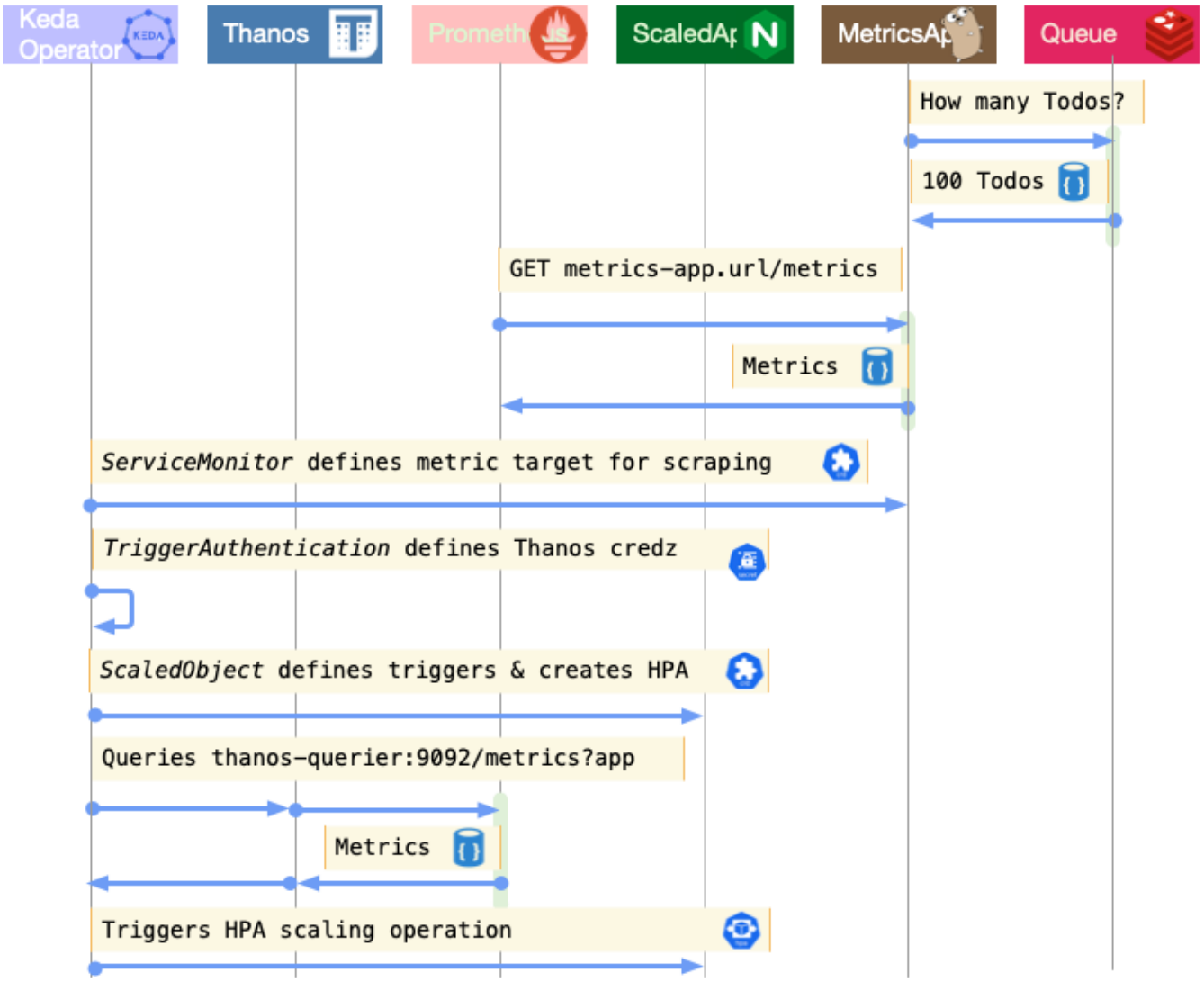
Demo Using Custom Prometheus Metrics for OpenShift Autoscaling with KEDA



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Outline of Steps

- Enable Prometheus user workload monitoring
- Install the Custom Metrics Autoscaler Operator and provision a KedaController
- Deploy an application with custom metrics target and an associated ServiceMonitor
- Create Thanos serviceaccount, token, role, rolebinding
- Configure authentication from Keda to Thanos
- Deploy sample application to autoscale based on above metrics
- Define deployment to be scaled and the metrics which trigger the scaling with ScaledObject

Docs and Refs

- https://cloud.redhat.com/blog/custom-metrics-autoscaler-on-openshift
- Knative versus KEDA
- Enabling user workload monitoring in OpenShift
- https://docs.openshift.com/container-platform/4.11/nodes/pods/nodes-pods-autoscaling-custom.html
- Autoscaling for RGW in ODF via HPA using KEDA
- https://docs.openshift.com/container-platform/4.11/monitoring/managing-metrics.html
- https://github.com/rhobs/prometheus-example-app
- https://keda.sh/docs/2.8/scalers/prometheus/
- Enabling TLS in ServiceMonitor
- https://github.com/marrober/pipelineBuildExample

Prerequisites

Enable User Workload Monitoring

- OpenShift user workload monitoring

```
oc extract configmap/cluster-monitoring-config \
   -n openshift-monitoring --to=-\
  | yq eval '.enableUserWorkload = true' - > config.yaml
oc set data configmap/cluster-monitoring-config \
  --from-file=config.yaml -n openshift-monitoring
```

Confirm User Workload Monitoring

Check that pods for prometheus-operator, prometheus-user-workload and thanos-ruler-user-workload are running in the openshift-user-workload-monitoring project.

Granting non-admin users permission to monitor user-defined projects (optional)

Roles

- `monitoring-rules-view` grants read access to PrometheusRule custom resources for a project.
- `monitoring-rules-edit` grants create, modify, and deleting PrometheusRule custom resources for a project.
- `monitoring-edit` grants `monitoring-rules-edit` plus create new scrape targets for services or pods. With this role, you can also create, modify, and delete ServiceMonitor and PodMonitor resources.

Grant `monitoring-edit` role.

Deploy Custom Metrics Autoscaler Operator

Deploys the OpenShift Custom Metric Autoscaler operator which is downstream from KEDA.sh.

```
oc apply -k operator
  namespace/openshift-keda created
  kedacontroller.keda.sh/keda created
  operatorgroup.operators.coreos.com/openshift-keda created
  subscription.operators.coreos.com/openshift-custom-metrics-autoscaler-operator
created
oc logs -f -n openshift-keda -l app=keda-operator
```

Deploy Custom Metric Producer

This application exists to expose a metrics endpoint that proffers custom metrics used for scaling a second application.

This metric may be tangentially related to the load oc the scaled app. For instance it may gather and report on a queue depth or work backlog. However, the current app referenced here does not.

```
oc apply -k custom-metric-app
  namespace/keda-test created
  service/prometheus-example-app created
  deployment.apps/prometheus-example-app created
  servicemonitor.monitoring.coreos.com/prometheus-example-monitor created
  route.route.openshift.io/prometheus-example-app created
```

View Example metrics

```
ROUTE=$(oc get route prometheus-example-app -o jsonpath='{.spec.host}')
curl $ROUTE/metrics
# HELP version Version information about this binary
# TYPE version gauge
version{version="v0.4.1"} 1
# create some traffic stats then retry above
curl $ROUTE
```

TODO

TIP	Create a new app with more pertinent metric example. Like returning the number of Todos from a work queue.

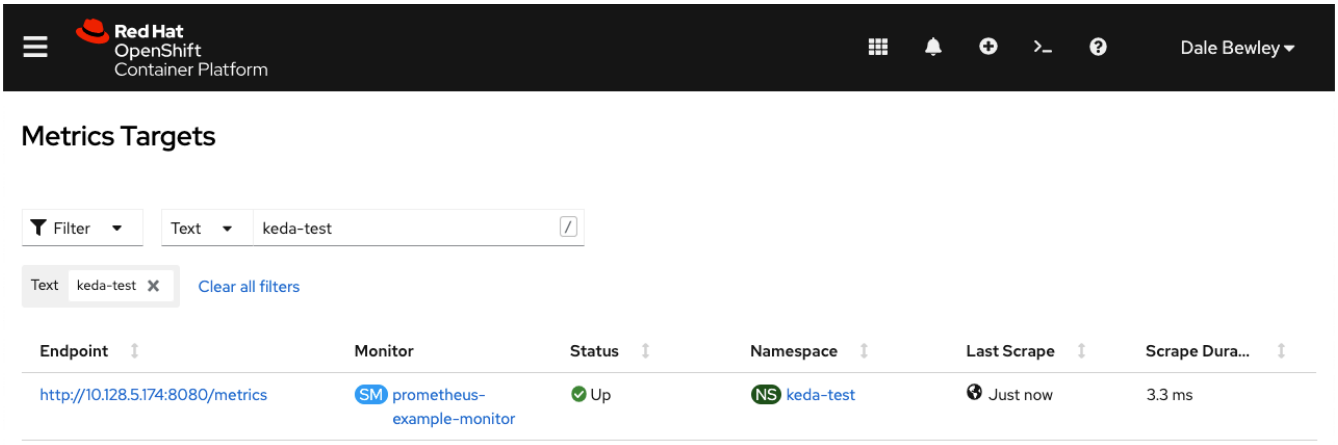
Deploy Scaled-App

This is a sample application that is scaled by virtue of custom metrics exported from custom metric app.

```
oc apply -k scaled-app
  namespace/keda-test unchanged
  serviceaccount/thanos created
  role.rbac.authorization.k8s.io/thanos-metrics-reader created
  rolebinding.rbac.authorization.k8s.io/thanos-metrics-reader created
  secret/thanos-token created
  service/static-app created
  deployment.apps/static-app created
  buildconfig.build.openshift.io/static-app created
  imagestream.image.openshift.io/static-app created
  scaledobject.keda.sh/static-app created
  triggerauthentication.keda.sh/keda-trigger-auth-prometheus created
  route.route.openshift.io/static-app created

oc get deployment,scaledobject,hpa -n keda-test

NAME                                     READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/prometheus-example-app   1/1     1            1           37m
deployment.apps/static-app               1/1     1            1           36m

NAME                                SCALETARGETKIND      SCALETARGETNAME   MIN   MAX
TRIGGERS     AUTHENTICATION                 READY   ACTIVE   FALLBACK   AGE
scaledobject.keda.sh/static-app   apps/v1.Deployment   static-app        1     10
prometheus   keda-trigger-auth-prometheus   True    False    False      36m

NAME                                                        REFERENCE
TARGETS     MINPODS   MAXPODS   REPLICAS   AGE
horizontalpodautoscaler.autoscaling/keda-hpa-static-app   Deployment/static-app   0/5
(avg)   1         10        1          36m
```

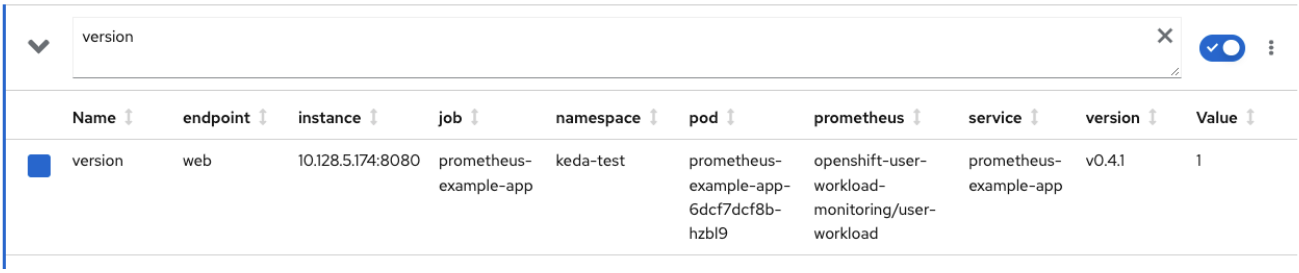
Managing metrics targets

As admin Observe → Targets → filter to 'keda-test' namespace.



Target http://<ip-address>:8080/metrics corresponds to endpoint of service 'prometheus-example-app'

Go to Observe → Metrics → promql query and search for "version" to see metric from custom metric app.



https://docs.openshift.com/container-platform/4.11/monitoring/managing-metrics-targets.html

Testing Autoscaling

Create a job that will generate traffic to the custom metric app. When the rate of traffic hits a 1 minute rolling average of 5 hits then the autoscaler will scale out the static-app deployment.

```
oc create -f load.yaml
# wait roughly a minute...
oc get pods
NAME                                  READY   STATUS      RESTARTS   AGE
generate-requests-55gsw-vw92t         0/1     Completed   0          66s
prometheus-example-app-6dcf7dcf8b-hzbl9   1/1     Running     0          6h58m
static-app-1-build                    0/1     Completed   0          7h38m
static-app-6944df7b7b-4zdnl           1/1     Running     0          12s
static-app-6944df7b7b-6lfpz           1/1     Running     0          12s
static-app-6944df7b7b-752qk           1/1     Running     0          26s
static-app-6944df7b7b-9pgrl           1/1     Running     0          26s
static-app-6944df7b7b-g2s6s           1/1     Running     0          26m
static-app-6944df7b7b-h2qjm           1/1     Running     0          27s
static-app-6944df7b7b-ldpl6           1/1     Running     0          26s
static-app-6944df7b7b-q7qpc           1/1     Running     0          12s
static-app-6944df7b7b-zdd5b           1/1     Running     0          12s
```

Metrics will now show a spike on the custom metric.