1. Unit Recap

- This week material and lab activities is a recap for what we have gone through this unit, it revisted from the basic elements like deploying simple NodeJs app, then configured this deployment to have a sidecar architecture, editing reasonable resources for both the container and sidecar container, scaling the deployment – which are the core elements / principle of DevOp, thus, they are all equally important as they are built on top of each other. This is reflected through errors I made through this lab: incorrect placing of codes in super-pets.yaml lead to deployment failure, miscalculation in setup for both memory and cpu requests and limits – also due to low spec computational VM that causing errors during "curling" loop and lead to further error during scaling as the readinessProbe mistakenly flagged the generated pods as unhealthy due to taking quite a period of time to fully running. All of these are expected in real life situations.

2. Lab Activities

Initial deployment

Followed the lab instructions, result below was obtained from "kubectl get all" command

```
haydenyeung@HaydenYeung-virtualbox:~/my-container$ kubectl apply -f super-pets.yaml
deployment.apps/ecommerce-super-pets created
service/super-pets created
configmap/super-pets created
haydenyeung@HaydenYeung-virtualbox:~/my-container$ kubectl get all
NAME                                        READY   STATUS    RESTARTS   AGE
pod/ecommerce-super-pets-79c65ccd77-cx6rn   1/1     Running   0          20s
pod/ecommerce-super-pets-79c65ccd77-pkwxr   1/1     Running   0          20s
pod/ecommerce-super-pets-79c65ccd77-t6wn8   1/1     Running   0          20s

NAME                 TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)        AGE
service/kubernetes   ClusterIP   10.152.183.1     <none>        443/TCP        75d
service/super-pets   NodePort    10.152.183.239   <none>        80:30329/TCP   20s

NAME                                    READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/ecommerce-super-pets    3/3     3            3           20s

NAME                                              DESIRED   CURRENT   READY   AGE
replicaset.apps/ecommerce-super-pets-79c65ccd77   3         3         3       20s
```

Obtained three different pods from "curl 10.152.183.239" command

```
haydenyeung@HaydenYeung-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-79c65ccd77-cx6rnhaydenyeung@HaydenYeung-virtualbox:~/my-cont
ainer$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-79c65ccd77-pkwxrhaydenyeung@HaydenYeung-virtualbox:~/my-cont
ainer$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-79c65ccd77-t6wn8haydenyeung@HaydenYeung-virtualbox:~/my-cont
ainer$
```

These errors was caused by forgot to include \n by the end of res.write('Hello ' + clientIP + ', this is ' + server_name + ' v1 on ' + os.hostname());

Application data & sidecars

Edited the super-pets.yaml according to lab instructions and obtained the following results

```
haydenyeung@HaydenYeung-virtualbox:~/my-container$ kubectl get all
NAME                                        READY   STATUS    RESTARTS   AGE
pod/ecommerce-super-pets-75fb58dc49-kpc7g   2/2     Running   0          4m58s
pod/ecommerce-super-pets-75fb58dc49-m7jsm   2/2     Running   0          5m22s
pod/ecommerce-super-pets-75fb58dc49-m959n   2/2     Running   0          4m53s

NAME                 TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)                      AGE
service/kubernetes   ClusterIP   10.152.183.1     <none>        443/TCP                      75d
service/super-pets   NodePort    10.152.183.239   <none>        80:31530/TCP,443:30479/TCP   26m

NAME                                    READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/ecommerce-super-pets   3/3     3            3           26m

NAME                                              DESIRED   CURRENT   READY   AGE
replicaset.apps/ecommerce-super-pets-75fb58dc49   3         3         3       5m22s
replicaset.apps/ecommerce-super-pets-79c65ccd77   0         0         0       26m
```

```
haydenyeung@HaydenYeung-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-75fb58dc49-kpc7ghaydenyeung@HaydenYeun
g-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-75fb58dc49-kpc7ghaydenyeung@HaydenYeun
g-virtualbox:~/my-container$ curl 10.152.183.239
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
haydenyeung@HaydenYeung-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-75fb58dc49-m959nhaydenyeung@HaydenYeun
g-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-75fb58dc49-m7jsmhaydenyeung@HaydenYeun
g-virtualbox:~/my-container$
```

API security & recource needs

Followed the instructions and applied “kubectl get all” to observe the results:

```
haydenyeung@HaydenYeung-virtualbox:~/my-container$ kubectl get all
NAME                                      READY   STATUS    RESTARTS       AGE
pod/ecommerce-super-pets-6c7cf95c5c-7mrc7   2/2     Running   5 (104s ago)   6m25s
pod/ecommerce-super-pets-6c7cf95c5c-8tpm4   2/2     Running   5 (103s ago)   6m35s
pod/ecommerce-super-pets-6c7cf95c5c-wr9qj   2/2     Running   5 (104s ago)   6m30s

NAME                 TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)                      AGE
service/kubernetes   ClusterIP   10.152.183.1     <none>        443/TCP                      75d
service/super-pets   NodePort    10.152.183.239   <none>        80:31530/TCP,443:30479/TCP   41m

NAME                                   READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/ecommerce-super-pets   3/3     3            3           41m

NAME                                              DESIRED   CURRENT   READY   AGE
replicaset.apps/ecommerce-super-pets-6c7cf95c5c   3         3         3       6m36s
replicaset.apps/ecommerce-super-pets-75fb58dc49   0         0         0       20m
replicaset.apps/ecommerce-super-pets-79c65ccd77   0         0         0       41m
haydenyeung@HaydenYeung-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6c7cf95c5c-wr9qjhaydenyeung@HaydenYeun
g-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6c7cf95c5c-8tpm4haydenyeung@HaydenYeun
g-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6c7cf95c5c-7mrc7haydenyeung@HaydenYeun
```

```
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
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curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 1 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
```
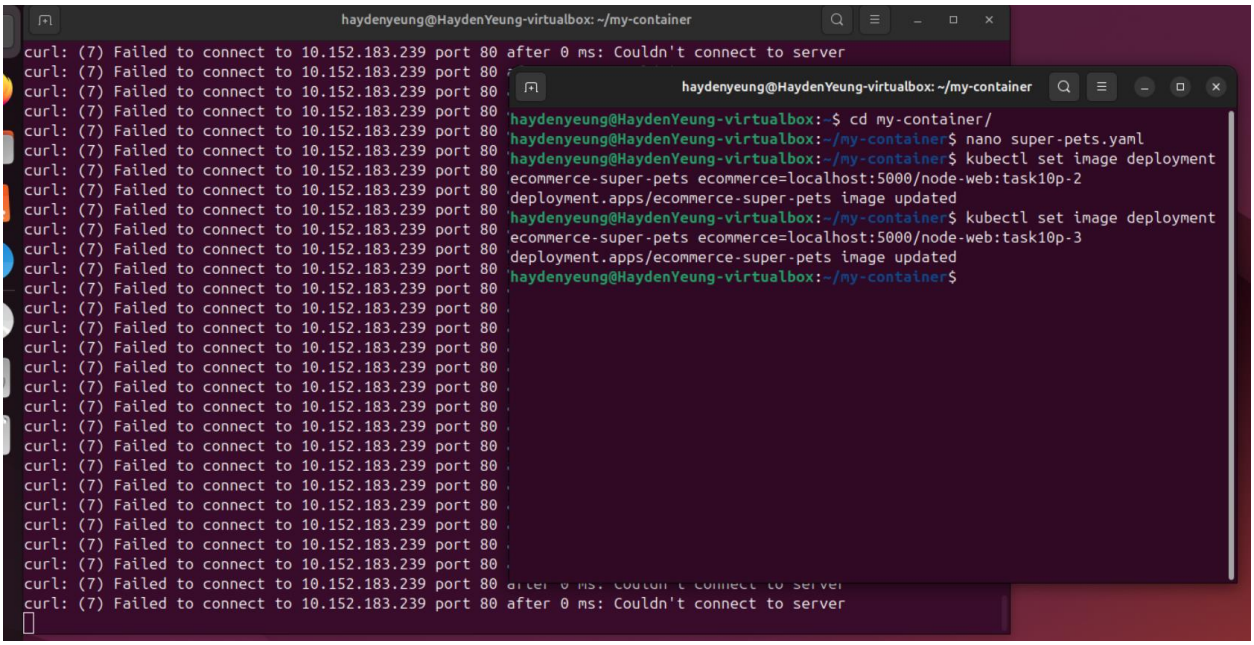

Activity 1 – Try out the application

Because of experienced the above errors, I decided to remove resources from both the NodeJs container & Envoy Container and the results were at below

```
haydenyeung@HaydenYeung-virtualbox:~/my-container$ while true ; do curl 10.152.183.239 ; done
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6d96bf6985-sd9c5curl: (7) Failed to co
nnect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6d96bf6985-jw88mHello ::ffff:10.0.2.15
 , this is Super Pets v1 on ecommerce-super-pets-6d96bf6985-hhs8bcurl: (7) Failed to connect to 10.152.183.23
9 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
curl: (7) Failed to connect to 10.152.183.239 port 80 after 0 ms: Couldn't connect to server
```

Thus, I assume that running both containers is quite a heavy toll for my nodes.



Hence, changing the image did not solve the problem.

Based on the previous tasks, theoretically speaking is that:

- When changing the image to v2 (or v3), the Deployment performs a rolling update, replacing v1 pods with v2 pods. During this process, the curl loop shows intermittent failures (e.g., "Connection refused" or timeouts) because some pods are terminating while others are starting. Once the update completes, the responses reflect the new version.
- With preference from Grok, I also found that: because there's no readinessProbe defined for the ecommerce container at this stage.
    - Without a readiness probe, Kubernetes routes traffic to pods as soon as their containers start, even if the NodeJS application isn't fully initialized (i.e., not yet listening on port 8080).
    - This leads to failed requests during the rolling update.

- Additionally, the rolling update itself causes brief periods where fewer pods are available, increasing the chance of requests hitting a pod that's not ready.

Task 2 – Is it fixed now?

```
haydenyeung@HaydenYeung-virtualbox:~/my-container$ kubectl get all
NAME                                        READY   STATUS             RESTARTS      AGE
pod/ecommerce-super-pets-844b758fb4-6jhxv   1/2     CrashLoopBackOff   6 (24s ago)   6m38s
pod/ecommerce-super-pets-844b758fb4-kl5vk   1/2     CrashLoopBackOff   6 (26s ago)   6m32s
pod/ecommerce-super-pets-844b758fb4-lwjlk   1/2     CrashLoopBackOff   4 (4s ago)    98s

NAME                 TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)                      AGE
service/kubernetes   ClusterIP   10.152.183.1     <none>        443/TCP                      76d
service/super-pets   NodePort    10.152.183.239   <none>        80:31530/TCP,443:30479/TCP   77m

NAME                                    READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/ecommerce-super-pets    0/3     3            0           77m

NAME                                               DESIRED   CURRENT   READY   AGE
replicaset.apps/ecommerce-super-pets-844b758fb4    3         3         0       6m39s

NAME                                                          REFERENCE                          TARGETS
     MINPODS   MAXPODS   REPLICAS   AGE
horizontalpodautoscaler.autoscaling/ecommerce-super-pets   Deployment/ecommerce-super-pets   cpu: <unknown>/2
0%   1         5         3          11m
```

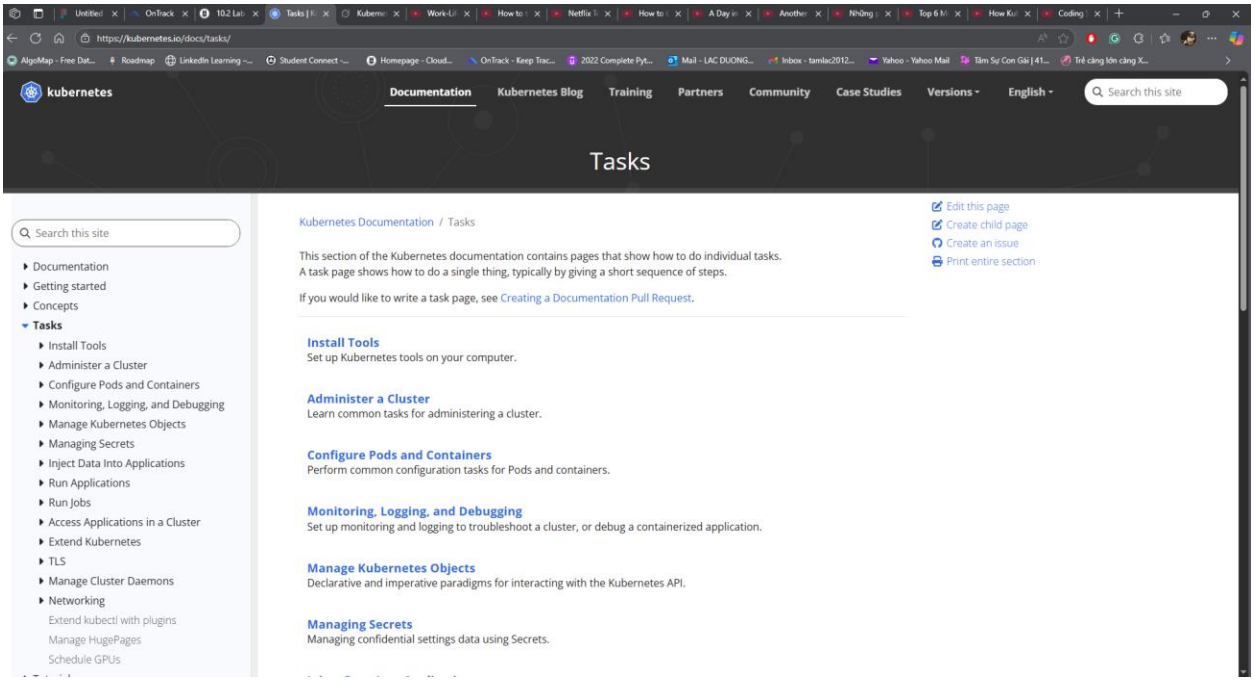
```
haydenyeung@HaydenYeung-virtualbox:~/my-container$ kubectl get all
NAME                                        READY   STATUS    RESTARTS   AGE
pod/ecommerce-super-pets-6d96bf6985-j2ctt   2/2     Running   0          15s
pod/ecommerce-super-pets-6d96bf6985-qddk2   2/2     Running   0          28s
pod/ecommerce-super-pets-6d96bf6985-rkr78   2/2     Running   0          21s

NAME                 TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)                      AGE
service/kubernetes   ClusterIP   10.152.183.1     <none>        443/TCP                      76d
service/super-pets   NodePort    10.152.183.239   <none>        80:31530/TCP,443:30479/TCP   81m

NAME                                    READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/ecommerce-super-pets    3/3     3            3           81m

NAME                                               DESIRED   CURRENT   READY   AGE
replicaset.apps/ecommerce-super-pets-6cf9cf5bfb    0         0         0       89s
replicaset.apps/ecommerce-super-pets-6d96bf6985    3         3         3       28s
replicaset.apps/ecommerce-super-pets-844b758fb4    0         0         0       10m
replicaset.apps/ecommerce-super-pets-86688ccb84    0         0         0       2m21s

NAME                                                          REFERENCE                          TARGETS
     MINPODS   MAXPODS   REPLICAS   AGE
horizontalpodautoscaler.autoscaling/ecommerce-super-pets   Deployment/ecommerce-super-pets   cpu: <unknown>/2
0%   1         5         3          14m
```

```
horizontalpodautoscaler.autoscaling/ecommerce-super-pets   Deployment/ecommerce-super-pets   cpu: <unknown>/2
0%   1         5         3          14m
haydenyeung@HaydenYeung-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6d96bf6985-rkr78haydenyeung@HaydenYeun
g-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6d96bf6985-rkr78haydenyeung@HaydenYeun
g-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6d96bf6985-qddk2haydenyeung@HaydenYeun
g-virtualbox:~/my-container$ curl 10.152.183.239
Hello ::ffff:10.0.2.15 , this is Super Pets v1 on ecommerce-super-pets-6d96bf6985-j2ctthaydenyeung@HaydenYeun
```

I had to remove the readinessProbe in order for all 3 pods running – this can be explained that these pods are healthy (proved by curl-able). The readinessProbe, as introduced from previous lecture, is that it will check on the status of the pod upon its creation and the time was set too low (10s for an Ubuntu VM with low spec in RAM) will always result in failed (CrashLoopBackOff).

Theoretically speaking: in an ideal node with good computational spec having readinessProbe will prevent the error we encountered (expected to encountered in task 1 instead of error due to "spamming" curl command on low computing spec node).

Challenge Task



I had visited the mentioned page, and will repeat the visit frequently in the near future as I will try to practice deploying my personal projects with k8s.

3. Quiz Result

Final-Term Quiz

Add to ePortfolio

HAYDEN DUONG (username: s222610226)

Individual Attempts	Grade
Attempt 1	9 / 10 - 90 %
Overall Grade (highest attempt):	9 / 10 - 90 %