Release H: Cert-Manager

Introduction

cert-manager provides X.509 certificate management on Kubernetes.

Setup

Install

Install cert-manager on your cluster by following the instruction in the link below.

You can use following command: kubectl apply -f https://github.com/cert-manager/cert-manager/releases/download/v1.11.0/cert-manager.yaml

Once started you should see the following 3 pods running:

cert-manager

```
$ kubectl get pods -n cert-manager
NAME                                       READY   STATUS    RESTARTS   AGE
cert-manager-5b65cb968c-d2zbv              1/1     Running   0          5h46m
cert-manager-cainjector-56b88bcdf7-7gbj6   1/1     Running   0          5h46m
cert-manager-webhook-c784c79c7-6d57m       1/1     Running   0          5h46m
```

Create Issuer

Create a cluster-issuer and a certificate/secret for the self signed root CA

ClusterIssuer

```
apiVersion: cert-manager.io/v1
kind: ClusterIssuer
metadata:
  name: selfsigned-rootca-cluster-issuer
spec:
  selfSigned: {}
---
apiVersion: cert-manager.io/v1
kind: Certificate
metadata:
  name: selfsigned-rootca
  namespace: default
spec:
  isCA: true
  duration: 2160h # 90d
  renewBefore: 360h # 15d
  commonName: selfsigned-rootca
  subject:
    organizations:
      - oran
    organizationalUnits:
      - oran
    countries:
      - Ireland
    localities:
      - Dublin
    streetAddresses:
      - Main Street
  secretName: cm-cluster-issuer-rootca-secret
  privateKey:
    rotationPolicy: Always
    algorithm: RSA
    encoding: PKCS1
    size: 2048
  issuerRef:
    name: selfsigned-rootca-cluster-issuer
    kind: ClusterIssuer
    group: cert-manager.io
  dnsNames:
  - localhost
  - minikube
  ipAddresses:
    - 127.0.0.1
    - 192.168.49.2
  emailAddresses:
    - ca@mail.com
```

Create an issuer for the self signed root CA

Issuer

```
apiVersion: cert-manager.io/v1
kind: Issuer
metadata:
  name: cm-ca-issuer
  namespace: default
spec:
  ca:
    secretName: cm-cluster-issuer-rootca-secret
```

Create Certificate

Create a server key/certificate/keystore/truststore

server

```
apiVersion: v1
kind: Secret
metadata:
  name: cm-keycloak-jwk-pw
  namespace:  default
type: Opaque
data:
  password: Y2hhbmdlaXQ=
---
apiVersion: cert-manager.io/v1
kind: Certificate
metadata:
  name: keycloak-server-cert
  namespace: default
spec:
  secretName: cm-keycloak-server-certs
  duration: 2160h # 90d
  renewBefore: 360h # 15d
  subject:
    organizations:
      - oran
    organizationalUnits:
      - oran
    countries:
      - IE
    localities:
      - Dublin
    streetAddresses:
      - Main Street
  commonName: keycloak
  isCA: false
  keystores:
    jks:
      create: true
      passwordSecretRef:
        name: cm-keycloak-jwk-pw
        key: password
  privateKey:
    algorithm: RSA
    encoding: PKCS1
    size: 2048
  usages:
    - server auth
  dnsNames:
    - keycloak.default
    - keycloak
    - keycloak.est.tech
  emailAddresses:
    - server@mail.com
  issuerRef:
    name: cm-ca-issuer
    kind: Issuer
    group: cert-manager.io
```

This certificate creates a secret "cm-keycloak-server-certs" containing 5 data items: tls.key (private key), tls.crt (Corresponding certificate), ca.crt (CA certificate), keystore.jks (keystore) and truststore.jks (truststore)

The keystore and truststore can be used to start keycloak over https.

Create a client key/certificate

client

```
apiVersion: cert-manager.io/v1
kind: Certificate
metadata:
  name: keycloak-client-cert
  namespace: default
spec:
  secretName:
  duration: 2160h # 90d
  renewBefore: 360h # 15d
  subject:
    organizations:
      - oran
    organizationalUnits:
      - oran
    countries:
      - IE
    localities:
      - Dublin
    streetAddresses:
      - Main Street
  commonName: keycloak
  isCA: false
  privateKey:
    algorithm: RSA
    encoding: PKCS1
    size: 2048
  usages:
    - client auth
  dnsNames:
    - keycloak.default
    - keycloak
    - keycloak.est.tech
  emailAddresses:
    - client@mail.com
  issuerRef:
    name: cm-ca-issuer
    kind: Issuer
    group: cert-manager.io
```

This certificate creates a secret "cm-keycloak-client-certs" containing 3 data items: tls.key (private key), tls.crt (Corresponding certificate) and ca.crt (CA certificate)

These certs can be used to communicate with the keycloak server over https.

Note: email addresses appear in the subject's alternative name rather than the distinguished name

CA injector

cainjector is used to configure the CA certificates for Mutating Webhooks - see link below.

Kafka

You can use your own certificates and keys with Kafka by adding the following section in your configuration:

clusterCa

```
  clusterCa:
    generateCertificateAuthority: false
```

If this is set to false you need to setup your own cluster secrets containing the keys and certificates prior to starting the cluster.

Please refer to 8.3. Installing your own CA certificates

You can do the same for the client CA.

For the listeners you can also configure your own server certificates in the brokerCertChainAndKey section.

brokerCertChainAndKey

```
      - name: external
        port: 9098
        type: nodeport
        tls: true
        authentication:
          type: tls
        configuration:
          brokerCertChainAndKey:
            secretName: cm-kafka-server-certs
            certificate: tls.crt
            key: tls.key
          bootstrap:
            alternativeNames:
              - localhost
              - 192.168.49.2
              - my-cluster-kafka-external-bootstrap.kafka
              - my-cluster-kafka-external-bootstrap.kafka.svc
              - my-cluster-kafka-external-0.kafka
              - my-cluster-kafka-external-0.kafka.svc
```

Please refer to the brokerCertChainAndKey section in the Strimzi documentation for more information.

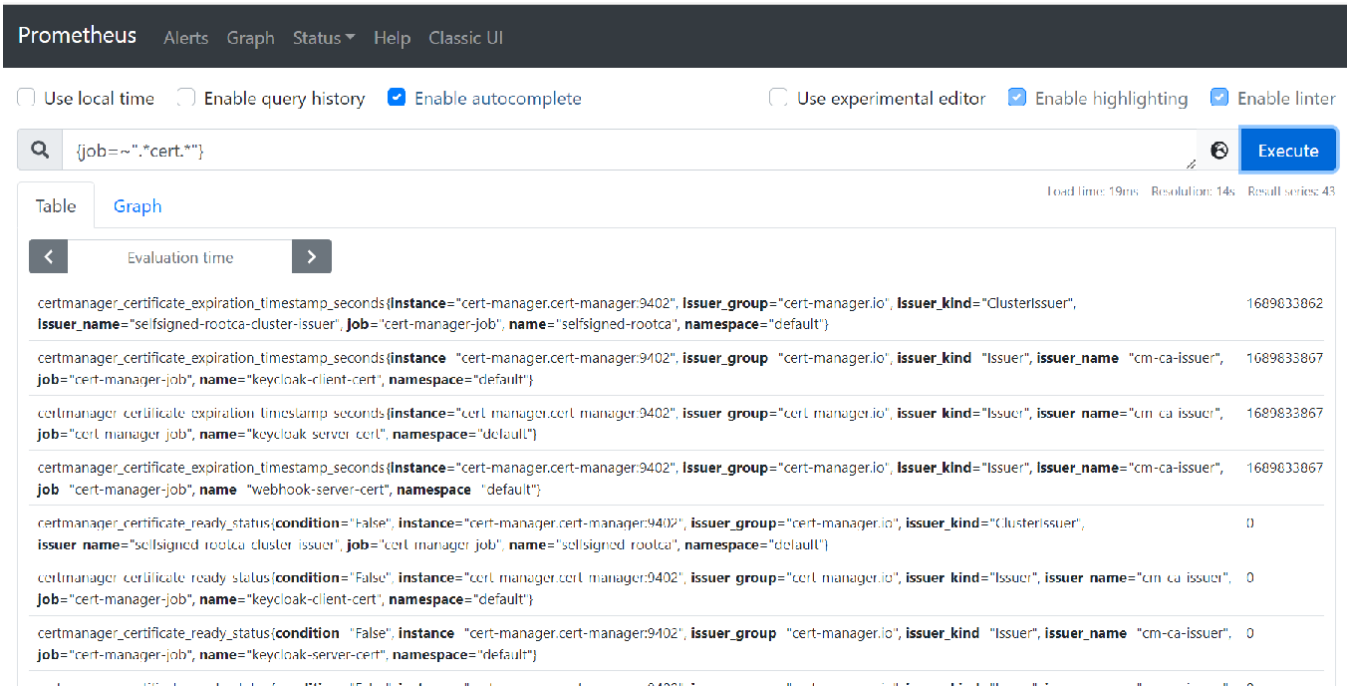
Prometheus & Grafana

cert-manager provides a metrics endpoint which can be scraped by Prometheus.

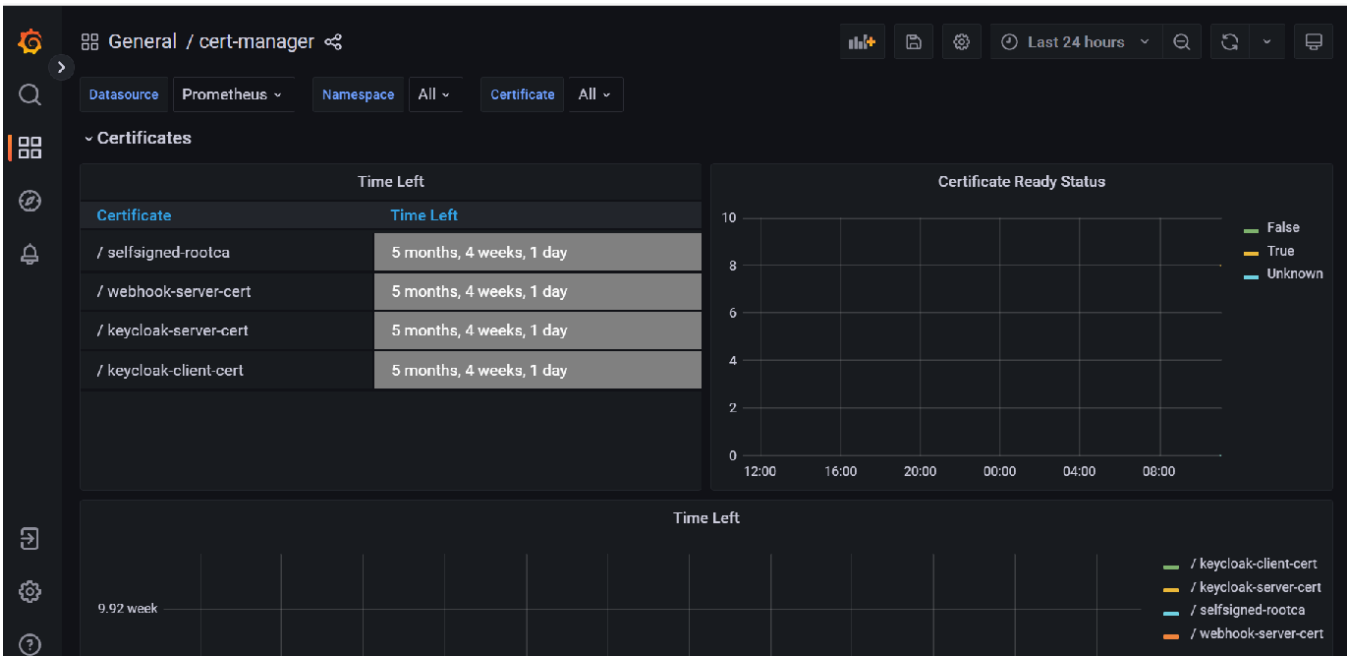
scrape config

```
    scrape_configs:
    - job_name: cert-manager-job
      metrics_path: /metrics
      scheme: http
      static_configs:
      - targets: ['cert-manager.cert-manager:9402']
```

Once the collection starts you can view these metrics in Prometheus.



Grafana also provides a dashboard for these metrics: cert-manager dashbord



Links

Installation

Issuer

SelfSigned

trust-manager

Github trust-manager

Certificate Resources