Project Details

Task: A2
Done by: Tan Wei Jie (A0202017B)
Repo Link: https://github.com/tanweijie123/CS3219_Sandbox/tree/main/Task_A/A2

Instructions on how to run

1. For my project, I will use minikube as the deployment node. So to start minikube, run `minikube start --driver=docker`. This will create a minikube docker.
2. Once it has created the minikube docker, run `eval $(minikube -p minikube docker-env)` to copy the docker environment into minikube.

```
tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ minikube start --driver=docker
* minikube v1.23.2 on Microsoft Windows 10 Home 10.0.19042 Build 19042
* Using the docker driver based on existing profile
* Starting control plane node minikube in cluster minikube
* Pulling base image ...
* docker "minikube" container is missing, will recreate.
* Creating docker container (CPUs=2, Memory=4000MB) ...
* Preparing Kubernetes v1.22.2 on Docker 20.10.8 ...
* Verifying Kubernetes components...
  - Using image gcr.io/k8s-minikube/storage-provisioner:v5
* Enabled addons: storage-provisioner, default-storageclass
* Done! kubectl is now configured to use "minikube" cluster and "default" namesp
ace by default

tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ eval $(minikube -p minikube docker-env)
```

3. Build the docker image that you want to use for kubernetes. In this example, I will use the webserver image I used for Task A1. Run `docker build <directory_of_Dockerfile> -t my-static-web`

```
tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ docker build ./../A1/webserver/ -t my-static-web
Sending build context to Docker daemon  4.096kB
Step 1/2 : FROM nginx:alpine
alpine: Pulling from library/nginx
Digest: sha256:686aac2769fd6e7bab67663fd38750c135b72d993d0bb0a942ab02ef647fc9c3
Status: Downloaded newer image for nginx:alpine
 ---> 513f9a9d8748
Step 2/2 : COPY . /usr/share/nginx/html
 ---> Using cache
 ---> 82a57b04be85
Successfully built 82a57b04be85
Successfully tagged my-static-web:latest
SECURITY WARNING: You are building a Docker image from Windows against a non-Win
dows Docker host. All files and directories added to build context will have '-r
wxr-xr-x' permissions. It is recommended to double check and reset permissions f
or sensitive files and directories.

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and l
earn how to fix them
```

4. Once the build is complete, execute `kubectl apply -f ./deployment-service.yml` to setup kubernetes configuration. Verify that you have 3 running pods for the `webserver-service` service. You should also note that port 31111 is exposed.

```
tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ kubectl apply -f ./deployment-service.yml
deployment.apps/webserver-deployment created
service/webserver-service created

tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ kubectl get service
NAME                TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)          AGE
kubernetes          ClusterIP   10.96.0.1      <none>        443/TCP          3h2
9m
webserver-service   NodePort    10.98.54.45    <none>        3000:31111/TCP   26s

tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ kubectl get pod
NAME                                   READY   STATUS    RESTARTS   AGE
webserver-deployment-648bf474bf-c4qzb   1/1     Running   0          33s
webserver-deployment-648bf474bf-fs9sk   1/1     Running   0          33s
webserver-deployment-648bf474bf-p46m9   1/1     Running   0          33s

tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ kubectl get deploy
NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
webserver-deployment   3/3     3            3           42s
```

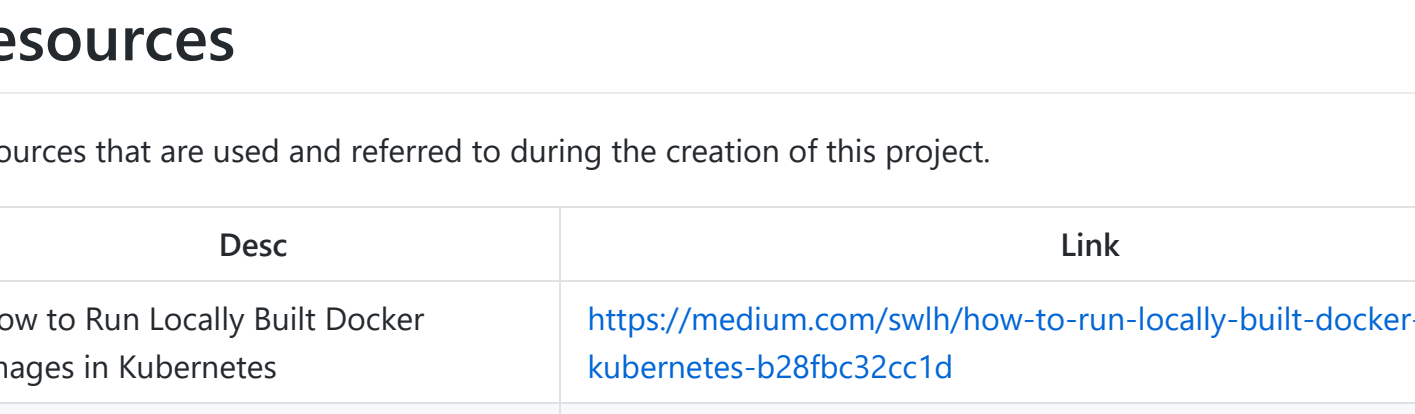
5. In this step, I will try to connect to the deployed image. Since I am using minikube for deployment node, I will need to connect the kubernetes service to minikube so that I can access it on my computer. Run `minikube`

`service webserver-service`.

```
tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ minikube service list
|-------------|-------------------|--------------|---------------------------|
|  NAMESPACE  |       NAME        | TARGET PORT  |            URL            |
|-------------|-------------------|--------------|---------------------------|
| default     | kubernetes        | No node port |                           |
| default     | webserver-service |         3000 | http://192.168.49.2:31111 |
| kube-system | kube-dns          | No node port |                           |
|-------------|-------------------|--------------|---------------------------|

tanwe@Zenbook156 MINGW64 ~/Desktop/Git/CS3219_sandbox/Task_A/A2 (main)
$ minikube service webserver-service
|-----------|-------------------|-------------|---------------------------|
| NAMESPACE |       NAME        | TARGET PORT |            URL            |
|-----------|-------------------|-------------|---------------------------|
| default   | webserver-service |        3000 | http://192.168.49.2:31111 |
|-----------|-------------------|-------------|---------------------------|
* Starting tunnel for service webserver-service.
|-----------|-------------------|-------------|-------------------------|
| NAMESPACE |       NAME        | TARGET PORT |           URL           |
|-----------|-------------------|-------------|-------------------------|
| default   | webserver-service |             | http://127.0.0.1:57657 |
|-----------|-------------------|-------------|-------------------------|
* Opening service default/webserver-service in default browser...
! Because you are using a Docker driver on windows, the terminal needs to be ope
n to run it.
```

6. After running the above command, a browser will pop up with the assigned URL. In this case, minikube assigned the service to `http://localhost:57657/`.



7. To close kubernetes deployment and services, run `kubectl delete -f ./deployment-service.yml`.

Learning Points

- In order to use locally created images, I need to set `imagePullPolicy: Never` and minikube to point to local Docker daemon.
- Need to run eval $(minikube -p minikube docker-env) for every new `minikube start`.
- Kubernetes are usually run on cloud, it is rarely run locally.

Resources

Resources that are used and referred to during the creation of this project.

Desc	Link
How to Run Locally Built Docker Images in Kubernetes	https://medium.com/swlh/how-to-run-locally-built-docker-images-in-kubernetes-b28fbc32cc1d
To expose port of service in Minikube	https://stackoverflow.com/questions/40767164/expose-port-in-minikube