

OTOT Task A3 Report

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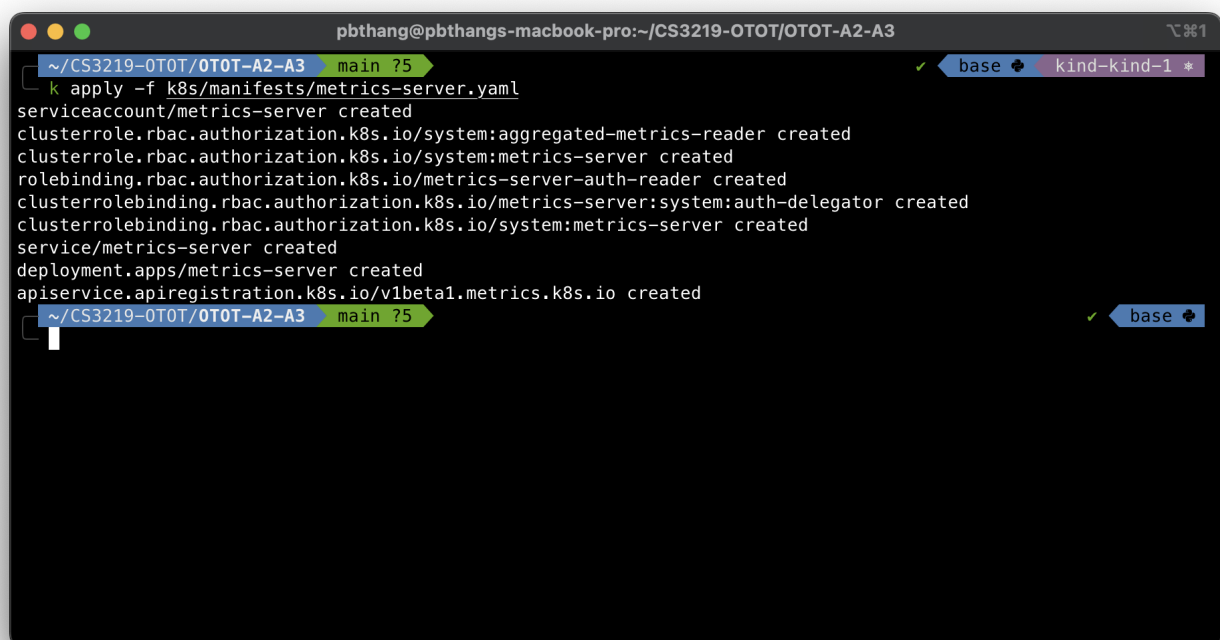
Matric No: A0219715B

Repo: <https://github.com/pbthang/OTOT-A2-A3>

Task A3.1

- Create a metrics server and verify that it is working:

```
kubectl apply -f k8s/kind/metrics-server.yml  
kubectl -nkube-system get deployment -w
```



A terminal window titled 'pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3' with tabs for 'base' and 'kind-kind-1'. The terminal shows the command 'k apply -f k8s/manifests/metrics-server.yml' being executed. The output lists the creation of various Kubernetes resources: serviceaccount/metrics-server, clusterrole.rbac.authorization.k8s.io/system:aggregated-metrics-reader, clusterrole.rbac.authorization.k8s.io/system:metrics-server, rolebinding.rbac.authorization.k8s.io/metrics-server-auth-reader, clusterrolebinding.rbac.authorization.k8s.io/metrics-server:system:auth-delegator, service/metrics-server, deployment.apps/metrics-server, and apiservice.apiregistration.k8s.io/v1beta1.metrics.k8s.io. The prompt returns to '~ /CS3219-OTOT/OTOT-A2-A3 main ?5'.

- Create a **HorizontalPodAutoscaler** and verify that it is working:

```
kubectl apply -f k8s/manifests/backend-hpa.yml  
kubectl get hpa
```

pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3

```

~/CS3219-OTOT/OTOT-A2-A3 main ?6
k apply -f k8s/manifests/backend-hpa.yml
horizontalpodautoscaler.autoscaling/backend created
~/CS3219-OTOT/OTOT-A2-A3 main ?6
k get po
NAME                                READY   STATUS    RESTARTS   AGE
backend-54db4b9667-2k55w            1/1     Running   0           158m
backend-54db4b9667-6bhvf            1/1     Running   0           158m
backend-54db4b9667-brjgk            1/1     Running   0           158m
~/CS3219-OTOT/OTOT-A2-A3 main ?6
k get po
NAME                                READY   STATUS    RESTARTS   AGE
backend-54db4b9667-2k55w            1/1     Running   0           158m
backend-54db4b9667-6bhvf            1/1     Running   0           158m
backend-54db4b9667-brjgk            1/1     Running   0           158m
~/CS3219-OTOT/OTOT-A2-A3 main ?6

```

- Perform load test using a tool of your choice, A script `stress_test.sh` for load testing is provided in the repo. Run `kubectl get po` to get the number of replica pods running.

pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3

```

~/CS3219-OTOT/OTOT-A2-A3 main ?8
k get po
NAME                                READY   STATUS    RESTARTS   AGE
backend-54db4b9667-77g14            1/1     Running   0           30s
backend-54db4b9667-8sjx7            1/1     Running   0           30s
backend-54db4b9667-vxjq9            1/1     Running   0           30s
~/CS3219-OTOT/OTOT-A2-A3 main ?8

```

Initial scaling: 3 replicas

```
pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3
~/CS3219-OTOT/OTOT-A2-A3 main 78
k get po
NAME                                READY   STATUS    RESTARTS   AGE
backend-54db4b9667-77g14            1/1     Running   0           3m11s
backend-54db4b9667-8sjx7            1/1     Running   0           3m11s
backend-54db4b9667-d58n8            1/1     Running   0           33s
backend-54db4b9667-mnsch            1/1     Running   0           33s
backend-54db4b9667-vjcs1            1/1     Running   0           33s
backend-54db4b9667-vxjq9            1/1     Running   0           3m11s
~/CS3219-OTOT/OTOT-A2-A3 main 78
```

After load test: 6 replicas

```
pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3
~/CS3219-OTOT/OTOT-A2-A3 main 78
k get po
NAME                                READY   STATUS    RESTARTS   AGE
backend-54db4b9667-77g14            1/1     Running   0           26m
~/CS3219-OTOT/OTOT-A2-A3 main 78
```

After a long idle period: 1 replica

- Verify the events happening during the load test:

```
kubectl describe hpa/backend
```

```

pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3
~/CS3219-OTOT/OTOT-A2-A3 main 78
k describe hpa
Warning: autoscaling/v2beta2 HorizontalPodAutoscaler is deprecated in v1.23+, unavailable in v1.26+; use autoscaling/v2 HorizontalPodAutoscaler
Name: backend
Namespace: default
Labels: <none>
Annotations: <none>
CreationTimestamp: Wed, 26 Oct 2022 18:23:48 +0800
Reference: Deployment/backend
Metrics: ( current / target )
  resource cpu on pods (as a percentage of request): 0% (0) / 50%
Min replicas: 1
Max replicas: 10
Deployment pods: 1 current / 1 desired
Conditions:
  Type            Status  Reason                        Message
  ----            -
  AbleToScale     True    ScaledDownStabilized         recent recommendations were higher than current one, applying the highest recent recommendation
  ScalingActive   True    ValidMetricFound              the HPA was able to successfully calculate a replica count from cpu resource utilization (percentage of request)
  ScalingLimited  False   DesiredWithinRange            the desired count is within the acceptable range
Events:
  Type            Reason              Age   From                      Message
  ----            -
  Normal          SuccessfulRescale   58m   horizontal-pod-autoscaler  New size: 6; reason: cpu resource utilization (percentage of request) above target
  Normal          SuccessfulRescale   53m   horizontal-pod-autoscaler  New size: 1; reason: All metrics below target
~/CS3219-OTOT/OTOT-A2-A3 main 78

```

Task A3.2

- View the nodes with their zones:

```
kubectl get nodes -L topology.kubernetes.io/zone
```

```

pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3
~/CS3219-OTOT/OTOT-A2-A3 main 78
kubectl get nodes -L topology.kubernetes.io/zone
NAME                STATUS    ROLES    AGE   VERSION   ZONE
kind-1-control-plane Ready    control-plane  7h35m v1.25.2
kind-1-worker        Ready    <none>        7h34m v1.25.2   a
kind-1-worker2        Ready    <none>        7h34m v1.25.2   a
kind-1-worker3        Ready    <none>        7h34m v1.25.2   b
~/CS3219-OTOT/OTOT-A2-A3 main 79

```

- Create a zone-aware backend deployment and verify that it is working:

```
kubectl apply -f k8s/manifests/backend-zone-aware-deployment.yml
kubectl get deploy/backend-zone-aware -w
```

```

pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3
~/CS3219-OTOT/OTOT-A2-A3 main 79
k apply -f k8s/manifests/backend-zone-aware-deployment.yml
deployment.apps/backend-zone-aware created
~/CS3219-OTOT/OTOT-A2-A3 main 79
kubectll get deploy/backend-zone-aware -w
NAME                READY    UP-TO-DATE    AVAILABLE    AGE
backend-zone-aware  4/10     10             4             8s
backend-zone-aware  5/10     10             5             8s
backend-zone-aware  6/10     10             6            10s
backend-zone-aware  7/10     10             7            11s
backend-zone-aware  8/10     10             8            12s
backend-zone-aware  9/10     10             9            13s
backend-zone-aware 10/10    10             10           14s
^C
~/CS3219-OTOT/OTOT-A2-A3 main 79

```

- Verify that the Pods are distributed evenly across the two zones:

```
kubectll get po -lapp=backend-zone-aware -owide --sort-by='.spec.nodeName'
```

```

pbthang@pbthangs-macbook-pro:~/CS3219-OTOT/OTOT-A2-A3
~/CS3219-OTOT/OTOT-A2-A3 main 78
kubectll get po -lapp=backend-zone-aware -owide --sort-by='.spec.nodeName'
NAME                                READY    STATUS    RESTARTS    AGE    IP            NODE                NOMINATED NODE    READINESS GATES
backend-zone-aware-675b8c6f7f-mfmt9 1/1      Running   0            4m3s   10.244.3.12    kind-1-worker       <none>             <none>
backend-zone-aware-675b8c6f7f-c65tc 1/1      Running   0            4m3s   10.244.2.17    kind-1-worker2      <none>             <none>
backend-zone-aware-675b8c6f7f-gfc8l 1/1      Running   0            4m3s   10.244.2.18    kind-1-worker2      <none>             <none>
backend-zone-aware-675b8c6f7f-hch6b 1/1      Running   0            4m3s   10.244.2.19    kind-1-worker2      <none>             <none>
backend-zone-aware-675b8c6f7f-twmmq 1/1      Running   0            4m3s   10.244.2.16    kind-1-worker2      <none>             <none>
backend-zone-aware-675b8c6f7f-6gkth 1/1      Running   0            4m3s   10.244.1.25    kind-1-worker3      <none>             <none>
backend-zone-aware-675b8c6f7f-gl77m 1/1      Running   0            4m3s   10.244.1.24    kind-1-worker3      <none>             <none>
backend-zone-aware-675b8c6f7f-s29cn 1/1      Running   0            4m3s   10.244.1.23    kind-1-worker3      <none>             <none>
backend-zone-aware-675b8c6f7f-tbvc5 1/1      Running   0            4m3s   10.244.1.26    kind-1-worker3      <none>             <none>
backend-zone-aware-675b8c6f7f-vykdz 1/1      Running   0            4m3s   10.244.1.22    kind-1-worker3      <none>             <none>
~/CS3219-OTOT/OTOT-A2-A3 main 78

```