Spring boot app

Sunday, January 2, 2022 9:59 PM

Deploy Spring boot app on Kubernetes and also on GCP.

Deploy spring boot microservice on local kubernetes cluster using Kubespray

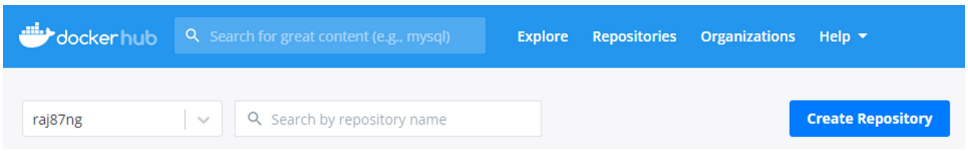
Create a spring boot application.
Create a Docker file:

```
FROM openjdk:8-jdk-alpine
ARG JAR_FILE=build/libs/*.jar
COPY ${JAR_FILE} app.jar
ENTRYPOINT ["java","-jar","/app.jar"]
```

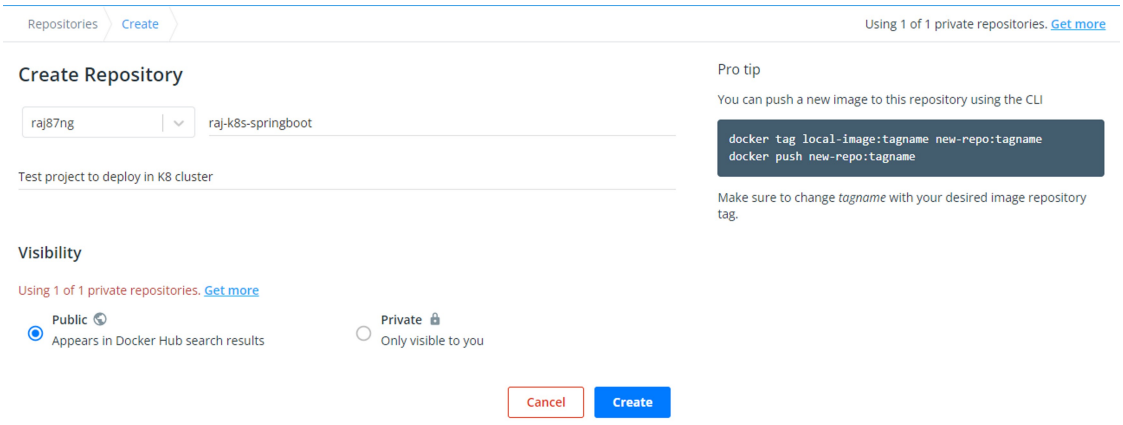
Create a Docker Registry at "https://hub.docker.com/"

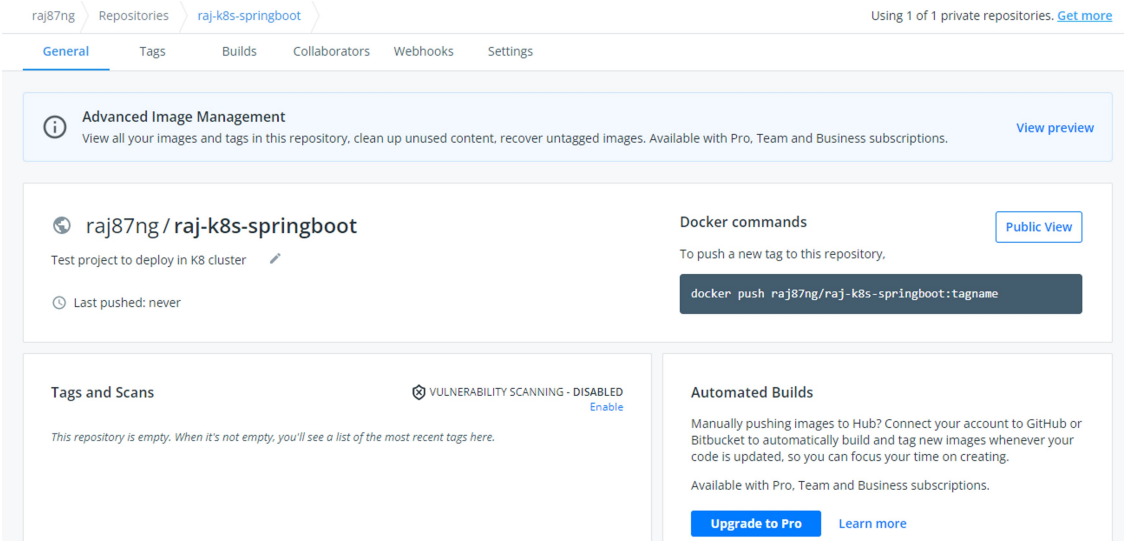
Before we build our docker image, the first thing we need to do is create a docker registry at "https://hub.docker.com/". So that we will push our spring boot docker image into the registry. Later on, we will pull the same docker image during kubernetes deployment.

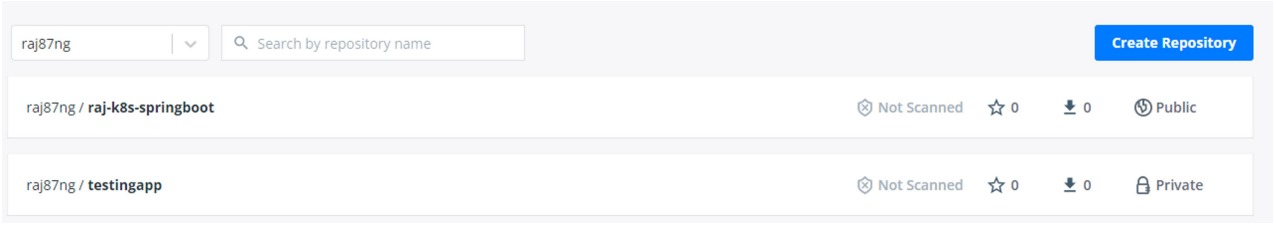
Goto "https://hub.docker.com/" and click on "Create Repository"



Now it will prompt you for the docker registry name, in this example I am going to put my registry name as - raj-k8s-springboot.
Based on your privacy settings either you can keep the docker registry either Public or Private.







“docker build” && “docker push image”

Now you have all the per-requisites done for building docker image and pushing it to the “https://hub.docker.com/".
But the first thing - Let’s build our docker image and assign a suitable tag name to the docker image
Step 1 - Build docker image and tag it with the name “raj-k8s-springboot”

```
$ docker build -t raj-k8s-springboot .
```

BASH

Step 2 - Since our registry name on dockerhub is “raj87ng/raj-k8s-springboot” so we need to tag the build image one more time with docker registry name

```
$ docker tag raj-k8s-springboot raj87ng/kubernetes:raj-k8s-springboot
```

BASH

Step 3 - Push the docker image to docker hub

```
$ docker push  raj87ng/kubernetes:raj-k8s-springboot
```

BASH

```
The push refers to repository [docker.io/raj87ng/kubernetes]14170fe294f1: Pushed
ceaf9e1ebef5: Layer already exists
9b9b7f3d56a0: Layer already exists
f1b5933fe4b5: Layer already exists
raj-k8s-springboot: digest: sha256:b50ccfc5f80308795051b75fe69cc76f30dc37996b2c6065d2c978125621aefa size: 1159
```

BASH

Great now our spring boot docker image is onto the docker hub. Let’s move onto our next step where we will be starting our kubernetes cluster to deploy “docker container” which we just pushed onto docker hub.

Start Kubernetes Cluster :

If you do not have kubernetes cluster running than please stop here and I would highly recommend going through the guide on - Kubespray – 12 Steps for Installing a Production Ready Kubernetes Cluster.

(Note: - I have tested the kubernetes cluster setup with latest available version of kubernetes v1.22)

How to use kubespray – 12 Steps for Installing a Production Ready Kubernetes Cluster

kubectl create deployment demo --image=rahulwagh17/kubernetes:jhooq-k8s-springboot

Check the deployment using following command

$ kubectl get deployments

NAME READY UP-TO-DATE AVAILABLE AGE
demo 1/1 115h20m
Step 2 - Expose the deployment to outside world

vagrant@kmaster:~$ kubectl expose deployment demo --type=LoadBalancer --name=demo-service --external-ip=1.1.1.1 --port=8080

service/demo-service exposed

Step 3 - Check the services

After exposing the service verify it with the following command
$ kubectl get service
It should return something similar

NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S)AGE
demo-service LoadBalancer 10.233.5.144 1.1.1.1 8080:31901/TCP 2s
kubernetes ClusterIP 10.233.0.1 <none> 443/TCP 28h
Step 4 - Curl or test the rest endpoint

Since we setup the kubernetes cluster on laptop, so to access the spring boot rest point outside of the cluster we need to use vagrant box(kmaster's) ip address .i.e. - 100.0.0.2

So from your laptop which is outside the cluster you can use the following curl command
$ curl http://100.0.0.2:31901/hello

Hello - Jhooq-k8s
And if you are interested in accessing it from browser then please refer to the following screenshot

But in case if you have deployed the cluster on AWS(Amazon web service) or Google Cloud then use the EXTERNAL-IP which you got after running the command
$ kubectl get service .i.e.

$ curl http://1.1.1.1:31901/hello
Great you have deployed your Spring Boot microservices on kubernetes.

10. Clean up the Deployment and Service

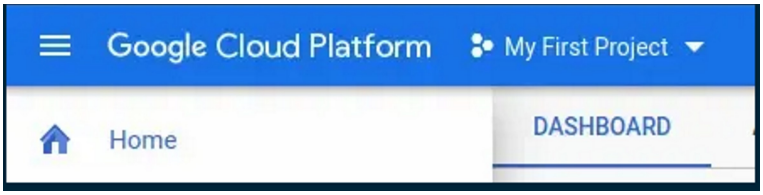
Once you are done with the deployment and exposing the deployment as a service. You can run the following command to clean the kubernetes cluster

$ kubectl delete service demo-service

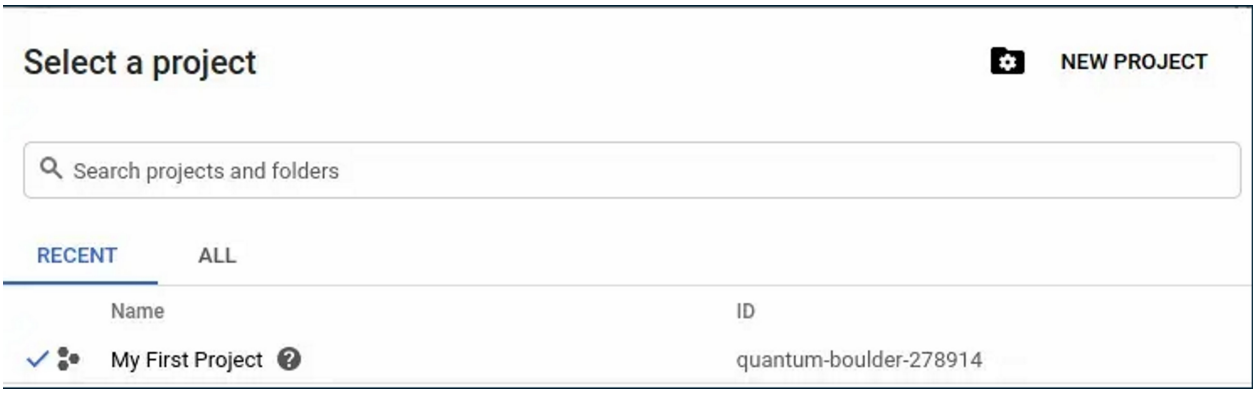
$ kubectl delete deplopyments demo

Deploy Spring boot service on Google Cloud Platform (GCP)

Create a project on Google Cloud
After the login goto "My First Project" and click on it.

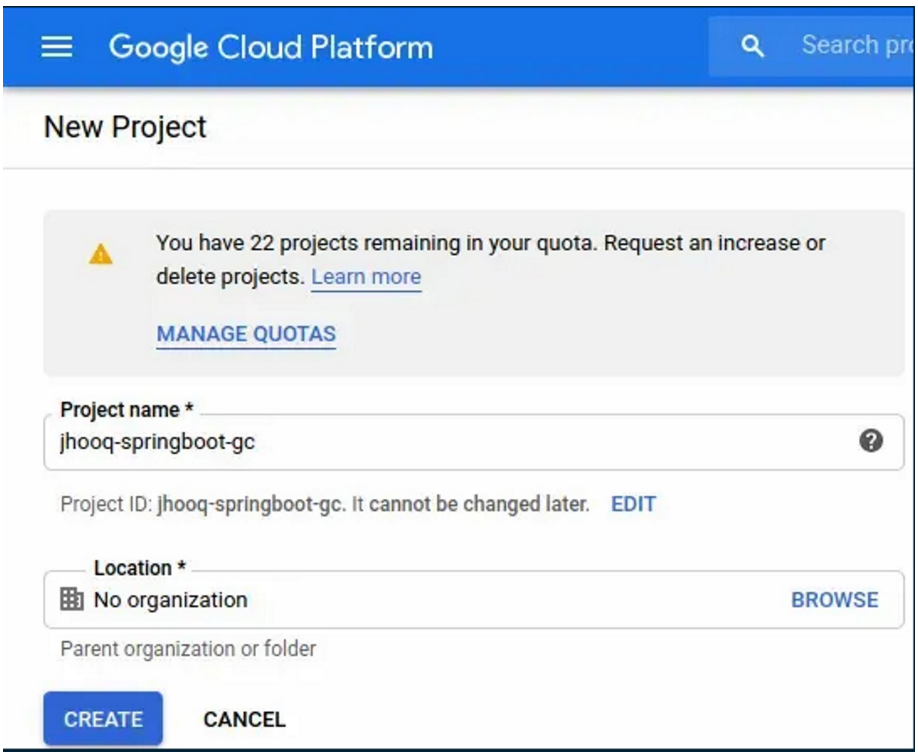


Now we need to click on the New Project to create a new project



Enter the name of the project. In our case, we are going to put the cluster name as “jhooq-springboot-gc”

From <https://jhooq.com/deploy-spring-boot-microservices-on-kubernetes/#part-2>

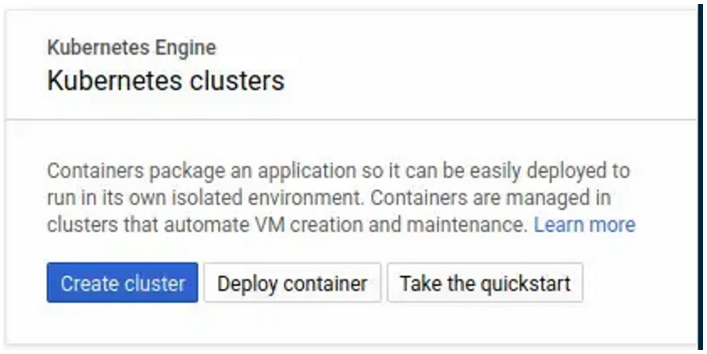


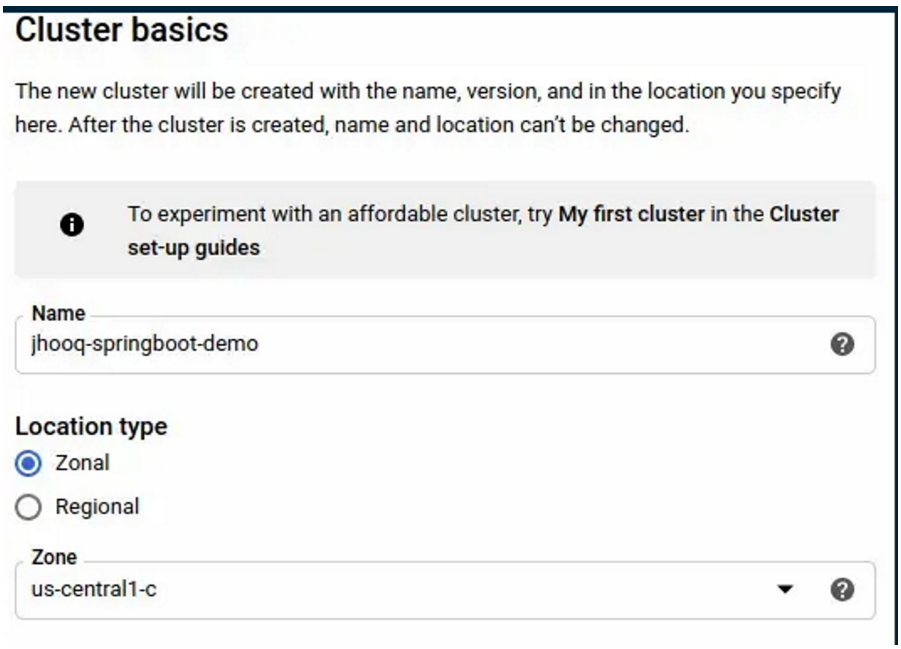
After click that you should be able to create the project and it should be visible under your project section

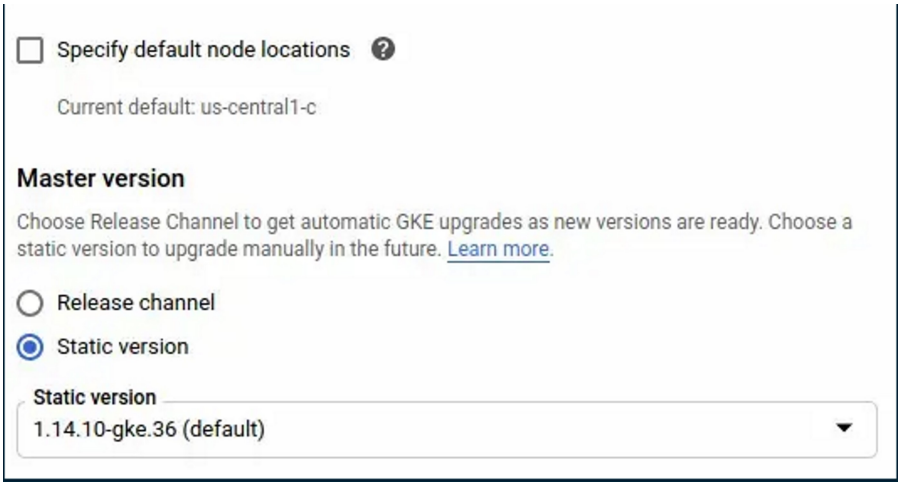
From <https://jhooq.com/deploy-spring-boot-microservices-on-kubernetes/#part-2>

Create Kubernetes Cluster on Google Cloud

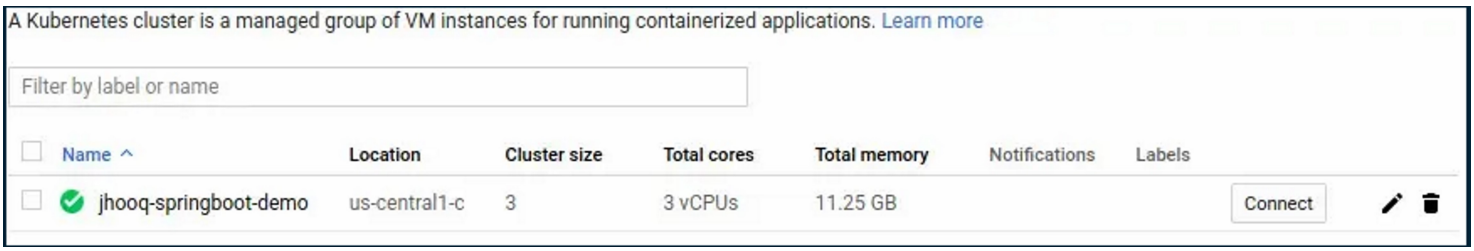
Now after creating the project, we need to setup/create kubernetes cluster
Setting up or creating a new cluster inside the Google Cloud Platform(GCP) is pretty simple and it can be done with few clicks and some information.
If you haven't selected your project then please do select from "My First Project " menu. After than navigate to "Kubernetes Engine" menu in the left hand side and then click on "Cluster"







It should take around couple of minutes or more to setup the cluster. But Once its ready you should be able to see your cluster information as show below



Push spring boot docker image to google container registry(gcr.io)
In Step 1 and Step 2 we pretty much setup the kubernetes cluster on the google cloud but we need docker image which we are going to deploy on the kubernetes cluster.
And for that, we need to push the docker image to Google Container Registry(gcr.io). GCR is very much same as docker-hub but in the Google cloud world we use google container registry instead.
Before we push the docker image to the Google Container register, we need to understand the Google Cloud SDK: Command Line Interface.
Because whenever you develop a spring boot or any other microservice you develop it on your local system or laptop but then you need to push or bring your application into the cloud environment from your local development machine(laptop).

So for that, we need to set up the Google Cloud SDK: Command Line Interface. While writing this article I was working on Ubuntu 20.04 so these steps can be followed for Ubuntu. But for another operating system such as Windows or Mac OS you can follow the guide from google(Its pretty easy) - https://cloud.google.com/sdk/docs/downloads-versioned-archives
Step 1 - Download the google SDK from the https://cloud.google.com/sdk/docs/downloads-versioned-archives
Step 2 - Now you need to goto directory - google-cloud-sdk-294.0.0-linux-x86_64/google-cloud-sdk run the install.sh

$./install.sh

```
To help improve the quality of this product, we collect anonymized usage data
and anonymized stacktraces when crashes are encountered; additional information
is available at <https://cloud.google.com/sdk/usage-statistics>. This data is
handled in accordance with our privacy policy
<https://policies.google.com/privacy>. You may choose to opt in this
collection now (by choosing 'Y' at the below prompt), or at any time in the
future by running the following command:

    gcloud config set disable_usage_reporting false


Do you want to help improve the Google Cloud SDK (y/N)?  y


Do you want to continue (Y/n)? y
```

```
To install or remove components at your current SDK version [294.0.0], run:
  $ gcloud components install COMPONENT_ID
  $ gcloud components remove COMPONENT_ID

To update your SDK installation to the latest version [294.0.0], run:
  $ gcloud components update


Modify profile to update your $PATH and enable shell command
completion?


Do you want to continue (Y/n)?  Y
```

Step 3 - Enter the path to RC file to update, leave it blank if you do not want to change the path

```
The Google Cloud SDK installer will now prompt you to update an rc
file to bring the Google Cloud CLIs into your environment.

Enter a path to an rc file to update, or leave blank to use
[/home/rahul/.bashrc]:
Backing up [/home/rahul/.bashrc] to [/home/rahul/.bashrc.backup].
[/home/rahul/.bashrc] has been updated.

==> Start a new shell for the changes to take effect.
```

Step 4 - Run the following command to setup the source

```
$ source ~/.bashrc
```

Step 5 - Initialize the google cloud on your local development computer

```
$ gcloud init
```

(If you are setting it up for the first time then it will redirect you to google account login page for authentication.)

In the next step, it will ask you to *Pick configuration to use:* (Select or enter 1 because we already created the cluster and now we need re-initialize that configuration here again.)

```
Pick configuration to use:
 [1] Re-initialize this configuration [default] with new settings
 [2] Create a new configuration
Please enter your numeric choice:  1
```

In the next step it will ask to *Choose the account to perform the operation*

```
Choose the account you would like to use to perform operations for
this configuration:
 [1] rahul.wagh17@gmail.com
 [2] Log in with a new account
Please enter your numeric choice: 1
```

Now we need to select our project which we have created on google cloud web interface. So we will go with - **jhooq-springboot-gc**.

```
You are logged in as: [rahul.wagh17@gmail.com].

Pick cloud project to use:
 [1] cryptic-tower-275912
 [2] jhooq-gc-springboot-k8s
 [3] jhooq-springboot-gc
 [4] quantum-boulder-278914
 [5] Create a new project
Please enter numeric choice or text value (must exactly match list
item): 3
```

In the next step it will ask for **default Compute Region and Zone** ?

Go for default and press Y

```
Your current project has been set to: [jhooq-springboot-gc].

Do you want to configure a default Compute Region and Zone? (Y/n)?  y
```

It will show you a long list of the compute zone so you can select the nearest one and input the zone number

```
Too many options [74]. Enter "list" at prompt to print choices fully.
Please enter numeric choice or text value (must exactly match list
item):  14
```

Alright, now we are ready to push our docker image to Google cloud registry.

Step 1 - In the Step 5 we created a docker file, so switch to that directory. After that we need to **tag** the docker image with the project name .i.e._ **jhooq-sprinboot-k8s-demo**_

```
$ docker build -t gcr.io/jhooq-sprinboot-k8s-demo/jhooq-springboot:v1 .
```

```
Sending build context to Docker daemon  28.31MBB
Step 1/4 : FROM openjdk:8-jdk-alpine
 ---> a3562aa0b991
Step 2/4 : ARG JAR_FILE=build/libs/*.jar
 ---> Using cache
 ---> ab3e5f96d4dc
Step 3/4 : COPY ${JAR_FILE} app.jar
 ---> Using cache
 ---> ede5735c296c
Step 4/4 : ENTRYPOINT ["java","-jar","/app.jar"]
 ---> Using cache
 ---> adaf5b0a60a2
Successfully built adaf5b0a60a2
Successfully tagged gcr.io/jhooq-springboot-k8s-demo/jhooq-springboot:v1
```

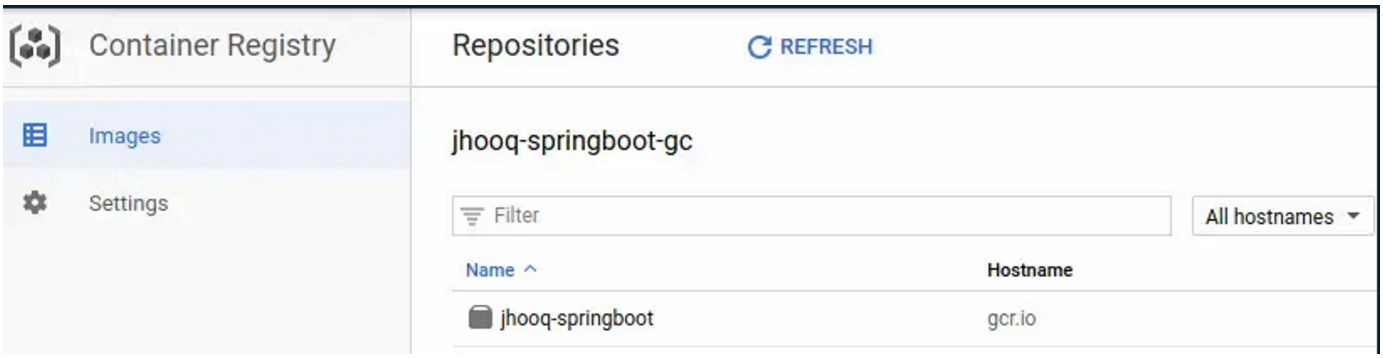
Step 2 - Push the docker image to the google container registry

```
$ docker push gcr.io/jhooq-sprinboot-k8s-demo/jhooq-springboot:v1
```bash

```bash
The push refers to repository [gcr.io/jhooq-springboot-k8s-demo/jhooq-springboot]
14170fe294f1: Mounted from jhooq-gc-springboot-k8s/jhooq-springboot
ceaf9e1ebef5: Layer already exists
9b9b7f3d56a0: Layer already exists
f1b5933fe4b5: Layer already exists
v1: digest: sha256:b50ccfc5f80308795051b75fe69cc76f30dc37996b2c6065d2c978125621aefa size: 1159
```

BASH

Now we have pushed our spring boot docker image to the Google Container registry. You can verify the image by logging into the Google Cloud selecting project *jhooq-sprinboot-k8s-demo* and navigating to the option *Container Registry*

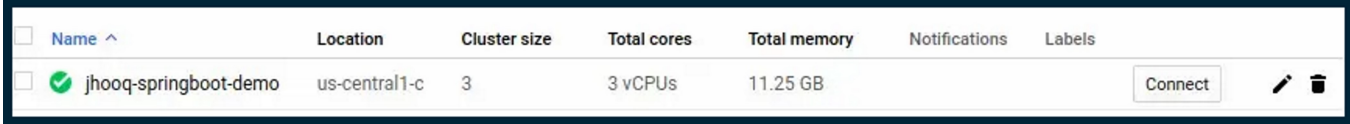


4. Deploy the spring boot microservice inside kubernetes cluster running on Google Cloud

Alright so till now you setup the kubernetes cluster then you pushed the spring-boot docker image to Google container registry and now its time to play with some kubernetes command.

Now we are going to use the Google Cloud shell to deploy docker image inside Kubernetes cluster.

Step 1- Connect to cloudshell. Click on the connect button for the cloudshell



Step 2- Now we need to do kubectl deployment, use the following command for the creating the deployment

```bash
; kubectl create deployment jhooq-springboot --image=gcr.io/jhooq-sprinboot-k8s-demo/jhooq-springboot:v1
```

```bash
deployment.apps/jhooq-springboot created
```

Step 3- expose deployment on external IP

```bash
$ kubectl expose deployment jhooq-springboot --type=LoadBalancer --port 80 --target-port 8080
```

```bash
service/jhooq-springboot exposed
```

Now you need to find the external IP of service, so that you can access the spring boot microservice outside of the network

BASH

```
$ kubectl get service
```

BASH

```
NAME              TYPE           CLUSTER-IP    EXTERNAL-IP    PORT(S)        AGE
jhooq-springboot  LoadBalancer   10.64.8.231   34.72.142.92   80:32537/TCP   11m
kubernetes        ClusterIP      10.64.0.1     <none>         443/TCP        3h51m
```

Well if you reached till step then i would say you did hell of job with kubernetes cluster setup on the Google Cloud Plateform.

Now you can access your rest end point with the external IP *.i.e. http://34.72.142.92:80/hello*

Ref : https://jhooq.com/