

LAPORAN PRAKTIKUM
TEKNOLOGI CLOUD
PERTEMUAN KE – 14



Disusun Oleh :

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Deploy, Scale, and Update Your Website on Google Kubernetes Engine

A. Tujuan

- Mahasiswa dapat membuat Google Kubernetes Engine cluster
- Mahasiswa dapat membuat docker image
- Mahasiswa dapat mendeploy docker image ke kubernetes
- Mahasiswa dapat scale an application on Kubernetes
- Mahasiswa dapat melakukan pembaruan bergulir di Kubernetes

B. Praktik

1. Create a GKE cluster

- Anda memerlukan cluster Kubernetes untuk men-deploy situs web Anda. Pertama, pastikan API yang tepat diaktifkan.

```
$ gcloud services enable container.googleapis.com
```

Sekarang anda sudah mempunyai akun.

- Jalankan perintah berikut untuk membuat cluster GKE bernama fancy-cluster dengan 3 node:

```
student_01_ac8aaeed1206@cloudshell:~ (qwiklabs-gcp-04-f6f58fa788b9)$ gcloud container clusters create fancy-cluster --num-nodes 3
ERROR: (gcloud.container.clusters.create) One of [--zone, --region] must be supplied: Please specify location,
```

Jika Anda mendapatkan kesalahan tentang region/zona yang tidak ditentukan, silakan lihat bagian pengaturan lingkungan untuk memastikan Anda menyetel zona komputasi default.

```
student_01_ac8aaeed1206@cloudshell:~ (qwiklabs-gcp-04-f6f58fa788b9)$ gcloud config set compute/zone us-central1-f
Updated property [compute/zone].
```

- Sekarang jalankan perintah berikut dan lihat tiga instance VM pekerja cluster:

```
student_01_ac8aaeed1206@cloudshell:~ (qwiklabs-gcp-04-f6f58fa788b9)$ gcloud compute instances list
NAME: gke-fancy-cluster-default-pool-28d01c95-1c3j
ZONE: us-central1-f
MACHINE TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.2
EXTERNAL_IP: 34.133.184.237
STATUS: RUNNING

NAME: gke-fancy-cluster-default-pool-28d01c95-vm89
ZONE: us-central1-f
MACHINE TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.3
EXTERNAL_IP: 35.184.39.162
STATUS: RUNNING

NAME: gke-fancy-cluster-default-pool-28d01c95-zszv
ZONE: us-central1-f
MACHINE TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.4
EXTERNAL_IP: 35.225.18.29
STATUS: RUNNING
```

- Temukan cluster Kubernetes Anda dan informasi terkait di Google Cloud Console. Klik menu **Navigasi**, lalu gulir ke bawah ke **Kubernetes Engine** dan klik **Cluster**.



Anda baru saja membuat cluster Kubernetes pertama Anda!

2. Clone source repository

- Jalankan perintah berikut untuk mengkloning git repo ke instance Cloud Shell Anda:

```
student_01_ac8aaed1206@cloudshell:~ (qwiklabs-gcp-04-f6f58fa788b9) $ cd ~
student_01_ac8aaed1206@cloudshell:~ (qwiklabs-gcp-04-f6f58fa788b9) $ git clone https://github.com/googlecloudk8s/monolith-to-microservices.git
Cloning into 'monolith-to-microservices'...
remote: Enumerating objects: 992, done.
remote: Counting objects: 100% (56/56), done.
remote: Compressing objects: 100% (56/56), done.
remote: Total 992 (delta 42), reused 0 (delta 0), pack-reused 936
Receiving objects: 100% (992/992), 2.82 MiB | 5.95 MiB/s, done.
Resolving deltas: 100% (443/443), done.
```

- Ubah ke direktori yang sesuai. Anda juga akan menginstal dependensi NodeJS sehingga Anda dapat menguji aplikasi Anda sebelum menerapkan:

```
student_01_ac8aaed1206@cloudshell:~ (qwiklabs-gcp-04-f6f58fa788b9) $ cd ~/monolith-to-microservices
student_01_ac8aaed1206@cloudshell:~/monolith-to-microservices (qwiklabs-gcp-04-f6f58fa788b9) $ ./setup.sh
Checking for required npm version...Completed.
Installing monolith dependencies...Completed.
Installing microservices dependencies...Completed.
Installing React app dependencies...Completed.
Building React app and placing into sub projects...Completed.

Script completed successfully!
```

Tunggu beberapa menit hingga script selesai running

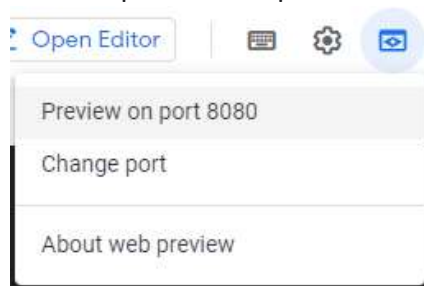
- Ubah ke direktori yang sesuai dan uji aplikasi dengan menjalankan perintah berikut untuk memulai server web:

```
student_01_ac8aaed1206@cloudshell:~/monolith-to-microservices (qwiklabs-gcp-04-f6f58fa788b9) $ cd ~/monolith-to-microservices/monolith
student_01_ac8aaed1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f58fa788b9) $ npm start

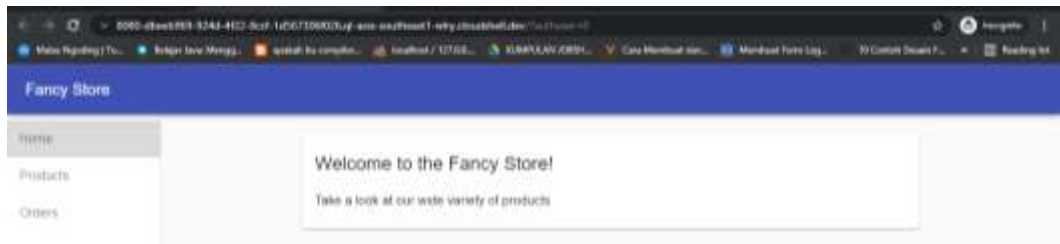
> monolith@1.0.0 start
> node ./src/server.js

Monolith listening on port 8080!
```

- Kamu dapat melihat preview website dengan mengklik **Preview on port 8080**:



- Ini akan membuka jendela baru di mana Anda dapat melihat Toko Mewah kami beraksi!



3. Create Docker container with Cloud Build

- Pertama, untuk memastikan Anda mengaktifkan Cloud Build API, jalankan perintah berikut:

```
student_01@csaas0126@cloudshell:~/monolith-to-microservices/monolith (gwiklabs-gcp-04-f6f58fa788b9) $ gcloud services enable cloudbuild.googleapis.com
student_01@csaas0126@cloudshell:~/monolith-to-microservices/monolith (gwiklabs-gcp-04-f6f58fa788b9) $ cd ~/monolith-to-microservices/monolith
student_01@csaas0126@cloudshell:~/monolith-to-microservices/monolith (gwiklabs-gcp-04-f6f58fa788b9) $ gcloud builds submit --tag gcr.io/${GOOGLE_CLOUD_PROJECT}/monolith:1.0.0
```

Output :

```
ID: 3f8e411d-b441-42e8-a2ef-c2fab7ee4c4d
CREATE TIME: 2021-12-27T10:06:53+00:00
DURATION: 42s
SOURCE: gs://gwiklabs-gcp-04-f6f58fa788b9/cloudbuild/source/1640599729.787057-75dcf7f24ef3b64ef19c163497257dedb1.tgz
IMAGES: gcr.io/gwiklabs-gcp-04-f6f58fa788b9/monolith:1.0.0
STATUS: SUCCESS
```

- Untuk melihat riwayat build Anda atau melihat prosesnya secara real time dengan mengeklik menu Navigasi dan menggulir ke bawah ke bagian Alat, lalu klik Cloud Build > History. Di sini Anda dapat melihat daftar semua bangunan Anda sebelumnya.



4. Deploy container to GKE

- Jalankan perintah berikut untuk menerapkan aplikasi Anda:

```
student_01@csaas0126@cloudshell:~/monolith-to-microservices/monolith (gwiklabs-gcp-04-f6f58fa788b9) $ kubectl create deployment monolith --image=gcr.io/${GOOGLE_CLOUD_PROJECT}/monolith:1.0.0
deployment.apps/monolith created
```

5. Verify Deployment

- Pastikan Deployment berhasil dibuat:

```
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl get all
NAME                READY   STATUS    RESTARTS   AGE
pod/monolith-fc9c44748-6p4w4  1/1     Running   0           107s

NAME                TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
service/kubernetes  ClusterIP     10.20.0.1    <none>         443/TCP     31m

NAME                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/monolith  1/1     1             1           108s

NAME                DESIRED   CURRENT   READY   AGE
replicaset.apps/monolith-fc9c44748  1         1         1       108s
```

- Anda juga dapat menjalankan perintah ke penerapan Anda secara terpisah:

```
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ # Show pods
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl get pods
NAME                READY   STATUS    RESTARTS   AGE
monolith-fc9c44748-6p4w4  1/1     Running   0           3m

student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ # Show deployments
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl get deployments
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
monolith            1/1     1             1           3m2s

student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ # Show replica sets
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl get rs
NAME                DESIRED   CURRENT   READY   AGE
monolith-fc9c44748  1         1         1       3m2s

student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ #You can also combine them
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl get pods,deployments
NAME                READY   STATUS    RESTARTS   AGE
pod/monolith-fc9c44748-6p4w4  1/1     Running   0           3m7s

NAME                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/monolith  1/1     1             1           3m7s
```

- Salin nama pod dari perintah sebelumnya, lalu gunakan saat Anda menjalankan perintah berikut untuk menghapusnya:

```
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl delete pod/monolith-fc9c44748-6p4w4
pod "monolith-fc9c44748-6p4w4" deleted
```

- Jika Anda cukup cepat, Anda dapat menjalankan get all lagi, dan Anda akan melihat dua pod: satu berhenti dan yang lainnya membuat atau menjalankan:

```
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl get all
NAME                READY   STATUS    RESTARTS   AGE
pod/monolith-fc9c44748-cq729  1/1     Running   0           64s

NAME                TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
service/kubernetes  ClusterIP     10.20.0.1    <none>         443/TCP     33m

NAME                READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/monolith  1/1     1             1           5m21s

NAME                DESIRED   CURRENT   READY   AGE
replicaset.apps/monolith-fc9c44748  1         1         1       5m21s
```

6. Expose GKE Deployment

- Jalankan perintah berikut untuk mengekspos situs web Anda ke Internet:

```
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl expose deployment monolith --type=LoadBalancer --port 80 --target-port 8080
service/monolith exposed
```

7. Accessing the service

- GKE menetapkan alamat IP eksternal ke resource Layanan, bukan Deployment.

Jika Anda ingin mengetahui IP eksternal yang disediakan GKE untuk aplikasi Anda, Anda dapat memeriksa Service dengan perintah kubectl get service:

```
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $ kubectl get service
NAME                TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)    AGE
kubernetes          ClusterIP     10.20.0.1    <none>         443/TCP     37m
monolith            LoadBalancer 10.20.12.184 34.70.177.107 80:81747/TCP 55s
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f38fa780b9) $
```

8. Scale GKE deployment

- Di Cloud Shell, jalankan perintah berikut untuk menskalakan penerapan Anda hingga 3 replika:

```
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f58fa788b9) $ kubectl scale deployment monolith --replicas=3
deployment.apps/monolith scaled
```

- Pastikan Deployment berhasil diskalakan:

```
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f58fa788b9) $ kubectl get all
NAME                 READY   STATUS    RESTARTS   AGE
pod/monolith-fc9c44748-cq729   1/1     Running   0           4m59s
pod/monolith-fc9c44748-g1rx6   1/1     Running   0           17s
pod/monolith-fc9c44748-vjwtn   0/1     ContainerCreating   0           17s

NAME                 TYPE          CLUSTER-IP   EXTERNAL-IP   PORT(S)          AGE
service/kubernetes   ClusterIP     10.20.0.1    <none>         443/TCP          39m
service/monolith     LoadBalancer 10.20.12.184 34.70.177.107 80:31747/TCP     2m15s

NAME                 READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/monolith  2/3     3             2           5m17s

NAME                 DESIRED   CURRENT   READY   AGE
replicaset.apps/monolith-fc9c44748  3         3         2       5m17s
```

9. Make changes to the website

- Jalankan perintah berikut salin file yang diperbarui ke nama file yang benar:

```
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f58fa788b9) $ cd ~/monolith-to-microservices/react-app/src/pages/Home
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/react-app/src/pages/Home (qwiklabs-gcp-04-f6f58fa788b9) $ mv index.js.new index.js
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/react-app/src/pages/Home (qwiklabs-gcp-04-f6f58fa788b9) $ cat ~/monolith-to-microservices/react-app/src/pages
```

- Jalankan perintah berikut untuk membangun aplikasi React dan salin ke direktori publik monolit:

```
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/react-app/src/pages/Home (qwiklabs-gcp-04-f6f58fa788b9) $ cd ~/monolith-to-microservices/react-app
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/react-app (qwiklabs-gcp-04-f6f58fa788b9) $ npm run build:monolith
```

- Jalankan perintah berikut untuk memicu pembangunan cloud baru dengan versi gambar yang diperbarui 2.0.0:

```
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/react-app (qwiklabs-gcp-04-f6f58fa788b9) $ cd ~/monolith-to-microservices/monolith
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f58fa788b9) $ gcloud builds submit --tag gcr.io/$(GOOGLE_CLOUD_PROJECT)/monolith:2.0.0 .
```

10. Update website with zero downtime

- Beri tahu Kubernetes bahwa Anda ingin memperbarui image untuk penerapan Anda ke versi baru dengan perintah berikut:

```
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f58fa788b9) $ kubectl set image deployment/monolith monolith=gcr.io/$(GOOGLE_CLOUD_PROJECT)/monolith:2.0.0
deployment.apps/monolith image updated
```

- Anda dapat memvalidasi pembaruan penerapan dengan menjalankan perintah berikut:

```
student_01_ac9aeeed1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f58fa788b9) $ kubectl get pods
NAME                 READY   STATUS    RESTARTS   AGE
monolith-689bf677df-fr8ag   1/1     Running   0           3s
monolith-689bf677df-fanh7   1/1     Running   0           6s
monolith-689bf677df-awdqi   1/1     Running   0           8s
monolith-fc9c44748-cq729   1/1     Terminating   0           8m37s
monolith-fc9c44748-g1rx6   1/1     Terminating   0           3m55s
monolith-fc9c44748-vjwtn   1/1     Terminating   0           3m55s
```


11. Cleanup

- Delete git repository:

```
student_01_ac8aaced1206@cloudshell:~/monolith-to-microservices/monolith (qwiklabs-gcp-04-f6f50fa708b9) $ cd -
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ rm -rf monolith-to-microservices
```

- Hapus gambar Google Container Registry:

```
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ Delete the container image for version 1.0.0 of the monolith
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ gcloud container images delete gcr.io/[PROJECT]/monolith:1.0.0 --quiet
WARNING: Successfully resolved tag to sha256, but it is recommended to use sha256 directly.
Digest:
- gcr.io/qwiklabs-gcp-04-f6f50fa708b9/monolith@sha256:b6a492b4017e4212f5d63de8d81846a70895b088122a6d1c25122229a7e07
Associated tags:
- 1.0.0
Tags:
- gcr.io/qwiklabs-gcp-04-f6f50fa708b9/monolith:1.0.0
Deleted [gcr.io/qwiklabs-gcp-04-f6f50fa708b9/monolith:1.0.0].
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ Delete the container image for version 2.0.0 of the monolith
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ gcloud container images delete gcr.io/[PROJECT]/monolith:2.0.0 --quiet
WARNING: Successfully resolved tag to sha256, but it is recommended to use sha256 directly.
Digest:
- gcr.io/qwiklabs-gcp-04-f6f50fa708b9/monolith@sha256:c522d13bc63b70e0f03db127b0f0d9c320942b24120321f6cf0270c705de6a17
Associated tags:
- 2.0.0
Tags:
- gcr.io/qwiklabs-gcp-04-f6f50fa708b9/monolith:2.0.0
Deleted [gcr.io/qwiklabs-gcp-04-f6f50fa708b9/monolith:2.0.0].
Deleted [gcr.io/qwiklabs-gcp-04-f6f50fa708b9/monolith@sha256:c522d13bc63b70e0f03db127b0f0d9c320942b24120321f6cf0270c705de6a17].
```

- Hapus artefak Google Cloud Build dari Google Cloud Storage:

```
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ gcloud builds list --no-color --format=json | jq '.[] | select(.status == "SUCCESS") | {name: .name, logs: .logs}'
CommandExecution The rm command (without -f) expects at least one file.
CommandExecution The rm command (without -f) expects at least one file.
CommandExecution The rm command (without -f) expects at least one file.
CommandExecution The rm command (without -f) expects at least one file.
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CommandExecution The rm command (without -f) expects at least one file.
CommandExecution The rm command (without -f) expects at least one file.
CommandExecution The rm command (without -f) expects at least one file.
```

- Delete GKE Service and Delete GKE Cluster:

```
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ kubectl delete service monolith
service "monolith" deleted
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ kubectl delete deployment monolith
deployment.apps "monolith" deleted
student_01_ac8aaced1206@cloudshell:~ (qwiklabs-gcp-04-f6f50fa708b9) $ gcloud container clusters delete fancy-cluster
The following clusters will be deleted.
- [fancy-cluster] in [us-central1-f]

Do you want to continue (Y/n)? Y
Deleting cluster fancy-cluster...done.
```

C. Kesimpulan

Setelah melakukan praktik diatas, dapat disimpulkan bahwa mahasiswa dapat mendeploy docker image ke kubernetes, scale an application on Kubernetes dan dapat melakukan melakukan pembaruan bergulir di Kubernetes

