c5ae0fbe553b664a6c
4b3c5f34efde    Up 2 hours                  k8s_POD_kube-scheduler-master_kube-system_009228e74aef4d7babd7968782118d5e
```



View Logs

```
docker logs 87fc
```

```
2019-02-13 02:53:28.144631 I | etcdmain: etcd Version: 3.2.18
2019-02-13 02:53:28.144680 I | etcdmain: Git SHA: eddf599c6
2019-02-13 02:53:28.144684 I | etcdmain: Go Version: go1.8.7
2019-02-13 02:53:28.144688 I | etcdmain: Go OS/Arch: linux/amd64
2019-02-13 02:53:28.144692 I | etcdmain: setting maximum number of CPUs to 4, total number of available CPUs is 4
2019-02-13 02:53:28.144734 N | etcdmain: the server is already initialized as member before, starting as etcd
member...
2019-02-13 02:53:28.146625 I | etcdserver: name = master
2019-02-13 02:53:28.146637 I | etcdserver: data dir = /var/lib/etcd
2019-02-13 02:53:28.146642 I | etcdserver: member dir = /var/lib/etcd/member
2019-02-13 02:53:28.146645 I | etcdserver: heartbeat = 100ms
2019-02-13 02:53:28.146648 I | etcdserver: election = 1000ms
2019-02-13 02:53:28.146651 I | etcdserver: snapshot count = 10000
2019-02-13 02:53:28.146677 I | etcdserver: advertise client URLs = 2019-02-13 02:53:28.185353 I | etcdserver/api:
enabled capabilities for version 3.2
2019-02-13 02:53:28.185588 I | embed: ClientTLS: cert = /etc/kubernetes/pki/etcd/server.crt, key =
/etc/kubernetes/pki/etcd/server.key, ca = , trusted-ca = /etc/kubernetes/pki/etcd/old-ca.crt, client-cert-auth =
```

https://github.com/mmumshad/kubernetes-the-hard-way/tree/master/tools