Assignment #08: Kubernetes Lab

Main Kubectl Commands - K8s CLI

```
[c:.] Command Prompt - kubectl edit deployment nginx-depl
No resources found in default namespace.

C:\Users\metar>kubectl get services
NAME          TYPE         CLUSTER-IP      EXTERNAL-IP      PORT(S)     AGE
kubernetes    ClusterIP    10.96.0.1       <none>           443/TCP     119m

C:\Users\metar>kubectl create depolyment nginx-depl --image=nginx
Error: unknown flag: --image
See 'kubectl create --help' for usage.

C:\Users\metar>kubectl create deployment nginx-depl --image=nginx
deployment.apps/nginx-depl created

C:\Users\metar>kubectl get deployment
NAME          READY     UP-TO-DATE     AVAILABLE     AGE
nginx-depl    1/1       1              1             33s

C:\Users\metar>kubectl get pod
NAME                          READY     STATUS      RESTARTS     AGE
nginx-depl-5ddc44dd46-m4kg4   1/1       Running     0            54s

C:\Users\metar>kubectl get replicaset
NAME                    DESIRED     CURRENT     READY     AGE
nginx-depl-5ddc44dd46   1           1           1         109s

C:\Users\metar>kubectl edit deployment
Edit cancelled, no changes made.

C:\Users\metar>kubectl edit deployment nginx-depl
_
```

```yaml
# Please edit the object below. Lines beginning with a '#' will be ignored,
# and an empty file will abort the edit. If an error occurs while saving this file will be
# reopened with the relevant failures.
#
apiVersion: apps/v1
kind: Deployment
metadata:
  annotations:
    deployment.kubernetes.io/revision: "1"
  creationTimestamp: "2022-03-18T13:16:56Z"
  generation: 1
  labels:
    app: nginx-depl
  name: nginx-depl
  namespace: default
  resourceVersion: "3182"
  uid: fbc3524f-2cc5-457c-8bc1-be8935a06125
spec:
  progressDeadlineSeconds: 600
  replicas: 1
  revisionHistoryLimit: 10
  selector:
    matchLabels:
      app: nginx-depl
  strategy:
    rollingUpdate:
      maxSurge: 25%
      maxUnavailable: 25%
    type: RollingUpdate
  template:
    metadata:
      creationTimestamp: null
      labels:
        app: nginx-depl
    spec:
      containers:
      - image: nginx
        imagePullPolicy: Always
        name: nginx
        resources: {}
        terminationMessagePath: /dev/termination-log
        terminationMessagePolicy: File
      dnsPolicy: ClusterFirst
      restartPolicy: Always
      schedulerName: default-scheduler
      securityContext: {}
      terminationGracePeriodSeconds: 30
status:
  availableReplicas: 1
  conditions:
  - lastTransitionTime: "2022-03-18T13:17:18Z"
    lastUpdateTime: "2022-03-18T13:17:18Z"
    message: Deployment has minimum availability.
    reason: MinimumReplicasAvailable
    status: "True"
    type: Available
  - lastTransitionTime: "2022-03-18T13:16:56Z"
    lastUpdateTime: "2022-03-18T13:17:18Z"
    message: ReplicaSet "nginx-depl-5ddc44dd46" has successfully progressed.
    reason: NewReplicaSetAvailable
    status: "True"
    type: Progressing
  observedGeneration: 1
  readyReplicas: 1
  replicas: 1
  updatedReplicas: 1
```

```
C:\Users\metar>kubectl get deployment
NAME         READY   UP-TO-DATE   AVAILABLE   AGE
nginx-depl   1/1     1            1           33s

C:\Users\metar>kubectl get pod
NAME                          READY   STATUS    RESTARTS   AGE
nginx-depl-5ddc44dd46-m4kg4   1/1     Running   0          54s

C:\Users\metar>kubectl get replicaset
NAME                    DESIRED   CURRENT   READY   AGE
nginx-depl-5ddc44dd46   1         1         1       109s

C:\Users\metar>kubectl edit deployment
Edit cancelled, no changes made.

C:\Users\metar>kubectl edit deployment nginx-depl
deployment.apps/nginx-depl edited

C:\Users\metar>kubectl get deployment
NAME         READY   UP-TO-DATE   AVAILABLE   AGE
nginx-depl   1/1     1            1           7m19s

C:\Users\metar>kubectl get get pod
error: the server doesn't have a resource type "get"

C:\Users\metar>kubectl get pod
NAME                          READY   STATUS    RESTARTS   AGE
nginx-depl-7d459cf5c8-bmdw8   1/1     Running   0          54s

C:\Users\metar>kubectl get replicaset
NAME                    DESIRED   CURRENT   READY   AGE
nginx-depl-5ddc44dd46   0         0         0       8m18s
nginx-depl-7d459cf5c8   1         1         1       89s
```

```
C:\Users\metar>kubectl get replicaset
NAME                      DESIRED   CURRENT   READY   AGE
nginx-depl-5ddc44dd46     0         0         0       9m53s
nginx-depl-7d459cf5c8     1         1         1       3m4s

C:\Users\metar>kubectl logs nginx-depl-7d459cf5c8
Error from server (NotFound): pods "nginx-depl-7d459cf5c8" not found

C:\Users\metar>kubectl get pod
NAME                        READY   STATUS    RESTARTS   AGE
nginx-depl-7d459cf5c8-bmdw8 1/1     Running   0          4m53s

C:\Users\metar>kubectl logs nginx-depl-7d459cf5c8-bmdw8

C:\Users\metar>kubectl create deploymet mongo-depl --image=mongo
Error: unknown flag: --image
See 'kubectl create --help' for usage.

C:\Users\metar>kubectl create deployment mongo-depl --image=mongo
deployment.apps/mongo-depl created

C:\Users\metar>kubectl get pod
NAME                        READY   STATUS             RESTARTS   AGE
mongo-depl-85ddc6d66-l4rjt  0/1     ContainerCreating  0          14s
nginx-depl-7d459cf5c8-bmdw8 1/1     Running            0          6m10s
```

```
C:\Users\metar>kubectl describe pod mongo-depl-85ddc6d66-l4rjt
Name:          mongo-depl-85ddc6d66-l4rjt
Namespace:     default
Priority:      0
Node:          minikube/192.168.49.2
Start Time:    Fri, 18 Mar 2022 20:29:41 +0700
Labels:        app=mongo-depl
               pod-template-hash=85ddc6d66
Annotations:   <none>
Status:        Running
IP:            172.17.0.3
IPs:
  IP:          172.17.0.3
Controlled By: ReplicaSet/mongo-depl-85ddc6d66
Containers:
  mongo:
    Container ID:   docker://e62686e47cd44daf43a7ba3539a2ef1ec05d423d6fb580f4af926dec628e0961
    Image:          mongo
    Image ID:       docker-pullable://mongo@sha256:03ef0031c1642df26d9d3efa9d57e24929672e1ae7aba5818227752089adde36
    Port:           <none>
    Host Port:      <none>
    State:          Running
      Started:      Fri, 18 Mar 2022 20:30:31 +0700
    Ready:          True
    Restart Count:  0
    Environment:    <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-jrhz9 (ro)
Conditions:
  Type              Status
  Initialized       True
  Ready             True
  ContainersReady   True
  PodScheduled      True
Volumes:
  kube-api-access-jrhz9:
    Type:                    Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds:  3607
    ConfigMapName:           kube-root-ca.crt
    ConfigMapOptional:       <nil>
    DownwardAPI:             true
QoS Class:                   BestEffort
Node-Selectors:              <none>
Tolerations:                 node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                             node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type    Reason     Age    From               Message
  ----    ------     ----   ----               -------
  Normal  Scheduled  2m48s  default-scheduler  Successfully assigned default/mongo-depl-85ddc6d66-l4rjt to minikube
  Normal  Pulling    2m47s  kubelet            Pulling image "mongo"
  Normal  Pulled     118s   kubelet            Successfully pulled image "mongo" in 48.4295684s
  Normal  Created    118s   kubelet            Created container mongo
  Normal  Started    118s   kubelet            Started container mongo

C:\Users\metar>
```

```
C:\Users\metar>kubectl get pod
NAME                            READY    STATUS     RESTARTS    AGE
mongo-depl-85ddc6d66-l4rjt      1/1      Running    0           5m4s
nginx-depl-7d459cf5c8-bmdw8     1/1      Running    0           11m

C:\Users\metar>kubectl exec -it mongo-depl-85ddc6d66-l4rjt -- bin/bash
root@mongo-depl-85ddc6d66-l4rjt:/# ls
bin   data  docker-entrypoint-initdb.d  home        lib    lib64   media  opt   root  sbin  sys  usr
boot  dev   etc                         js-yaml.js  lib32  libx32  mnt    proc  run   srv   tmp  var
root@mongo-depl-85ddc6d66-l4rjt:/# exit
exit

C:\Users\metar>kubectl get deployment
NAME          READY   UP-TO-DATE    AVAILABLE    AGE
mongo-depl    1/1     1             1            10m
nginx-depl    1/1     1             1            23m

C:\Users\metar>kubectl get pod
NAME                            READY    STATUS     RESTARTS    AGE
mongo-depl-85ddc6d66-l4rjt      1/1      Running    0           11m
nginx-depl-7d459cf5c8-bmdw8     1/1      Running    0           17m

C:\Users\metar>kubectl delete deployment mongo-depl
deployment.apps "mongo-depl" deleted

C:\Users\metar>kubectl get pod
NAME                            READY    STATUS     RESTARTS    AGE
nginx-depl-7d459cf5c8-bmdw8     1/1      Running    0           21m

C:\Users\metar>kubectl get replicaset
NAME                   DESIRED    CURRENT    READY    AGE
nginx-depl-5ddc44dd46  0          0          0        29m
nginx-depl-7d459cf5c8  1          1          1        22m

C:\Users\metar>kubectl delete deployment nginx-depl
deployment.apps "nginx-depl" deleted

C:\Users\metar>kubectl get replicaset
No resources found in default namespace.
```

K8s YAML Configuration File

```
C:\Users\metar\University\SA\assignment8>kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment created

C:\Users\metar\University\SA\assignment8>kubectl apply -f nginx-service.yaml
service/nginx-service created

C:\Users\metar\University\SA\assignment8>kubectl get pod
NAME                                 READY    STATUS     RESTARTS    AGE
nginx-deployment-599bdddccc-dcg22    1/1      Running    0           22s
nginx-deployment-599bdddccc-q7lmr    1/1      Running    0           22s

C:\Users\metar\University\SA\assignment8>kubectl get service
NAME             TYPE         CLUSTER-IP      EXTERNAL-IP    PORT(S)     AGE
kubernetes       ClusterIP    10.96.0.1       <none>         443/TCP     168m
nginx-service    ClusterIP    10.102.124.87   <none>         80/TCP      22s
```

```
C:\Users\metar\University\SA\assignment8>kubectl describe service nginx-service
Name:              nginx-service
Namespace:         default
Labels:            <none>
Annotations:       <none>
Selector:          app=nginx
Type:              ClusterIP
IP Family Policy:  SingleStack
IP Families:       IPv4
IP:                10.102.124.87
IPs:               10.102.124.87
Port:              <unset>  80/TCP
TargetPort:        8080/TCP
Endpoints:         172.17.0.3:8080,172.17.0.4:8080
Session Affinity:  None
Events:            <none>
```



```
C:\Users\metar\University\SA\assignment8>kubectl delete -f nginx-deployment.yaml
deployment.apps "nginx-deployment" deleted

C:\Users\metar\University\SA\assignment8>kubectl delete -f nginx-service.yaml
service "nginx-service" deleted
```

Demo Project: MongoDB and MongoExpress

```
C:\Users\metar\University\SA\assignment8>kubectl apply -f mongo-secret.yaml
secret/mongodb-secret created

C:\Users\metar\University\SA\assignment8>kubectl get secret
NAME                    TYPE                                  DATA    AGE
default-token-4xjn2     kubernetes.io/service-account-token   3       3h6m
mongodb-secret          Opaque                                2       17s

C:\Users\metar\University\SA\assignment8>kubectl apply -f mongo.yaml
deployment.apps/mongodb-deployment created
service/mongodb-service created

C:\Users\metar\University\SA\assignment8>kubectl get all
NAME                                        READY    STATUS              RESTARTS    AGE
pod/mongodb-deployment-7bb6c6c4c7-2bzj5     0/1      ContainerCreating   0           11s

NAME                        TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)      AGE
service/kubernetes          ClusterIP   10.96.0.1       <none>        443/TCP      3h7m
service/mongodb-service     ClusterIP   10.111.68.162   <none>        27017/TCP    11s

NAME                                    READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mongodb-deployment      0/1     1            0           11s

NAME                                              DESIRED   CURRENT   READY   AGE
replicaset.apps/mongodb-deployment-7bb6c6c4c7     1         1         0       11s

C:\Users\metar\University\SA\assignment8>kubectl get pod
NAME                                    READY   STATUS    RESTARTS   AGE
mongodb-deployment-7bb6c6c4c7-2bzj5     1/1     Running   0          35s

C:\Users\metar\University\SA\assignment8>kubectl get pod --watch
NAME                                    READY   STATUS    RESTARTS   AGE
mongodb-deployment-7bb6c6c4c7-2bzj5     1/1     Running   0          46s
```

```
C:\Windows\System32\cmd.exe
C:\Users\metar\University\SA\assignment8>kubectl get service
NAME              TYPE         CLUSTER-IP       EXTERNAL-IP    PORT(S)     AGE
kubernetes        ClusterIP    10.96.0.1        <none>         443/TCP     3h11m
mongodb-service   ClusterIP    10.111.68.162    <none>         27017/TCP   3m56s

C:\Users\metar\University\SA\assignment8>kubectl get pod -o wide
NAME                              READY   STATUS    RESTARTS   AGE     IP           NODE       NOMINATED NODE   READINESS GATES
mongodb-deployment-7bb6c6c4c7-2bzj5   1/1   Running   0        4m28s   172.17.0.3   minikube   <none>           <none>

C:\Users\metar\University\SA\assignment8>kubectl get all | grep mongodb
'grep' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\metar\University\SA\assignment8>kubectl appl -f mongo-configmap.yaml
Error: unknown command "appl" for "kubectl"

Did you mean this?
        apply

Run 'kubectl --help' for usage.

C:\Users\metar\University\SA\assignment8>kubectl apply -f mongo-configmap.yaml
configmap/mongodb-configmap created

C:\Users\metar\University\SA\assignment8>kubectl apply -f mongo-express.yaml
deployment.apps/mongo-express created
service/mongo-express-service created

C:\Users\metar\University\SA\assignment8>kubectl get pod
NAME                              READY   STATUS             RESTARTS   AGE
mongo-express-68c4748bd6-szkhq    0/1     ContainerCreating  0          20s
mongodb-deployment-7bb6c6c4c7-2bzj5   1/1   Running          0          12m

C:\Users\metar\University\SA\assignment8>kubectl get pod
NAME                              READY   STATUS    RESTARTS   AGE
mongo-express-68c4748bd6-szkhq    1/1     Running   0          52s
mongodb-deployment-7bb6c6c4c7-2bzj5   1/1   Running   0        13m

C:\Users\metar\University\SA\assignment8>kubectl get service
NAME                    TYPE           CLUSTER-IP       EXTERNAL-IP    PORT(S)          AGE
kubernetes              ClusterIP      10.96.0.1        <none>         443/TCP          3h22m
mongo-express-service   LoadBalancer   10.109.115.84    <pending>      8081:30000/TCP   2m15s
mongodb-service         ClusterIP      10.111.68.162    <none>         27017/TCP        14m
```
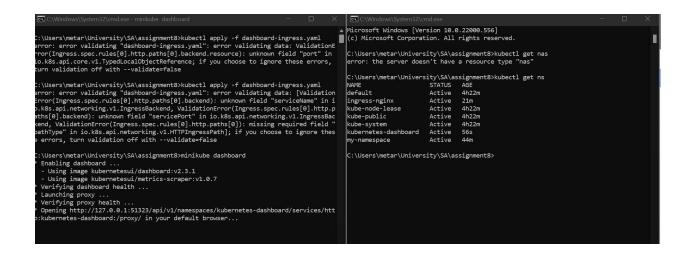
Organizing your components with K8s Namespaces

Use Cases when to use Namespaces:

1. Structure your components
2. Avoid conflicts between team
3. Share services between different envionments
4. Access and Resource Limit on Namespaces Level

```
C:\Users\metar\University\SA\assignment8>kubectl get namespace
NAME              STATUS   AGE
default           Active   3h36m
kube-node-lease   Active   3h36m
kube-public       Active   3h36m
kube-system       Active   3h36m

C:\Users\metar\University\SA\assignment8>kubectl cluster-info
Kubernetes control plane is running at https://127.0.0.1:63104
CoreDNS is running at https://127.0.0.1:63104/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.

C:\Users\metar\University\SA\assignment8>kubectl create namespace my-namespace
namespace/my-namespace created

C:\Users\metar\University\SA\assignment8>kubectl get namespace
NAME              STATUS   AGE
default           Active   3h37m
kube-node-lease   Active   3h37m
kube-public       Active   3h37m
kube-system       Active   3h37m
my-namespace      Active   8s

C:\Users\metar\University\SA\assignment8>kubectl apply -f msql-configmap.yaml
error: the path "msql-configmap.yaml" does not exist

C:\Users\metar\University\SA\assignment8>kubectl apply -f mysql-configmap.yaml
configmap/msql-configmap created

C:\Users\metar\University\SA\assignment8>kubectl get configmap
NAME               DATA   AGE
kube-root-ca.crt   1      3h51m
mongodb-configmap  1      32m
msql-configmap     1      20s

C:\Users\metar\University\SA\assignment8>kubectl get configmap -n default
NAME               DATA   AGE
kube-root-ca.crt   1      3h52m
mongodb-configmap  1      32m
msql-configmap     1      57s

C:\Users\metar\University\SA\assignment8>kubectl apply -f mysql-configmap.yaml --namespace=my-namespace
configmap/msql-configmap created

C:\Users\metar\University\SA\assignment8>kubectl apply -f mysql-configmap.yaml --namespace=my-namespace
configmap/msql-configmap unchanged

C:\Users\metar\University\SA\assignment8>kubectl get all -n my-namespace
No resources found in my-namespace namespace.

C:\Users\metar\University\SA\assignment8>kubectl get configmap -n my-namespace
NAME               DATA   AGE
kube-root-ca.crt   1      17m
msql-configmap     1      115s

C:\Users\metar\University\SA\assignment8>
```

K8s Ingress explained

C:\Windows\System32\cmd.exe - minikube dashboard

C:\Users\metar\University\SA\assignment8>kubectl apply -f dashboard-ingress.yaml
error: error validating "dashboard-ingress.yaml": error validating data: ValidationE
rror(Ingress.spec.rules[0].http.paths[0].backend.resource): unknown field "port" in
io.k8s.api.core.v1.TypedLocalObjectReference; if you choose to ignore these errors,
turn validation off with --validate=false

C:\Users\metar\University\SA\assignment8>kubectl apply -f dashboard-ingress.yaml
error: error validating "dashboard-ingress.yaml": error validating data: [Validation
Error(Ingress.spec.rules[0].http.paths[0].backend): unknown field "serviceName" in i
o.k8s.api.networking.v1.IngressBackend, ValidationError(Ingress.spec.rules[0].http.p
aths[0].backend): unknown field "servicePort" in io.k8s.api.networking.v1.IngressBac
kend, ValidationError(Ingress.spec.rules[0].http.paths[0]): missing required field "
pathType" in io.k8s.api.networking.v1.HTTPIngressPath]; if you choose to ignore thes
e errors, turn validation off with --validate=false

C:\Users\metar\University\SA\assignment8>minikube dashboard
* Enabling dashboard ...
  - Using image kubernetesui/dashboard:v2.3.1
  - Using image kubernetesui/metrics-scraper:v1.0.7
* Verifying dashboard health ...
* Launching proxy ...
* Verifying proxy health ...
* Opening http://127.0.0.1:51323/api/v1/namespaces/kubernetes-dashboard/services/htt
p:kubernetes-dashboard:/proxy/ in your default browser...

C:\Windows\System32\cmd.exe

Microsoft Windows [Version 10.0.22000.556]
(c) Microsoft Corporation. All rights reserved.

C:\Users\metar\University\SA\assignment8>kubectl get nas
error: the server doesn't have a resource type "nas"

C:\Users\metar\University\SA\assignment8>kubectl get ns
NAME   STATUS   AGE
default   Active   4h22m
ingress-nginx   Active   21m
kube-node-lease   Active   4h22m
kube-public   Active   4h22m
kube-system   Active   4h22m
kubernetes-dashboard   Active   56s
my-namespace   Active   44m

C:\Users\metar\University\SA\assignment8>

```
C:\Users\metar\University\SA\assignment8>kubectl get all -n kubernetes-dashboard
NAME                                              READY   STATUS    RESTARTS   AGE
pod/dashboard-metrics-scraper-58549894f-vzxt2     1/1     Running   0          2m35s
pod/kubernetes-dashboard-ccd587f44-pmsgn          1/1     Running   0          2m35s

NAME                                TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)    AGE
service/dashboard-metrics-scraper   ClusterIP   10.110.221.132   <none>        8000/TCP   2m35s
service/kubernetes-dashboard        ClusterIP   10.102.34.45     <none>        80/TCP     2m35s

NAME                                         READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/dashboard-metrics-scraper    1/1     1            1           2m35s
deployment.apps/kubernetes-dashboard         1/1     1            1           2m35s

NAME                                                    DESIRED   CURRENT   READY   AGE
replicaset.apps/dashboard-metrics-scraper-58549894f     1         1         1       2m35s
replicaset.apps/kubernetes-dashboard-ccd587f44          1         1         1       2m35s
```

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