

Project Rubric

Build and run a container image using Docker

ffrancisco

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Create Repository

ffrancisco / **udagram-api-feed**
Updated a few seconds ago

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ffrancisco / **udagram-reverse-proxy**
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ffrancisco / **udagram-ui**
Updated 8 hours ago

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ffrancisco / **udagram-api-users**
Updated a day ago

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Use Travis to build a CI/CD pipeline

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☆	flaviofrancisco udagram-api-users	DEFAULT BRANCH → master passed	LAST BUILD ✓ #10 passed	COMMIT 9881753 ↗	FINISHED 27 about a minute ago	≡
☆	flaviofrancisco udagram-api-feed	DEFAULT BRANCH → master passed	LAST BUILD ✓ #8 passed	COMMIT f727568 ↗	FINISHED 27 2 minutes ago	≡
☆	flaviofrancisco udagram-reverse-proxy	DEFAULT BRANCH → master passed	LAST BUILD ✓ #10 passed	COMMIT eefb8ac ↗	FINISHED 27 3 minutes ago	≡
☆	flaviofrancisco udagram-ui	DEFAULT BRANCH → master passed	LAST BUILD ✓ #9 passed	COMMIT 0aad06b ↗	FINISHED 27 8 hours ago	≡

Deploy microservices using a Kubernetes cluster on AWS

```
PS I:\> kubectl get all
```

NAME	READY	STATUS	RESTARTS	AGE
pod/udagram-api-feed-7fd9c66d66-rdc2m	1/1	Running	0	8h
pod/udagram-api-users-598588c9cd-nj48g	1/1	Running	0	8h
pod/udagram-reverse-proxy-979bcff8d-1lxjd	1/1	Running	0	8h
pod/udagram-ui-bc85dbc44-6sn22	1/1	Running	0	7h53m

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
service/kubernetes	ClusterIP	10.100.0.1	<none>	443/TCP	3d1h
service/udagram-api-feed	ClusterIP	10.100.108.1	<none>	8080/TCP	8h
service/udagram-api-users	ClusterIP	10.100.224.203	<none>	8080/TCP	8h
service/udagram-reverse-proxy	LoadBalancer	10.100.225.6	a93b2e8de285648bcb832562fee233f-211218333.eu-central-1.elb.amazonaws.com	8080:31356/TCP	8h
service/udagram-ui	LoadBalancer	10.100.239.246	a1089a60961374bc4cae2e332373f35-102837227.eu-central-1.elb.amazonaws.com	8100:30297/TCP	7h53m

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
deployment.apps/udagram-api-feed	1/1	1	1	8h
deployment.apps/udagram-api-users	1/1	1	1	8h
deployment.apps/udagram-reverse-proxy	1/1	1	1	8h
deployment.apps/udagram-ui	1/1	1	1	7h53m

NAME	DESIRED	CURRENT	READY	AGE
replicaset.apps/udagram-api-feed-7fd9c66d66	1	1	1	8h
replicaset.apps/udagram-api-users-598588c9cd	1	1	1	8h
replicaset.apps/udagram-reverse-proxy-979bcff8d	1	1	1	8h
replicaset.apps/udagram-ui-bc85dbc44	1	1	1	7h53m

NAME	REFERENCE	TARGETS	MINPODS	MAXPODS	REPLICAS	AGE
horizontalpodautoscaler.autoscaling/udagram-api-feed	Deployment/udagram-api-feed	0%/25%	1	3	1	7h26m
horizontalpodautoscaler.autoscaling/udagram-ui	Deployment/udagram-ui	0%/25%	1	3	1	7h26m

Get Pods

```
PS C:\> kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
udagram-api-feed-7fd9c66d66-rdc2m	1/1	Running	0	8h
udagram-api-users-598588c9cd-nj48g	1/1	Running	0	8h
udagram-reverse-proxy-979bcff8d-1lxjd	1/1	Running	0	8h
udagram-ui-bc85dbc44-6sn22	1/1	Running	0	7h54m

The output of kubectl describe services does not expose any sensitive strings such as database passwords.

Name: kubernetes
Namespace: default
Labels: component=apiserver
provider=kubernetes
Annotations: <none>
Selector: <none>
Type: ClusterIP
IP: 10.100.0.1
Port: https 443/TCP
TargetPort: 443/TCP
Endpoints: 172.31.15.56:443,172.31.44.147:443
Session Affinity: None
Events: <none>

Name: udagram-api-feed
Namespace: default
Labels: <none>
Annotations: kubectl.kubernetes.io/last-applied-configuration:

```
{"apiVersion":"v1","kind":"Service","metadata":{"annotations":{},"name":"udagram-api-feed","namespace":"default"},"spec":{"ports":[{"name"...
```

Selector: app=udagram-api-feed
Type: ClusterIP
IP: 10.100.108.1
Port: 8080 8080/TCP
TargetPort: 8080/TCP
Endpoints: 172.31.39.44:8080
Session Affinity: None
Events: <none>

Name: udagram-api-users
Namespace: default
Labels: <none>
Annotations: kubectl.kubernetes.io/last-applied-configuration:

```
{"apiVersion":"v1","kind":"Service","metadata":{"annotations":{},"name":"udagram-api-users","namespace":"default"},"spec":{"ports":[{"name"...
```

Selector: app=udagram-api-users
Type: ClusterIP
IP: 10.100.224.203
Port: 8080 8080/TCP
TargetPort: 8080/TCP
Endpoints: 172.31.41.140:8080
Session Affinity: None
Events: <none>

Name: udagram-reverse-proxy
Namespace: default
Labels: <none>
Annotations: kubectl.kubernetes.io/last-applied-configuration:

```
{"apiVersion":"v1","kind":"Service","metadata":{"annotations":{},"name":"udagram-reverse-proxy","namespace":"default"},"spec":{"ports":[{"name"...
```

Selector: app=udagram-reverse-proxy
Type: LoadBalancer
IP: 10.100.225.6
LoadBalancer Ingress: a93b2e8de285648bcbcb832562fee233f-211218333.eu-central-1.elb.amazonaws.com
Port: 8080 8080/TCP
TargetPort: 8080/TCP
NodePort: 8080 31356/TCP
Endpoints: 172.31.15.223:8080

Session Affinity: None
External Traffic Policy: Cluster
Events: <none>

Name: udagram-ui
Namespace: default
Labels: <none>
Annotations: kubectl.kubernetes.io/last-applied-configuration:

```
{"apiVersion":"v1","kind":"Service","metadata":{"annotations":{},"name":"udagram-ui","names  
pace":"default"},"spec":{"ports":[{"name":"8100...
```

Selector: app=udagram-ui
Type: LoadBalancer
IP: 10.100.239.246
LoadBalancer Ingress:
a1089a60961374bc4acae2e332373f35-102837227.eu-central-1.elb.amazonaws.com
Port: 8100 8100/TCP
TargetPort: 8100/TCP
NodePort: 8100 30297/TCP
Endpoints: 172.31.39.107:8100
Session Affinity: None
External Traffic Policy: Cluster
Events: <none>

Screenshot of Kubernetes services shows a reverse proxy

```
deployment > kubernetes > . reverseproxy service
1  apiVersion: v1
2  kind: Service
3  metadata:
4    name: udagram-reverse-proxy
5  spec:
6    type: LoadBalancer
7    selector:
8      app: udagram-reverse-proxy
9    ports:
10     - name: "8080"
11       port: 8080
12       targetPort: 8080
13
```

Configure scaling and self-healing for each service

```
deployment > kubernetes > ! udagram-api-feed.deployment.yaml > {} spec > # replicas
1  apiVersion: apps/v1
2  kind: Deployment
3  metadata:
4    labels:
5      app: udagram-api-feed
6      name: udagram-api-feed
7  spec:
8    replicas: 2
9    selector:
10     matchLabels:
11       app: udagram-api-feed
12   template:
13     metadata:
14       labels:
15         app: udagram-api-feed
16     spec:
17       containers:
18         - name: udagram-api-feed
19           image: ffrancisco/udagram-api-feed
20           envFrom:
21             - configMapRef:
22               name: app-settings
23           resources:
24             requests:
25               memory: "64Mi"
26               cpu: "250m"
27             limits:
28               memory: "1024Mi"
29               cpu: "500m"
30           ports:
31             - containerPort: 8080
32           volumeMounts:
33             - name: aws-secret
34               mountPath: /usr/src/app/secret/
35               readOnly: true
36       volumes:
37         - name: aws-secret
38           secret:
39             secretName: aws-secret-file
40
```

Screenshot of Kubernetes cluster of command kubectl describe hpa has autoscaling configured with CPU metrics.

```
PS I:\projects\aws\udacity\microservices\deployment\kubernetes> kubectl describe hpa
Name:                                udagram-api-feed
Namespace:                           default
Labels:                               <none>
Annotations:                           <none>
CreationTimestamp:                    Tue, 23 Jun 2020 11:01:07 +0200
Reference:                            Deployment/udagram-api-feed
Metrics:
  resource cpu on pods  (as a percentage of request): 0% (0) / 25%
Min replicas:                          1
Max replicas:                          3
Deployment pods:                        1 current / 1 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:           <none>

Name:                                udagram-ui
Namespace:                           default
Labels:                               <none>
Annotations:                           <none>
CreationTimestamp:                    Tue, 23 Jun 2020 11:01:34 +0200
Reference:                            Deployment/udagram-ui
Metrics:
  resource cpu on pods  (as a percentage of request): 0% (1m) / 25%
Min replicas:                          1
Max replicas:                          3
Deployment pods:                        1 current / 1 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:           <none>
```

Screenshot of one of the backend API pod logs indicates user activity that is logged when an API call is made.

The screenshot shows the Visual Studio Code interface with the Kubernetes extension. The left sidebar shows the 'KUBERNETES' section with a tree view of the cluster resources. The 'Pods' section is expanded, showing the pod 'udagram-api-feed-7d9c6d66-rc2m'. The main editor area displays the logs for this pod. The logs show a successful API call and the creation of a new record in the 'FeedItem' table.

```
Loading...Executing (default): CREATE TABLE IF NOT EXISTS "User" ("email" VARCHAR(255) , "passwordHash" VARCHAR(255), "createdAt" TIMESTAMPTZ WITH TIME ZONE, "updatedAt" TIMESTAMPTZ WITH TIME ZONE, "isActive" AS name, is.indisprimary AS primary, is.indisunique AS unique, is.index AS index, array_agg(a.attname) AS column_names, array_agg(a.attname) AS column_indexes, array_agg(a.attname) AS column_names, array_agg(a.attname) AS column_indexes, array_agg(a.attname) AS column_names, array_agg(a.attname) AS column_indexes) AS "User";
Executing (default): SELECT "email", "passwordHash", "createdAt", "updatedAt" FROM "User" AS "User" WHERE "User"."email" = 'francisco@udacity.com';
server running *
press CTRL+C to stop server
Executing (default): SELECT "email", "passwordHash", "createdAt", "updatedAt" FROM "User" AS "User" WHERE "User"."email" = 'francisco@udacity.com';
server running *
press CTRL+C to stop server
Executing (default): SELECT count(*) AS "count" FROM "FeedItem" AS "FeedItem";
Executing (default): SELECT "id", "caption", "url", "createdAt", "updatedAt" FROM "FeedItem" AS "FeedItem" ORDER BY "FeedItem"."id" DESC;
Executing (default): SELECT count(*) AS "count" FROM "FeedItem" AS "FeedItem";
Executing (default): SELECT "id", "caption", "url", "createdAt", "updatedAt" FROM "FeedItem" AS "FeedItem" ORDER BY "FeedItem"."id" DESC;
Executing (default): SELECT count(*) AS "count" FROM "FeedItem" AS "FeedItem";
Executing (default): SELECT "id", "caption", "url", "createdAt", "updatedAt" FROM "FeedItem" AS "FeedItem" ORDER BY "FeedItem"."id" DESC;
Executing (default): SELECT count(*) AS "count" FROM "FeedItem" AS "FeedItem";
Executing (default): SELECT "id", "caption", "url", "createdAt", "updatedAt" FROM "FeedItem" AS "FeedItem" ORDER BY "FeedItem"."id" DESC;
Executing (default): SELECT count(*) AS "count" FROM "FeedItem" AS "FeedItem";
Executing (default): SELECT "id", "caption", "url", "createdAt", "updatedAt" FROM "FeedItem" AS "FeedItem" ORDER BY "FeedItem"."id" DESC;
Executing (default): SELECT count(*) AS "count" FROM "FeedItem" AS "FeedItem";
Executing (default): SELECT "id", "caption", "url", "createdAt", "updatedAt" FROM "FeedItem" AS "FeedItem" ORDER BY "FeedItem"."id" DESC;
Executing (default): SELECT count(*) AS "count" FROM "FeedItem" AS "FeedItem";
Executing (default): SELECT "id", "caption", "url", "createdAt", "updatedAt" FROM "FeedItem" AS "FeedItem" ORDER BY "FeedItem"."id" DESC;
Executing (default): INSERT INTO "FeedItem" ("id","caption","url","createdAt","updatedAt") VALUES (DEFAULT,$1,$2,$3,$4) RETURNING *;
```