Networking and Cloud Computing - HW 8 - GKE steps and output

1. Open a project in GCE
2. Activate Google Cloud Shell
3. Run the following command
   pagare_pr@superb-heaven-155622:~$ gcloud auth list
   Credentialed Accounts:
   - pagare.pr@husky.neu.edu ACTIVE
4. Run following command
   pagare_pr@superb-heaven-155622:~$ gcloud config list project[core]project = superb-heaven-155622

   Your active configuration is: [cloudshell-8230]
5. Set the default zone and project configuration using
   $ gcloud config set compute/zone us-central1-f
6. Write the node.js application as server.js file using nano or vi editor and save
7. Run the node.js application using "node server.js" command
8. Use the web preview option of the google cloud shell to see output of node application
9. Stop the application and now package the application in Docker container
10. Create Dockerfile for creating docker image for the application as follows:

    FROM node:6.9.2
    EXPOSE 8080
    COPY server.js .
    CMD node server.js

11. Create a docker image using Dockerfile configuration
    pagare_pr@superb-heaven-155622:~$ docker build -t gcr.io/superb-heaven-155622/hello-node:v1 .
    Sending build context to Docker daemon 19.46 kB
    Step 1 : FROM node:6.9.26.9.2: Pulling from library/node75a822cd7888: Pull complete 57de64c72267: Pull complete 4306be1e8943: Pull complete 871436ab7225: Pull complete 0110c26a367a: Pull complete 1f04fe713f1b: Pull complete ac7c0b5fb553: Pull complete Digest: sha256:2e95be60faf429d6c97d928c762cb36f1940f4456ce4bd33fbdc34de94a5e043Status: Downloaded newer image for node:6.9.2 ---> faaadb4aaf9b
    Step 2 : EXPOSE 8080 ---> Running in e7c6981e9434 ---> db81a6c48555Removing intermediate container e7c6981e9434
    Step 3 : COPY server.js . ---> ac8af7ef086dRemoving intermediate container fe9c7ffee972
    Step 4 : CMD node server.js ---> Running in e83b0fcd5a5a ---> f5819b9db798Removing intermediate container e83b0fcd5a5aSuccessfully built f5819b9db798

12. Test the image locally using following command:
    pagare_pr@superb-heaven-155622:~$ docker run -d -p 8080:8080 gcr.io/superb-heaven-155622/hello-node:v1

    7b752526eece73369a1fb7370c28736e949882beb93a3408fe67a4e1d5dbca12
13. Open the web preview or use curl http//:localhost:8080 to test the output. You should see Hello world!
14. Stop the docker container as follows:
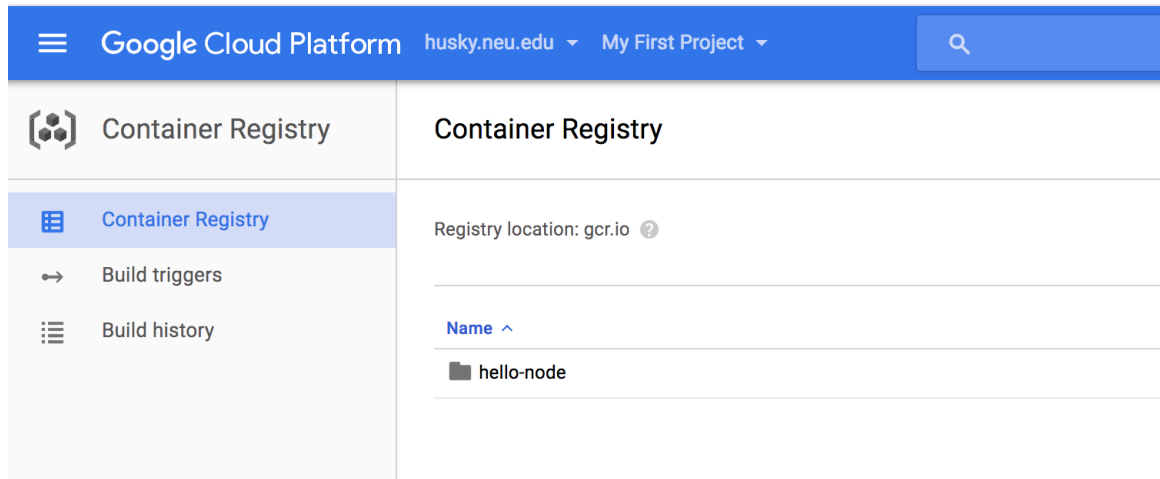   pagare_pr@superb-heaven-155622:~$ docker ps

    CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
    7b752526eece gcr.io/superb-heaven-155622/hello-node:v1 "/bin/sh -c 'node ser" 3 minutes ago Up 3 minutes 0.0.0.0:8080->8080/tcp adoring_swartz
    pagare_pr@superb-heaven-155622:~$ docker stop 7b752526eece
    7b752526eece
15. Push the project to the Google Container Registry, a private repository for Docker images accessible from Google Cloud projects as follows:
    pagare_pr@superb-heaven-155622:~$ gcloud docker -- push gcr.io/superb-heaven-155622/hello-node:v1

    The push refers to a repository [gcr.io/superb-heaven-155622/hello-node]
    99e9f0ef8821: Pushed
    381c97ba7dc3: Pushed
    604c78617f34: Pushed
    fa18e5ffd316: Pushed
    0a5e2b2ddeaa: Pushed
    53c779688d06: Pushed
    60a0858edcd5: Pushed
    b6ca02dfe5e6: Pushed
    v1: digest:
    sha256:cc7d9c1c37e37977644ed59032136bdb83ce2a16af6fb579ce0e50207f984c
    30 size: 2002

16. Go to your Tools > Container Registry on GCE and check of hello-node is added to the repository

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Container Registry

Container Registry

| Container Registry |
| Build triggers |
| Build history |

Registry location: gcr.io

Name ^

📁 hello-node

17. Create a cluster after the registry is ready to serve

A cluster consists of a Kubernetes master API server hosted by Google and a set of worker nodes.

pagare_pr@superb-heaven-155622:~$ gcloud config set project superb-heaven-155622

Updated property [core/project].

pagare_pr@superb-heaven-155622:~$ gcloud container clusters create hello-world
\> --num-nodes 2
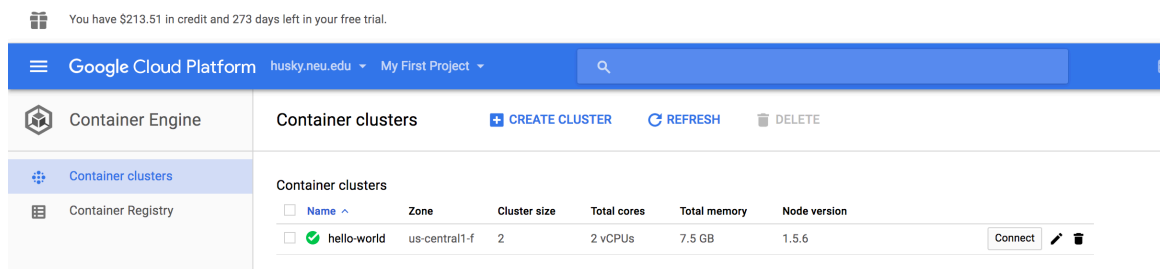\> --machine-type n1-standard-1
\> --zone us-central1-f

Creating cluster hello-world...done.
Created [https://container.googleapis.com/v1/projects/superb-heaven-155622/zones/us-central1-f/clusters/hello-world].kubeconfig entry generated for hello-world.
NAME ZONE MASTER_VERSION MASTER_IP MACHINE_TYPE NODE_VERSION NUM_NODES STATUS
hello-world us-central1-f 1.5.6 35.184.225.221 n1-standard-1 1.5.6 2 RUNNING

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Container Engine

| Container clusters |
| Container Registry |

Container clusters   ➕ CREATE CLUSTER   🔄 REFRESH   🗑 DELETE

Container clusters

Name ^	Zone	Cluster size	Total cores	Total memory	Node version		
✅ hello-world	us-central1-f	2	2 vCPUs	7.5 GB	1.5.6	Connect ✏ 🗑

18. Create kubectl pods to deploy the node application

pagare_pr@superb-heaven-155622:~$ kubectl run hello-node \>

--image=gcr.io/superb-heaven-155622/hello-node:v1 \>
--port=8080

deployment "hello-node" created

19. View the deployments using:
pagare_pr@superb-heaven-155622:~$ kubectl get deployments

NAME DESIRED CURRENT UP-TO-DATE AVAILABLE AGE
hello-node 1 1 1 1 3m

20. View the pods using following command
pagare_pr@superb-heaven-155622:~$ kubectl get pods

NAME READY STATUS RESTARTS AGE
hello-node-679988191-ljzq4 1/1 Running 0 5m

21. Check if the cluster is created for kubernetes using
pagare_pr@superb-heaven-155622:~$ kubectl cluster-info
Kubernetes master is running at https://35.184.225.221
GLBCDefaultBackend is running at
https://35.184.225.221/api/v1/proxy/namespaces/kube-system/services/default-http-backend
Heapster is running at https://35.184.225.221/api/v1/proxy/namespaces/kube-system/services/heapster
KubeDNS is running at https://35.184.225.221/api/v1/proxy/namespaces/kube-system/services/kube-dns
kubernetes-dashboard is running at
https://35.184.225.221/api/v1/proxy/namespaces/kube-system/services/kubernetes-dashboard

22. Expose the application to allow external traffic using the command:
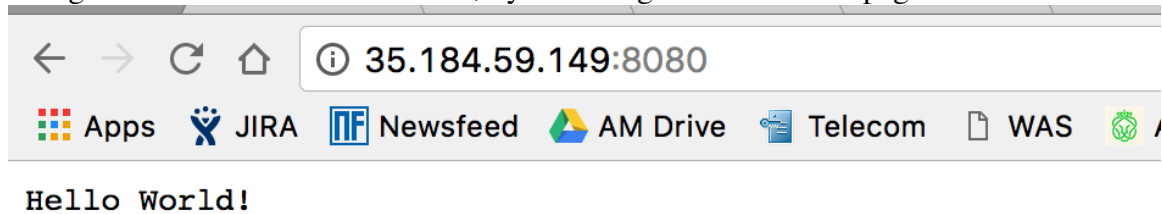pagare_pr@superb-heaven-155622:~$ kubectl expose deployment hello-node --type="LoadBalancer"

service "hello-node" exposed

23. To find the IP address and link accessible for external clients use the following command:
pagare_pr@superb-heaven-155622:~$ kubectl get services

NAME CLUSTER-IP EXTERNAL-IP PORT(S) AGE
hello-node 10.3.243.23 35.184.59.149 8080:31175/TCP 1mkubernetes 10.3.240.1 <none> 443/TCP 3h

24. Using the external IP 35.184.59.149, try accessing the hello world page

25. Scaling up the service:
we can create multiple replicas of the same application to scale up the application
Lets say we have only one deployment on kubernetes

pagare_pr@superb-heaven-155622:~$ kubectl get deployment
NAME DESIRED CURRENT UP-TO-DATE AVAILABLE AGE
hello-node 1 1 1 1 3h

Now we try to create 3 replicas of the same deployment as follows:
pagare_pr@superb-heaven-155622:~$ kubectl scale deployment hello-node --replicas=3

deployment "hello-node" scaled

pagare_pr@superb-heaven-155622:~$ kubectl get deployment

NAME DESIRED CURRENT UP-TO-DATE AVAILABLE AGE
hello-node 3 3 3 1 3h

Now we have 3 replicas thus scaling up the performance of the application

pagare_pr@superb-heaven-155622:~$ kubectl get pods

NAME READY STATUS RESTARTS AGE
hello-node-679988191-4t7rh 1/1 Running 0 2m
hello-node-679988191-ljzq4 1/1 Running 0 3h
hello-node-679988191-t4dzw 1/1 Running 0 2m

Rolling out the application: Making changes and deploying a new version
Edit the application, try to print current date-time

26. Build a docker image with new version, v2

pagare_pr@superb-heaven-155622:~$ docker build -t gcr.io/superb-heaven-

155622/hello-node:v2 .

Sending build context to Docker daemon 54.27 kB
Step 1 : FROM node:6.9.2 ---> faaadb4aaf9b
Step 2 : EXPOSE 8080 ---> Using cache ---> db81a6c48555
Step 3 : COPY server.js . ---> 771504f6bd90
Removing intermediate container af4a9026b833
Step 4 : CMD node server.js
---> Running in 39f8326eccf4

---> 3e279fac27fb
Removing intermediate container 39f8326eccf4
Successfully built 3e279fac27fb

Pushing the image to gcloud

pagare_pr@superb-heaven-155622:~$ gcloud docker -- push gcr.io/superb-heaven-155622/hello-node:v2

The push refers to a repository [gcr.io/superb-heaven-155622/hello-node]
71b29d3de31b: Pushed
381c97ba7dc3: Layer already exists
604c78617f34: Layer already exists
fa18e5ffd316: Layer already exists
0a5e2b2ddeaa: Layer already exists
53c779688d06: Layer already exists
60a0858edcd5: Layer already exists
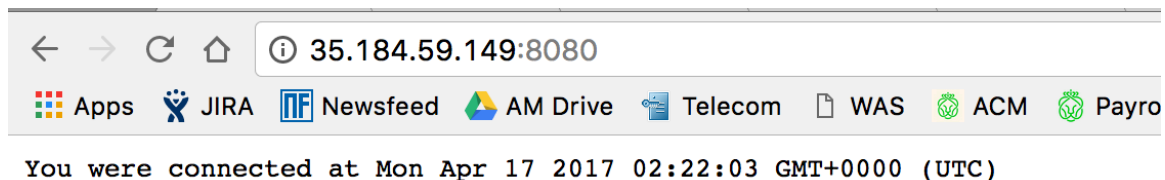b6ca02dfe5e6: Layer already exists
v2: digest:
sha256:77f82df37bcf453c38495b2f46b4ba369daa46e4766ca5ebbdc7769ada93e6c9 size:
2002

27. In order to have correct version being deployed to kubernetes, we have to edit the hello-node deployment file as follows:

use command: kubectl edit deployment hello-node
and edit spec: containers: - image: gcr.io/superb-heaven-155622/hello-node:v1
to spec: containers: - image: gcr.io/superb-heaven-155622/hello-node:v2

← → C ⟳ ⓘ **35.184.59.149**:8080

▦ Apps 💥 JIRA 📖 Newsfeed 🔺 AM Drive ▦ Telecom ▯ WAS ⚙ ACM ⚙ Payro

```
You were connected at Mon Apr 17 2017 02:22:03 GMT+0000 (UTC)
```

28. Clean up steps: Delete the cluster, service and deployments using following commands:

pagare_pr@superb-heaven-155622:~$ kubectl delete service,deployment hello-node

service "hello-node" deleted
deployment "hello-node" deleted

pagare_pr@superb-heaven-155622:~$ gcloud container clusters delete hello-world --zone=us-central1-f

The following clusters will be deleted. - [hello-world] in [us-central1-f]
Do you want to continue (Y/n)? Y
Deleting cluster hello-world...done.
Deleted [https://container.googleapis.com/v1/projects/superb-heaven-155622/zones/us-central1-f/clusters/hello-world].

pagare_pr@superb-heaven-155622:~$ gsutil ls

gs://artifacts.superb-heaven-155622.appspot.com/

pagare_pr@superb-heaven-155622:~$ gsutil rm -r gs://artifacts.superb-heaven-155622.appspot.com/

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:0110c26a367a1906458e53dd2df6b9adb3dd3115eb14cbb42b26b82d8a6d2a4e#1492378304132319...
Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:1f04fe713f1b4a69e025c1acc5861877c9b2f799ec814734732ed9bb78bb607c#1492378304575246...
Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:3e279fac27fbd9059574b34a779a0b7724f18a51cdaab4f68e0dffca0dbe51c5#1492393530939379...
Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:4306be1e8943b446026b96c2ef7b3ab8471c760774fd1cd11334df7084fed57b#1492378550025473.../
[4 objects] ==> NOTE: You are performing a sequence of gsutil operations that mayrun significantly faster if you instead use gsutil -m -o ... Pleasesee the -m section under "gsutil help options" for further informationabout when gsutil -m can be advantageous.
Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:57de64c72267e88e952b064236cb906c7626f7c07a1a2d5900cf6953e72632b3#1492378335043109...
Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:65c2931e34b78e73a0f6ba10944b1d36ba9bc183115ddd86f986dfe0f4658b92#1492393529521067...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:75a822cd7888e394c49828b951061402d31745f596b1f502758570f2d0ee79e2#1492378592725622...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:7d8bfbe0b9fcd5f4e0ee512e8b818b168bfe76f14a726a236978fa4c3d510043#1492378304689535...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:871436ab7225503e9e951a7acb7b1689a91a60d033bf8cbabcd40fe5ca4cfc87#1492378643860829...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:ac7c0b5fb55330194d7a9d0f22a5313481e41a86d6b25c8386835417259579e7#1492378359732827...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/images/sha256:f5819b9db798edd946aced5dd398b2bd605b1a092a1a774e46bfe66d01f95580#1492378645325265...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/repositories/library/hello-node/manifest_sha256:77f82df37bcf453c38495b2f46b4ba369daa46e4766ca5ebbdc7769ada93e6c9#1492393531593045...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/repositories/library/hello-node/manifest_sha256:cc7d9c1c37e37977644ed59032136bdb83ce2a16af6fb579ce0e50207f984c30#1492378646010037...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/repositories/library/hello-node/tag_v1#1492378646219790...

Removing gs://artifacts.superb-heaven-155622.appspot.com/containers/repositories/library/hello-node/tag_v2#1492393531841910.../ [15 objects] Operation completed over 15 objects.

Removing gs://artifacts.superb-heaven-155622.appspot.com/...