

1. Link github repo: <https://github.com/lam-phanminh/End-Project-2>
2. To run Jenkinsfile. I set up a node docker.

The screenshot shows the Jenkins 'Configure Clouds' page in a web browser. The page title is 'Configure Clouds (Jenkins) - Mozilla Firefox'. The browser address bar shows 'localhost:8080/manage/configureClouds/'. The page has a sidebar with 'Dashboard' and 'Manage Jenkins' links. The main content area is titled 'Configure Clouds' and contains a 'Docker' configuration card. The card has a 'Name' field with the value 'docker', a 'Docker Host URI' field with the value 'tcp://172.31.24.13:4243', and a 'Server credentials' section. Below the card are 'Save' and 'Apply' buttons. A second, larger screenshot below shows the 'Docker Agent templates' configuration. It has a 'Labels' field with the value 'java-docker-slave', an 'Enabled' checkbox that is checked, a 'Name' field with the value 'java-docker-slave', and a 'Docker Image' field with the value 'babinwilson/jenkins-slave:latest'. It also has 'Save' and 'Apply' buttons.

Configure Clouds

Back to Dashboard

Manage Nodes

Docker

Name ?

docker

Docker Cloud details...

Docker Agent templates...

Configure Clouds

Docker

Name ?

docker

Docker Host URI ?

tcp://172.31.24.13:4243

Server credentials

Save Apply

Dashboard > Manage Jenkins > Configure Clouds

List all images to be downloaded as agents

Docker Agent templates

Labels ?

java-docker-slave

☒ Enabled ?

Name ?

java-docker-slave

Docker Image ?

babinwilson/jenkins-slave:latest







Save Apply




3. Set up credentials:

localhost:8080/manage/credentials/store/system/domain/_

Dashboard > Manage Jenkins > Credentials > System > Global credentials (unrestricted)

Credentials that should be available irrespective of domain specification to requirements matching.

ID	Name	Kind	Description
 ssh-key-slave	root (ssh-key-slave)	SSH Username with private key	ssh-key-slave 
 docker-hub	docker-hub	Username with password	docker-hub 
 kubeconfig	kubeconfig (kubeconfig)	Kubernetes configuration (kubeconfig)	kubeconfig 

Icons:   



4. Create job multi branch:

Dashboard > Final-Project-2 >

Configuration

- General
- Branch Sources**
- Build Configuration
- Scan Repository Triggers
- Orphaned Item Strategy
- Appearance
- Health metrics
- Properties

Branch Sources

GitHub Credentials 
 - none -
 + Add
 ⚠ Credentials are recommended
 + Repository HTTPS URL
 Repository HTTPS URL 
 https://github.com/lam-phanminh/End-Project-2.git
 Validate
 Repository Scan - Deprecated Visualization


Save Apply

Dashboard > Final-Project-2 >

Configuration

- General
- Branch Sources
- Build Configuration**
- Scan Repository Triggers
- Orphaned Item Strategy
- Appearance
- Health metrics
- Properties

Build Configuration

Mode
 by Jenkinsfile
 Script Path 
 Jenkinsfile

Add source +



Dashboard > Final-Project-2 >

Configuration

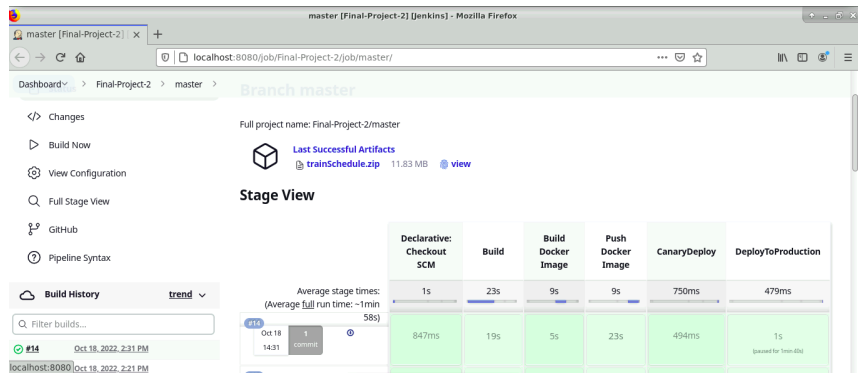
- General
- Branch Sources
- Build Configuration
- Scan Repository Triggers
- Orphaned Item Strategy
- Appearance
- Health metrics**
- Properties

Health metrics...

Properties

Docker Label 
 Docker registry URL 
 https://registry.hub.docker.com
 Registry credentials
 docker-hub
 + Add

Save Apply



5. Console output:

- Stage: Build

```
Dashboard > Final-Project-2 > master > #14

[Pipeline]
[Pipeline] stage
[Pipeline] { (Build)
[Pipeline] echo
Running build automation
[Pipeline] sh
+ ./gradlew build --no-daemon
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.codehaus.groovy.vmplugin.v7.Java7$1 (file:/var/lib/jenkins/.gradle/wrapper/dists/g
5.1-bin/djwv4j1srixindp1pceh59/gradle-5.1/lib/groovy-all-1.0-2.5.4.jar) to constructor
java.lang.invoke.MethodHandles$Lookup(java.lang.Class,int)
WARNING: Please consider reporting this to the maintainers of org.codehaus.groovy.vmplugin.v7.Java7$1
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
> Task :nodeSetup UP-TO-DATE
> Task :npmSetup UP-TO-DATE
> Task :npmInstall UP-TO-DATE

> Task :npm_test

> cld-pipeline-train-schedule-git@0.0.0 test /var/lib/jenkins/workspace/Final-Project-2_master
> mocha

Index Page
[6mGET / [32m200 [9m208.005 ms - 829[9m
```

- Stage: Build Docker Image

```
Dashboard > Final-Project-2 > master > #14

[Pipeline] sh
+ docker build -t phamminhlan/train-schedule-2 .
Sending build context to Docker daemon 433.2kB

Step 1/7 : FROM node:carbon
--> 8eeadf3757f4
Step 2/7 : WORKDIR /usr/src/app
--> Using cache
--> 9efa654aa62c
Step 3/7 : COPY package*.json ./
--> Using cache
--> 7ab69c3d52b9
Step 4/7 : RUN npm install
--> Using cache
--> 44908b481d57
Step 5/7 : COPY . .
--> cd31253728b6
Step 6/7 : EXPOSE 8080
--> Running in fc7f320310bf
Removing intermediate container fc7f320310bf
--> 757afdb279c1
Step 7/7 : CMD [ "npm", "start" ]
--> Running in 5c3af945a906
Removing intermediate container 5c3af945a906
--> 3f95369809ea
Successfully built 3f95369809ea
Successfully tagged phamminhlan/train-schedule-2:latest
```

- Stage: Push Docker Image

```
Dashboard > Final-Project-2 > master > #14
[Pipeline]
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Push Docker Image)
[Pipeline] script
[Pipeline] {
[Pipeline] withEnv
[Pipeline] {
[Pipeline] withDockerRegistry
$ docker login -u phamminhlan -p ***** https://registry.hub.docker.com
WARNING! Using --password via the CLI is insecure. Use --password-stdin.
WARNING! Your password will be stored unencrypted in /var/lib/jenkins/workspace/Final-Project-2_master/tmp/d63ef684-af71-462
bcd2-56407f791c33/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[Pipeline] {
[Pipeline] login
[Pipeline] withEnv
[Pipeline] {
[Pipeline] sh
+ docker tag phamminhlan/train-schedule-2 registry.hub.docker.com/phamminhlan/train-schedule-2:14
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] login
[Pipeline] withEnv
[Pipeline] {
[Pipeline] }

99eb8b3efaaf: Preparing
bee1e39d7c3a: Preparing
1f59a4b2c206: Preparing
0ca7f54856c0: Preparing
b2aaf85d6633: Waiting
88601a85cell: Waiting
42f9c2f9c08e: Waiting
99eb8b3efaaf: Waiting
bee1e39d7c3a: Waiting
1f59a4b2c206: Waiting
ebb9ae013834: Preparing
0ca7f54856c0: Waiting
ebb9ae013834: Waiting
00477e3e33b5: Layer already exists
76c70a8a0b34: Layer already exists
423451e044f2: Layer already exists
f331e01d02e: Layer already exists
524bb05143cc: Layer already exists
b2aaf85d6633: Layer already exists
88601a85cell: Layer already exists
99eb8b3efaaf: Layer already exists
42f9c2f9c08e: Layer already exists
bee1e39d7c3a: Layer already exists
ebb9ae013834: Layer already exists
1f59a4b2c206: Layer already exists
0ca7f54856c0: Layer already exists
latest: digest: sha256:01f57f655776d9ba39b8159802330c0b12404e3277c99c1ea14c85e03b215e39 size: 3053
```

• Stage: CanaryDeploy

```
Dashboard > Final-Project-2 > master > #14
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (CanaryDeploy)
[Pipeline] withEnv
[Pipeline] {
[Pipeline] kubernetesDeploy
Starting Kubernetes deployment
Loading configuration: /var/lib/jenkins/workspace/Final-Project-2_master/train-schedule-kube-canary.yml
Applied Service: Service(apiVersion=v1, kind=Service, metadata=ObjectMeta(annotations=null, clusterName=null,
creationTimestamp=2022-10-18T14:19:10Z, deletionGracePeriodSeconds=null, deletionTimestamp=null, finalizers=[], generateName
generation=null, initializers=null, labels=null, name=train-schedule-service-canary, namespace=default, ownerReferences=[]
resourceVersion=16074, selfLink=/api/v1/namespaces/default/services/train-schedule-service-canary, uid=69713a4d-3e2f-421f-
99f0-b37f8ae5846a, additionalProperties={managedFields=[(manager=khttp, operation=update, apiVersion=v1, time=2022-10-18T14
fieldsType=FieldsV1, fieldsV1={f:spec={f:externalTrafficPolicy={}, f:ports={.=(), k:{"port":8080,"protocol":"TCP"}=({.=(),
f:nodePort={}, f:port={}, f:protocol={}, f:targetPort={}}), f:selector={.=(), f:app={}, f:track={}}, f:sessionAffinity={}, f
{}))}}), spec=ServiceSpec(clusterIP=10.96.255.75, externalIPs=[], externalName=null, externalTrafficPolicy=Cluster,
healthCheckNodePort=null, loadBalancerIP=null, loadBalancerSourceRanges=[], ports=[ServicePort(name=null, nodePort=31355, po
protocol=TCP, targetPort=IntOrString[Intval=8080, Kind=null, StrVal=null, additionalProperties={}]), additionalProperties={}])
publishNotReadyAddresses=null, selector={app=train-schedule, track=canary}, sessionAffinity=None, sessionAffinityConfig=null
type=NodePort, additionalProperties={})), status=ServiceStatus(loadBalancer=LoadBalancerStatus(ingress=[]), additionalProperti
additionalProperties={})), additionalProperties={})
Applied Deployment: Deployment(apiVersion=apps/v1, kind=Deployment, metadata=ObjectMeta(annotations=null, clusterName=null,
creationTimestamp=2022-10-18T14:19:11Z, deletionGracePeriodSeconds=null, deletionTimestamp=null, finalizers=[], generateName
generation=7, initializers=null, labels={app=train-schedule}, name=train-schedule-deployment-canary, namespace=default,
ownerReferences=[], resourceVersion=18346, selfLink=/apis/apps/v1/namespaces/default/deployments/train-schedule-deployment-c
uid=4bae465-7db3-4ee2-afb2-b9bf0d1c32b, additionalProperties={managedFields=[(manager=khttp, operation=update,
apiVersion=apps/v1, time=2022-10-18T14:19:11Z, fieldsType=FieldsV1, fieldsV1={f:metadata={f:labels={.=(), f:app={}}, f:spec
```

```
Dashboard > Final-Project-2 > master > #14

schedule-deployment-canary-588fbc9c9" has successfully progressed., reason=NewReplicaSetAvailable, status=true, type=Progre
additionalProperties={}), observedGeneration=6, readyReplicas=2, replicas=2, unavailableReplicas=null, updatedReplicas=2,
additionalProperties={}), additionalProperties={})
Applied HorizontalPodAutoscaler: HorizontalPodAutoscaler(apiVersion=autoscaling/v1, kind=HorizontalPodAutoscaler,
metadata=ObjectMeta(annotations={autoscaling.alpha.kubernetes.io/conditions=
[{"type":"AbleToScale","status":"True","lastTransitionTime":"2022-10-18T14:19:26Z","reason":"ScaleDownStabilized","message":
recommendations were higher than current one, applying the highest recent recommendation"},
{"type":"ScalingActive","status":"True","lastTransitionTime":"2022-10-18T14:28:16Z","reason":"ValidMetricFound","message":"t
was able to successfully calculate a replica count from cpu resource utilization (percentage of request)"}],
{"type":"ScalingLimited","status":"True","lastTransitionTime":"2022-10-18T14:28:16Z","reason":"TooFewReplicas","message":"th
desired replica count is less than the minimum replica count"}], autoscaling.alpha.kubernetes.io/current-metrics=
[{"type":"Resource","resource":{"name":"cpu","currentAverageUtilization":0,"currentAverageValue":"1m"}]), clusterName=null,
creationTimestamp=2022-10-18T14:19:11Z, deletionGracePeriodSeconds=null, deletionTimestamp=null, finalizers=[], generateName
generation=null, initializers=null, labels=null, name=hpa-train-schedule-deployment-canary, namespace=default, ownerReferenc
resourceVersion=18354, selfLink=/apis/autoscaling/v1/namespaces/default/horizontalpodautoscalers/hpa-train-schedule-deploye
canary, uid=217ac18c-1d62-4383-895b-38578149f3ad, additionalProperties={managedFields=(manager=kube-controller-manager,
operation=Update, apiVersion=autoscaling/v1, time=2022-10-18T14:28:16Z, fieldsType=FieldsV1, fieldsV1={f:status={
f:currentCPUUtilizationPercentage=(), f:currentReplicas=(), f:desiredReplicas=(), f:lastScaleTime=()}}), (manager=okhttp,
operation=Update, apiVersion=autoscaling/v1, time=2022-10-18T14:32:05Z, fieldsType=FieldsV1, fieldsV1={f:metadata={f:annotat
(f:autoscaling.alpha.kubernetes.io/current-metrics=()}}), f:spec={f:maxReplicas=(), f:minReplicas=(), f:scaleTargetRef=
(f:apiVersion=(), f:kind=(), f:name=(), f:targetCPUUtilizationPercentage=()}})})), spec=HorizontalPodAutoscalerSpec(minRepl
minReplicas=2, scaleTargetRef=CrossVersionObjectReference(apiVersion=apps/v1, kind=Deployment, name=train-schedule-deployem
canary, additionalProperties={}), targetCPUUtilizationPercentage=5, additionalProperties={}),
status=HorizontalPodAutoscalerStatus(currentCPUUtilizationPercentage=0, currentReplicas=2, desiredReplicas=2,
lastScaleTime=2022-10-18T14:28:16Z, observedGeneration=null, additionalProperties={}), additionalProperties={})
Finished Kubernetes deployment
```

• Stage: DeployToProduction

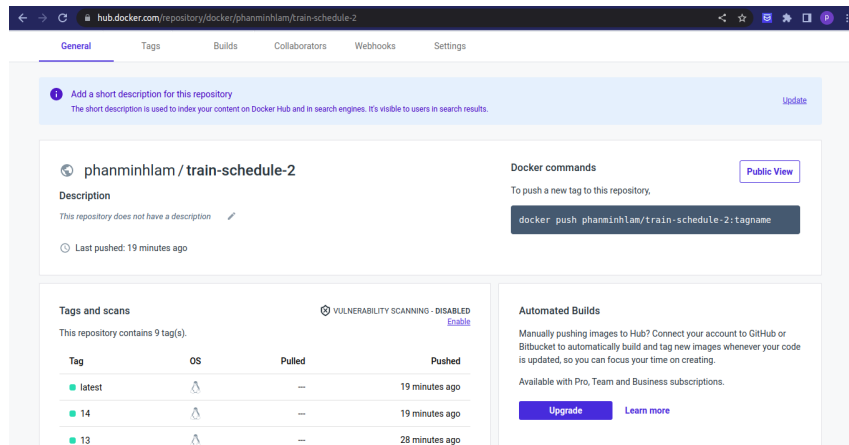
```
Dashboard > Final-Project-2 > master > #14

[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] {
[Pipeline] withEnv
[Pipeline] {
[Pipeline] input
Deploy to Production?
Proceed or Abort
Approved by admin
[Pipeline] milestone
Trying to pass milestone 1
[Pipeline] kuberneteshelm
Starting Kubernetes deployment
Loading configuration: /var/lib/jenkins/workspace/Final-Project-2-master/train-schedule-kube-canary.yml
Applied Service: Service(apiVersion=v1, kind=Service, metadata=ObjectMeta(annotations=null, clusterName=null,
creationTimestamp=2022-10-18T14:19:10Z, deletionGracePeriodSeconds=null, deletionTimestamp=null, finalizers=[], generateName
generation=null, initializers=null, labels=null, name=train-schedule-service-canary, namespace=default, ownerReferences=[]),
resourceVersion=18674, selfLink=/api/v1/namespaces/default/services/train-schedule-service-canary, uid=69713ad4-3a2f-421f-
99f9-037f8ae5846a, additionalProperties={managedFields=(manager=okhttp, operation=Update, apiVersion=v1, time=2022-10-18T14
fieldsType=FieldsV1, fieldsV1={f:spec={f:externalTrafficPolicy=(), f:ports=(=(), k:{'port':8080,'protocol':'TCP'}=(=(),
f:nodePort=(), f:port=(), f:protocol=(), f:targetPort=()}}), f:selector=(=(), f:app=(), f:track=(), f:sessionAffinity=(), f
()}})})), spec=ServiceSpec(clusterIP=10.96.255.75, externalIPs=[], externalName=null, externalTrafficPolicy=Cluster,
healthCheckNodePort=null, loadBalancerIP=null, loadBalancerSourceRanges=[], ports=[ServicePort(name=null, nodePort=31355, po
protocol=TCP, targetPort=IntOrString(IntVal=8080, Kind=null, StrVal=null, additionalProperties={}), additionalProperties={})
publishNotReadyAddresses=null, selector={app=train-schedule, track=canary}, sessionAffinity=None, sessionAffinityConfig=null
type=NodePort, additionalProperties={}), status=ServiceStatus(loadBalancer=LoadBalancerStatus(Ingress=[]), additionalPropert
AdditionalProperties={})

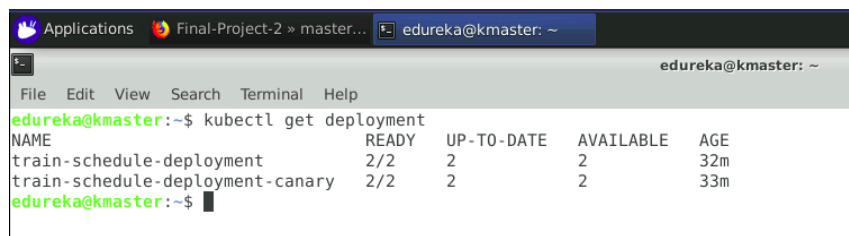
Dashboard > Final-Project-2 > master > #14

creationTimestamp=2022-10-18T14:20:12Z, deletionGracePeriodSeconds=null, deletionTimestamp=null, finalizers=[], generateName
generation=null, initializers=null, labels=null, name=hpa-train-schedule-kube, namespace=default, ownerReferences=[],
resourceVersion=18807, selfLink=/apis/autoscaling/v1/namespaces/default/horizontalpodautoscalers/hpa-train-schedule-kube,
uid=2c3a80f9-9335-475c-a184-1ae516c644e, additionalProperties={managedFields=(manager=kube-controller-manager, operation=U
apiVersion=autoscaling/v1, time=2022-10-18T14:28:16Z, fieldsType=FieldsV1, fieldsV1={f:status={f:currentCPUUtilizationPercen
time=2022-10-18T14:33:47Z, fieldsType=FieldsV1, fieldsV1={f:metadata={f:annotations={f:autoscaling.alpha.kubernetes.io/curre
metrics=()}}), f:spec={f:maxReplicas=(), f:minReplicas=(), f:scaleTargetRef={f:apiVersion=(), f:kind=(), f:name=(),
f:targetCPUUtilizationPercentage=()}})})), spec=HorizontalPodAutoscalerSpec(maxReplicas=5, minReplicas=2,
scaleTargetRef=CrossVersionObjectReference(apiVersion=apps/v1, kind=Deployment, name=train-schedule-deployment,
additionalProperties={}), targetCPUUtilizationPercentage=5, additionalProperties={}),
status=HorizontalPodAutoscalerStatus(currentCPUUtilizationPercentage=0, currentReplicas=2, desiredReplicas=2,
lastScaleTime=2022-10-18T14:28:16Z, observedGeneration=null, additionalProperties={}), additionalProperties={})
Finished Kubernetes deployment
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

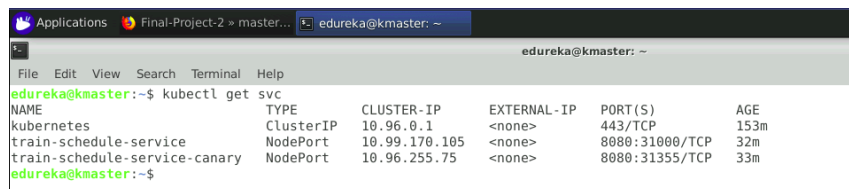
6. Images pushed to dockerhub:



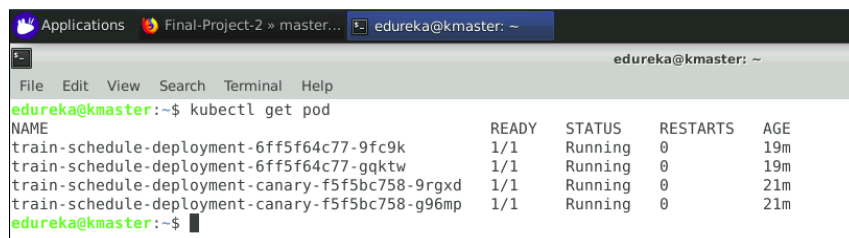
7. Deployments:



8. Services:



9. Pods:



10. Install metric-server: kubectl apply -f https://github.com/kubernetes-sigs/metrics-server/re

```
edureka@kmaster:~$ kubectl get deployment -n kube-system
NAME                READY    UP-TO-DATE    AVAILABLE    AGE
coredns              2/2      2              2            152m
metrics-server      1/1      1              1            26m
edureka@kmaster:~$
```

```
Applications Final-Project-2 » master... edureka@kmaster: ~
File Edit View Search Terminal Help
edureka@kmaster:~$ kubectl get pod -n kube-system
NAME                                READY    STATUS    RESTARTS    AGE
coredns-66bff467f8-9b99r            1/1      Running   2            151m
coredns-66bff467f8-nmv6h            1/1      Running   2            151m
etcd-kmaster                         1/1      Running   2            151m
kube-apiserver-kmaster               1/1      Running   2            151m
kube-controller-manager-kmaster      1/1      Running   2            151m
kube-proxy-jwpcx                     1/1      Running   4            150m
kube-proxy-kkr7k                     1/1      Running   2            151m
kube-scheduler-kmaster               1/1      Running   2            151m
metrics-server-847f49f9ff-6p6q9     1/1      Running   0            24m
edureka@kmaster:~$
```

11. kubectl top pod

```
Applications Final-Project-2 » master... edureka@kmaster: ~
File Edit View Search Terminal Help
edureka@kmaster:~$ kubectl top pod
NAME                                CPU(cores)    MEMORY(bytes)
train-schedule-deployment-6ff5f64c77-9fc9k    1m            58Mi
train-schedule-deployment-6ff5f64c77-gqktw     4m            58Mi
train-schedule-deployment-canary-f5f5bc758-9rgxd  2m            53Mi
train-schedule-deployment-canary-f5f5bc758-g96mp  1m            53Mi
edureka@kmaster:~$
```

12. Config HPA to deployments:

```
---
apiVersion: autoscaling/v1
kind: HorizontalPodAutoscaler
metadata:
  name: hpa-train-schedule-kube
spec:
  scaleTargetRef:
    apiVersion: apps/v1
    kind: Deployment
    name: train-schedule-deployment
  minReplicas: 2
  maxReplicas: 5
  targetCPUUtilizationPercentage: 5
```

```
---
apiVersion: autoscaling/v1
kind: HorizontalPodAutoscaler
metadata:
  name: hpa-train-schedule-deployment-canary
spec:
  scaleTargetRef:
    apiVersion: apps/v1
    kind: Deployment
    name: train-schedule-deployment-canary
  minReplicas: 2
  maxReplicas: 5
  targetCPUUtilizationPercentage: 5
```

13. `kubectl describe hpa hpa-train-schedule-deployment-canary`


```
edureka@kmaster:~$ kubectl get hpa
NAME                                REFERENCE                                TARGETS  MINPODS  MAXPODS  REPLICAS  AGE
hpa-train-schedule-deployment-canary  Deployment/train-schedule-deployment-canary  0%/5%    2         5         2          33m
hpa-train-schedule-kube               Deployment/train-schedule-deployment         0%/5%    2         5         2          34m
edureka@kmaster:~$ kubectl describe hpa hpa-train-schedule-deployment-canary
Name:                                hpa-train-schedule-deployment-canary
Namespace:                           default
Labels:                               <none>
Annotations:                          <none>
CreationTimestamp:                   Tue, 18 Oct 2022 14:19:11 +0000
Reference:                           Deployment/train-schedule-deployment-canary
Metrics:                              ( current / target )
  resource cpu on pods (as a percentage of request): 1% (2%) / 5%
Min replicas:                          2
Max replicas:                          5
Deployment pods:                       2 current / 2 desired
Conditions:
  Type            Status  Reason                        Message
  ----            -
  AbleToScale     True    ReadyForNewScale             recommended size matches current size
  ScalingActive   True    ValidMetricFound             the HPA was able to successfully calculate a replica count from cpu resource utilization (percentage of request)
  ScalingLimited  True    TooFewReplicas               the desired replica count is less than the minimum replica count
Events:
  Type            Reason      Age           From              Message
  ----            -
  Normal          SuccessfulRescale    33m            horizontal-pod-autoscaler    New size: 2; reason: Current number of replicas below Spec.MinReplicas
  Warning         FailedComputeMetricsReplicas  29m (x12 over 34m) horizontal-pod-autoscaler    Invalid metrics (1 invalid out of 1), first error is: failed to get cpu utilization: unable to get metrics for resource cpu: unable to fetch metrics from resource metrics API: the server could not find the requested resource (get pods.metrics.k8s.io)
  Warning         FailedGetResourceMetric  29m (x13 over 34m) horizontal-pod-autoscaler    unable to get metrics for resource cpu: unable to fetch metrics from resource metrics API: the server could not find the requested resource (get pods.metrics.k8s.io)
  Warning         FailedGetResourceMetric  22m            horizontal-pod-autoscaler    did not receive metrics for any ready pods
  Normal          SuccessfulRescale      15m            horizontal-pod-autoscaler    New size: 4; reason: All metrics below target
  Normal          SuccessfulRescale      14m (x2 over 26m) horizontal-pod-autoscaler    New size: 2; reason: All metrics below target
```

14. kubectl describe hpa kubectl describe hpa hpa-train-schedule-kube

```
edureka@kmaster:~$ kubectl describe hpa hpa-train-schedule-kube
Name:                                hpa-train-schedule-kube
Namespace:                           default
Labels:                               <none>
Annotations:                          <none>
CreationTimestamp:                   Tue, 18 Oct 2022 14:20:12 +0000
Reference:                           Deployment/train-schedule-deployment
Metrics:                              ( current / target )
  resource cpu on pods (as a percentage of request): 0% (1%) / 5%
Min replicas:                          2
Max replicas:                          5
Deployment pods:                       2 current / 2 desired
Conditions:
  Type            Status  Reason                        Message
  ----            -
  AbleToScale     True    ScaledDownStabilized         recent recommendations were higher than current one, applying the highest recent recommendation
  ScalingActive   True    ValidMetricFound             the HPA was able to successfully calculate a replica count from cpu resource utilization (percentage of request)
  ScalingLimited  True    TooFewReplicas               the desired replica count is less than the minimum replica count
Events:
  Type            Reason      Age           From              Message
  ----            -
  Warning         FailedComputeMetricsReplicas  32m (x12 over 34m) horizontal-pod-autoscaler    Invalid metrics (1 invalid out of 1), first error is: failed to get cpu utilization: unable to get metrics for resource cpu: unable to fetch metrics from resource metrics API: the server could not find the requested resource (get pods.metrics.k8s.io)
  Warning         FailedGetResourceMetric  29m (x21 over 34m) horizontal-pod-autoscaler    unable to get metrics for resource cpu: unable to fetch metrics from resource metrics API: the server could not find the requested resource (get pods.metrics.k8s.io)
  Warning         FailedGetResourceMetric  21m            horizontal-pod-autoscaler    did not receive metrics for any ready pods
  Normal          SuccessfulRescale      10m            horizontal-pod-autoscaler    New size: 4; reason: All metrics below target
  Normal          SuccessfulRescale      9m44s (x2 over 27m) horizontal-pod-autoscaler    New size: 2; reason: All metrics below target
```

15. kubectl get hpa

```
edureka@kmaster:~$ kubectl get hpa
NAME                                REFERENCE                                TARGETS  MINPODS  MAXPODS  REPLICAS  AGE
hpa-train-schedule-deployment-canary  Deployment/train-schedule-deployment-canary  1%/5%    2         5         2          34m
hpa-train-schedule-kube               Deployment/train-schedule-deployment         0%/5%    2         5         2          33m
edureka@kmaster:~$
```

16. Deploy Prometheus - Grafana by helm

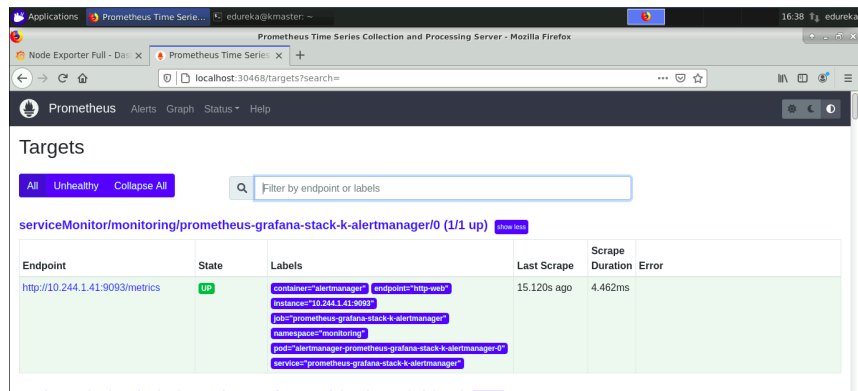
- Run commands:
 - kubectl create namespace monitoring
 - helm repo add prometheus-community <https://prometheus-community.github.io/helm-charts>
 - helm repo update
 - helm install prometheus-grafana-stack prometheus-community/kube-prometheus-stack --namespace monitoring

```

edureka@kmaster:~$ kubectl get deployment -n monitoring
NAME                                READY    UP-TO-DATE    AVAILABLE    AGE
prometheus-grafana-stack            1/1      1              1            54m
prometheus-grafana-stack-k-operator 1/1      1              1            54m
prometheus-grafana-stack-kube-state-metrics 1/1      1              1            54m
edureka@kmaster:~$ kubectl get svc -n monitoring
NAME                                TYPE                CLUSTER-IP    EXTERNAL-IP    PORT(S)                                AGE
alertmanager-operated               ClusterIP           None           <none>          9093/TCP,9094/TCP,9094/UDP            54m
prometheus-grafana-stack            NodePort            10.110.223.170 <none>          80:30947/TCP                          54m
prometheus-grafana-stack-k-alertmanager ClusterIP           10.110.142.41 <none>          9093/TCP                          54m
prometheus-grafana-stack-k-operator ClusterIP           10.97.161.191 <none>          443/TCP                          54m
prometheus-grafana-stack-k-prometheus NodePort            10.187.71.219 <none>          9090:30468/TCP                      54m
prometheus-grafana-stack-kube-state-metrics ClusterIP           10.188.199.54 <none>          8080/TCP                          54m
prometheus-grafana-stack-prometheus-node-exporter ClusterIP           10.98.100.169 <none>          9100/TCP                          54m
prometheus-operated                 ClusterIP           None           <none>          9090/TCP                          54m
edureka@kmaster:~$ kubectl get pod -n monitoring
NAME                                READY    STATUS    RESTARTS    AGE
alertmanager-prometheus-grafana-stack-k-alertmanager-0 2/2      Running   3            54m
prometheus-grafana-stack-84c774b8f7-z7kjj               3/3      Running   3            54m
prometheus-grafana-stack-k-operator-59f5dcd478-g6qm7     1/1      Running   1            54m
prometheus-grafana-stack-kube-state-metrics-68cc67cbc9-ttx4p 1/1      Running   1            54m
prometheus-grafana-stack-prometheus-node-exporter-8ms87 1/1      Running   1            54m
prometheus-grafana-stack-prometheus-node-exporter-nqcff 1/1      Running   1            54m
prometheus-prometheus-grafana-stack-k-prometheus-0      2/2      Running   2            54m
edureka@kmaster:~$

```

- NodePort Prometheus and Grafana.
- Access Prometheus:



- Access Grafana, login and import dashboard ID 1860

