

In this lab, you create a Google Kubernetes Engine cluster containing several containers, each containing a web server. You place a load balancer in front of the cluster and view its contents.

In this lab, you learn how to perform the following tasks:

- Provision a [Kubernetes](#) cluster using [Kubernetes Engine](#).
 - Deploy and manage Docker containers using `kubectl`.
1. Scroll down in the list of enabled APIs, and confirm that both of these APIs are enabled:
 - Kubernetes Engine API
 - Container Registry API

If either API is missing, click **Enable APIs and Services** at the top.

`export MY_ZONE=us-central1-a`

Start a Kubernetes cluster managed by Kubernetes Engine. Name the cluster **webfrontend** and configure it to run 2 nodes:

`gcloud container clusters create webfrontend --zone $MY_ZONE --num-nodes 2`

```
student_02_557a736da51f@cloudshell:~$ gcloud container clusters create webfrontend --num-nodes=2 --zone=$MY_ZONE
ERROR: (gcloud.container.clusters.create) The required property [project] is not currently set.
It can be set on a per-command basis by re-running your command with the [--project] flag.

You may set it for your current workspace by running:


$ gcloud config set project VALUE

or it can be set temporarily by the environment variable [CLOUDSDK_CORE_PROJECT]
student_02_557a736da51f@cloudshell:~$ gcloud config set project qwiklabs-gcp-01-5aa3c608592f
Updated property [core/project].
student_02_557a736da51f@cloudshell:~ (quiklabs-gcp-01-5aa3c608592f) $ gcloud container clusters create webfrontend --num-nodes=2 --zone=$MY_ZONE
Default change: VPC-native is the default mode during cluster creation for versions greater than 1.21.0-gke.1500. To create advanced route
s based clusters, please pass the '--no-enable-ip-alias' flag
```

After the cluster is created, check your installed version of Kubernetes using the `kubectl version` command:

`kubectl version`

```
Updated property [core/project].
student_02_557a736da51f@cloudshell:~ (quiklabs-gcp-01-5aa3c608592f) $ kubectl version
WARNING: This version information is deprecated and will be replaced with the output from kubectl version --short. Use --output=yaml|json
to get the full version.
Client Version: version.Info{Major:"1", Minor:"26", GitVersion:"v1.26.1", GitCommit:"8f94681cd294aa8cfd3407b8191f6c70214973a4", GitTreeSta
te:"clean", BuildDate:"2023-01-18T15:58:16Z", GoVersion:"go1.19.5", Compiler:"gc", Platform:"linux/amd64"}
Kustomize Version: v4.5.7
Server Version: version.Info{Major:"1", Minor:"24", GitVersion:"v1.24.8-gke.2000", GitCommit:"63bd400145c58fe450325af1d249c3072fed68ef", G
itTreeState:"clean", BuildDate:"2022-12-07T09:33:04Z", GoVersion:"go1.18.8b7", Compiler:"gc", Platform:"linux/amd64"}
WARNING: version difference between client (1.26) and server (1.24) exceeds the supported minor version skew of +/-1
student_02_557a736da51f@cloudshell:~ (quiklabs-gcp-01-5aa3c608592f) $ █
```

View your running nodes in the GCP Console. On the **Navigation menu** () , click **Compute Engine > VM Instances**.

INSTANCES

OBSERVABILITY

NEW

INSTANCE SCHEDULES

VM instances

Filter

Enter property name or value

<input type="checkbox"/>	Status	Name ↑	Zone	Recommendations	In use by
<input type="checkbox"/>	✓	gke-webfrontend-default-pool-ad625f65-kdcj	us-central1-a		gke-web... ▼
<input type="checkbox"/>	✓	gke-webfrontend-default-pool-ad625f65-rhz0	us-central1-a		gke-web... ▼

Your Kubernetes cluster is now ready for use.

RUN AND DEPLOY CONTAINER

launch a single instance of the nginx container. (Nginx is a popular web server.)

`kubectl create deploy nginx --image=nginx:1.17.10`

```

student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ kubectl create deploy nginx --image=nginx:1.17.10
deployment.apps/nginx created
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ █

```

In Kubernetes, all containers run in pods. This use of the `kubectl create` command caused Kubernetes to create a deployment consisting of a single pod containing the nginx container.

A Kubernetes deployment keeps a given number of pods up and running even in the event of failures among the nodes on which they run. In this command, you launched the default number of pods, which is 1.

2. View the pod running the nginx container:

`kubectl get pods`

```

student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
nginx-5fc59799db-rzv4j4             1/1     Running   0           71s
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ █

```

Expose the nginx container to the Internet:

`kubectl expose deployment nginx --port 80 --type LoadBalancer`

```
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ kubectl expose deployment nginx --port 80 --type LoadBalancer
service/nginx exposed
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ █
```

Kubernetes created a service and an external load balancer with a public IP address attached to it. The IP address remains the same for the life of the service. Any network traffic to that public IP address is routed to pods behind the service: in this case, the nginx pod.

View the new service:

`kubectl get services`

```
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ kubectl get services
NAME          TYPE          CLUSTER-IP    EXTERNAL-IP    PORT(S)          AGE
kubernetes    ClusterIP     10.52.0.1     <none>         443/TCP          8m20s
nginx         LoadBalancer 10.52.7.232   34.123.108.172 80:30837/TCP     53s
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ █
```

You can use the displayed external IP address to test and contact the nginx container remotely. It may take a few seconds before the **External-IP** field is populated for your service. This is normal. Just re-run the `kubectl get services` command every few seconds until the field is populated.

2. Open a new web browser tab and paste your cluster's external IP address into the address bar. The default home page of the Nginx browser is displayed.

e | 34.123.108.172

PLATFORMS_CICD_... DAILY_URLS

Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.

3. Scale up the number of pods running on your service:

`kubectl scale deployment nginx --replicas 3`

```
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ kubectl scale deployment nginx --replicas 3
deployment.apps/nginx scaled
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ █
```

Scaling up a deployment is useful when you want to increase available resources for an application that is becoming more popular.

2. Confirm that Kubernetes has updated the number of pods:

`kubectl get pods`

```
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
nginx-5fc59799db-49mrs             1/1     Running   0           63s
nginx-5fc59799db-f5t6f             1/1     Running   0           63s
nginx-5fc59799db-rzv4              1/1     Running   0           4m52s
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$
```

2. Confirm that your external IP address has not changed:

`kubectl get services`

```
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$ kubectl get services
NAME      TYPE       CLUSTER-IP   EXTERNAL-IP   PORT(S)          AGE
kubernetes ClusterIP   10.52.0.1     <none>        443/TCP          11m
nginx     LoadBalancer 10.52.7.232   34.123.108.172 80:30837/TCP     3m39s
student_02_557a736da51f@cloudshell:~ (qwiklabs-gcp-01-5aa3c608592f)$
```

2. Return to the web browser tab in which you viewed your cluster's external IP address.

Refresh the page to confirm that the nginx web server is still responding.

In this lab, you configured a Kubernetes cluster in Kubernetes Engine. You populated the cluster with several pods containing an application, exposed the application, and scaled the application.