OPERATING KUBERNETES

PRODUCTION READINESS

```
C:\Windows\System32> cd kubernetes

C:\Windows\System32\kubernetes>kubectl apply -f labs/productionizing/specs/whoami
deployment.apps/whoami created
service/whoami-np created
service/whoami-lb created
```

```
PS C:\WINDOWS\system32\kubernetes> Set-ExecutionPolicy -ExecutionPolicy Unrestricted -Scope Process -Force; . ./scripts/
windows-tools.ps1
PS C:\WINDOWS\system32\kubernetes> curl http://localhost:8010
>>
Hostname: whoami-7647cd58d9-8pflq
IP: 10.1.0.48
IP: fe80::412:18ff:fe6c:2ebc
PS C:\WINDOWS\system32\kubernetes> curl --data '503' http://localhost:8010/health
>>
PS C:\WINDOWS\system32\kubernetes>
```

```
>>
PS C:\WINDOWS\system32\kubernetes> curl -i http://localhost:8010
>>
HTTP/1.1 200 OK
Date: Thu, 08 May 2025 07:46:20 GMT
Content-Length: 78
Content-Type: text/plain; charset=utf-8

Hostname: whoami-7647cd58d9-m79n5
IP: 10.1.0.49
IP: fe80::1833:c3ff:fef8:df73
PS C:\WINDOWS\system32\kubernetes>
```

```
PS C:\WINDOWS\system32\kubernetes> & "C:\WINDOWS\system32\kubernetes\kubectl.exe" apply -f "C:\WINDOWS\system32\kubernet
es\labs\productionizing\specs\whoami\update\deployment-with-readiness.yaml"
>>
deployment.apps/whoami configured
PS C:\WINDOWS\system32\kubernetes> & "C:\WINDOWS\system32\kubernetes\kubectl.exe" wait --for=condition=Ready pod -l app=
whoami,update=readiness
>>
pod/whoami-5d5d68bb56-5qmtp condition met
pod/whoami-5d5d68bb56-bqn5t condition met
```

```
PS C:\WINDOWS\system32\kubernetes> & "C:\WINDOWS\system32\kubernetes\kubectl.exe" get pods -l app=whoami,update=readines
s
>>
NAME                       READY   STATUS    RESTARTS   AGE
whoami-5d5d68bb56-5qmtp    1/1     Running   0          97s
whoami-5d5d68bb56-bqn5t    1/1     Running   0          95s
```

```
PS C:\WINDOWS\system32\kubernetes> & "C:\WINDOWS\system32\kubernetes\kubectl.exe" port-forward pod/whoami-5d5d68bb56-5qm
tp 8010:80
>>
Forwarding from 127.0.0.1:8010 -> 80
```

```
C:\Windows\System32>curl --data "503" http://localhost:8010/health

C:\Windows\System32>
C:\Windows\System32>kubectl get po -l app=whoami --watch
NAME                        READY   STATUS    RESTARTS       AGE
whoami-5d5d68bb56-5qmtp     1/1     Running   1 (24m ago)    4d9h
whoami-5d5d68bb56-bqn5t     1/1     Running   1 (24m ago)    4d9h
whoami-5d5d68bb56-5qmtp     0/1     Running   1 (24m ago)    4d9h
```

```
C:\Windows\System32>
C:\Windows\System32>kubectl get endpoints whoami-np
NAME         ENDPOINTS        AGE
whoami-np    10.1.0.59:80     4d10h

C:\Windows\System32>
C:\Windows\System32>curl http://localhost:8010
Hostname: whoami-5d5d68bb56-bqn5t
IP: 10.1.0.59
IP: fe80::f417:e8ff:fea9:2d19
```

```
D:\kubernetes>kubectl apply -f labs/productionizing/specs/metrics-server
serviceaccount/metrics-server created
clusterrole.rbac.authorization.k8s.io/system:aggregated-metrics-reader created
clusterrole.rbac.authorization.k8s.io/system:metrics-server created
rolebinding.rbac.authorization.k8s.io/metrics-server-auth-reader created
clusterrolebinding.rbac.authorization.k8s.io/metrics-server:system:auth-delegator created
clusterrolebinding.rbac.authorization.k8s.io/system:metrics-server created
service/metrics-server created
deployment.apps/metrics-server created
apiservice.apiregistration.k8s.io/v1beta1.metrics.k8s.io created
```

```
erD:\kubernetes>
 D:\kubernetes>kubectl top nodes
 NAME             CPU(cores)   CPU(%)   MEMORY(bytes)   MEMORY(%)
 docker-desktop   1124m        14%      2686Mi          72%
```

```
D:\kubernetes>
D:\kubernetes>kubectl apply -f labs/productionizing/specs/pi
deployment.apps/pi-web created
horizontalpodautoscaler.autoscaling/pi-cpu created
service/pi-np created
service/pi-lb created
```

```
D:\kubernetes>
D:\kubernetes>kubectl top pod -l app=pi-web
NAME                        CPU(cores)    MEMORY(bytes)
pi-web-676c759cf6-d6r8b     7m            18Mi
```

```
D:\kubernetes>
D:\kubernetes>kubectl get hpa pi-cpu --watch
NAME      REFERENCE          TARGETS      MINPODS    MAXPODS    REPLICAS    AGE
pi-cpu    Deployment/pi-web  cpu: 0%/75%  1          5          1           7m16s
```

```
D:\kubernetes>
D:\kubernetes>kubectl exec deploy/pi-web -- whoami
root

D:\kubernetes>kubectl exec deploy/pi-web -- cat /var/run/secrets/kubernetes.io/serviceaccount/token
```
```
eyJhbGciOiJSUzI1NiIsImtpZCI6InhNV0pyS0lORkZTam1VNjEtbzhmSjBRZ21UNUlHQV9xR0ctQU40dUlwQlUifQ.eyJhdWQiOlsiaHR0cHM6Ly9rdWJlc
m5ldGVzLmRlZmF1bHQuc3ZjLmNsdXN0ZXIubG9jYWwiXSwiZXhwIjoxNzc4NjEwNTQ0LCJpYXQiOjE3NDcwNzQ1NDQsImlzcyI6Imh0dHBzOi8va3ViZXJu
ZXRlcy5kZWZhdWx0LnN2Yy5jbHVzdGVyLmxvY2FsIiwianRpIjoiYTJlNGE5MWMtZDkyZi00ZTBkLWIyNjEtY2U0MjJjYmM1Y2NjIiwia3ViZXJuZXRlcy5pb
yI6eyJuYW1lc3BhY2UiOiJkZWZhdWx0Iiwibm9kZSI6eyJuYW1lIjoiZG9ja2VyLWRlc2t0b3AiLCJ1aWQiOiI4ODMwOGY5OC01NjMxLTQwMGEtYmU2Yy05N
DYyMjcwYjI3MTkifSwic29kIjp7Im5hbWUiOiJwaS13ZWItNjc2Yzc1OWNmNi1kNnI4YiIsInVpZCI6IjU2NmVkZjY4LWFlNzktNGFkZC1iYWE0LTM5ZDk1Z
DcwMTlhMiJ9LCJzZXJ2aWNlYWNjb3VudCI6eyJuYW1lIjoiZGVmYXVsdCIsInVpZCI6Ijk4NmVmYjYxLTViOTMtNGExYy1hMzk3LTBkNzIxYzdmMjYzMiJ9L
CJ3YXJuYWZ0ZXIiOjE3NDcwNzgxNTF9LCJuYmYiOjE3NDcwNzQ1NDQsInN1YiI6InN5c3RlbTpzZXJ2aWNlYWNjb3VudDpkZWZhdWx0Om9lZmF1bHQifQ.pV
RUWjKcgCos35mZgWvNYs2_UgbPdlf6WbV286Xr5IIrXw5LeI3rES5euB4uY6hYvcnClWy26GquwhZu4TCa6YLgOw5GvUXsTzxxJV0uamZNszRyQqsdbY_-8n
qTE9EXvUs-2mVmgYIuTKHQ_yEIi0iGyMN4ZuYiPIRtk6Ie3M8J5_qhQVyAsHbANE3X-SqFhSYp32yxXlioO57NKKPPXmKcKhN9pPWHBsEHnMUhXqYSi3Dx-C
dNQ07gZjbXFaa9URsu0RNNAp_2FkOynlN-C7OZr6PD6g0F7F_gIztOjEntXLjMBxlx3FO5wc7qe4Hd4imcdmNWC5SJcQSTTl171g
```
```
D:\kubernetes>kubectl exec deploy/pi-web -- chown root:root /app/Pi.Web.dll

D:\kubernetes>
```

```
D:\kubernetes>kubectl apply -f labs/productionizing/specs/pi-secure/
deployment.apps/pi-secure-web created
service/pi-secure-np created
service/pi-secure-lb created

D:\kubernetes>kubectl get pod -l app=pi-secure-web --watch
NAME                           READY    STATUS     RESTARTS    AGE
pi-secure-web-6c7ddb5f54-b6zj7 1/1      Running    0           8s
```

```
D:\kubernetes>kubectl apply -f labs/productionizing/specs/pi-secure/update
deployment.apps/pi-secure-web configured

D:\kubernetes>kubectl wait --for=condition=Ready pod -l app=pi-secure-web,update=ports
pod/pi-secure-web-69548dfdc-4hsgr condition met
```

Monitoring with Prometheus and Grafana

```
:\kubernetes>kubectl apply -f labs/monitoring/specs/fulfilment-processor
deployment.apps/fulfilment-processor created
service/fulfilment-processor-lb created
service/fulfilment-processor-np created

:\kubernetes>
:\kubernetes>kubectl get all -l kubernetes.courselabs.co=monitoring
NAME                              TYPE            CLUSTER-IP       EXTERNAL-IP    PORT(
)          AGE
service/fulfilment-processor-lb   LoadBalancer    10.101.107.49    localhost      9110:
0694/TCP   6s
service/fulfilment-processor-np   NodePort        10.96.87.39      <none>         9110:
0011/TCP   6s

NAME                                    READY    UP-TO-DATE    AVAILABLE    AGE
deployment.apps/fulfilment-processor    0/1      1             0            6s

:\kubernetes>
```

```
D:\kubernetes>kubectl apply -f labs/monitoring/specs/monitoring
namespace/monitoring configured
configmap/grafana-config unchanged
service/grafana-lb configured
service/grafana-np configured
secret/grafana-creds configured
deployment.apps/grafana unchanged
configmap/prometheus-config unchanged
service/prometheus unchanged
service/prometheus-np configured
deployment.apps/prometheus unchanged
serviceaccount/prometheus unchanged
clusterrole.rbac.authorization.k8s.io/prometheus unchanged
clusterrolebinding.rbac.authorization.k8s.io/prometheus unchanged

D:\kubernetes>kubectl get svc -n monitoring
NAME            TYPE            CLUSTER-IP        EXTERNAL-IP    PORT(S)             AGE
grafana-lb      LoadBalancer    10.97.137.192     localhost      3000:31267/TCP      7d6h
grafana-np      NodePort        10.107.37.186     <none>         3000:30030/TCP      7d6h
prometheus      LoadBalancer    10.111.182.124    localhost      9090:31566/TCP      7d6h
prometheus-np   NodePort        10.108.91.178     <none>         9090:30019/TCP      7d6h
```

```
D:\kubernetes>kubectl get svc -n monitoring
NAME            TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)           AGE
grafana-lb      LoadBalancer   10.97.137.192    localhost     3000:31267/TCP    7d6h
grafana-np      NodePort       10.107.37.186    <none>        3000:30030/TCP    7d6h
prometheus      LoadBalancer   10.111.182.124   localhost     9090:31566/TCP    7d6h
prometheus-np   NodePort       10.108.91.178    <none>        9090:30019/TCP    7d6h

D:\kubernetes>kubectl get svc -n monitoring
NAME            TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)           AGE
grafana-lb      LoadBalancer   10.97.137.192    localhost     3000:31267/TCP    7d6h
grafana-np      NodePort       10.107.37.186    <none>        3000:30030/TCP    7d6h
prometheus      LoadBalancer   10.111.182.124   localhost     9090:31566/TCP    7d6h
prometheus-np   NodePort       10.108.91.178    <none>        9090:30019/TCP    7d6h
```

```
D:\kubernetes>kubectl get svc -n monitoring
NAME            TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)           AGE
grafana-lb      LoadBalancer   10.97.137.192    localhost     3000:31267/TCP    7d6h
grafana-np      NodePort       10.107.37.186    <none>        3000:30030/TCP    7d6h
prometheus      LoadBalancer   10.111.182.124   localhost     9090:31566/TCP    7d6h
prometheus-np   NodePort       10.108.91.178    <none>        9090:30019/TCP    7d6h

D:\kubernetes>kubectl get svc -n monitoring
NAME            TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)           AGE
grafana-lb      LoadBalancer   10.97.137.192    localhost     3000:31267/TCP    7d6h
grafana-np      NodePort       10.107.37.186    <none>        3000:30030/TCP    7d6h
prometheus      LoadBalancer   10.111.182.124   localhost     9090:31566/TCP    7d6h
prometheus-np   NodePort       10.108.91.178    <none>        9090:30019/TCP    7d6h

D:\kubernetes>kubectl describe secret -n monitoring grafana-creds
Name:         grafana-creds
Namespace:    monitoring
Labels:       <none>
Annotations:  <none>

Type:  Opaque

Data
====
GF_SECURITY_ADMIN_PASSWORD:  4 bytes
GF_SECURITY_ADMIN_USER:      5 bytes
```

```
PS C:\Users\user> $encodedString = kubectl get secret -n monitoring grafana-creds -o jsonpath="{.data.GF_SECURITY_ADMIN_USER}"
PS C:\Users\user> [System.Text.Encoding]::UTF8.GetString([Convert]::FromBase64String($encodedString))
admin
```

```
D:\kubernetes>kubectl apply -f labs/monitoring/specs/cluster-metrics
daemonset.apps/cadvisor created
deployment.apps/kube-state-metrics created
serviceaccount/kube-state-metrics created
clusterrole.rbac.authorization.k8s.io/kube-state-metrics created
clusterrolebinding.rbac.authorization.k8s.io/kube-state-metrics created

D:\kubernetes>kubectl get pods -l kubernetes.courselabs.co=monitoring -A
NAMESPACE      NAME                                   READY    STATUS            REST
ARTS    AGE
kube-system    cadvisor-fvx2s                         0/1      ContainerCreating  0
        7s
kube-system    kube-state-metrics-6664bd99d8-7s75q    0/1      ContainerCreating  0
        7s
```

```
D:\kubernetes>kubectl delete ns,deploy,svc -l kubernetes.courselabs.co=monitoring
namespace "monitoring" deleted
deployment.apps "fulfilment-processor" deleted
service "fulfilment-processor-lb" deleted
service "fulfilment-processor-np" deleted

D:\kubernetes>kubectl delete ds,deploy -n kube-system -l kubernetes.courselabs.co=mo
nitoring
daemonset.apps "cadvisor" deleted
deployment.apps "kube-state-metrics" deleted

D:\kubernetes>
D:\kubernetes>kubectl delete clusterrole,clusterrolebinding -l kubernetes.courselabs
co=monitoring
clusterrole.rbac.authorization.k8s.io "kube-state-metrics" deleted
clusterrole.rbac.authorization.k8s.io "prometheus" deleted
clusterrolebinding.rbac.authorization.k8s.io "kube-state-metrics" deleted
clusterrolebinding.rbac.authorization.k8s.io "prometheus" deleted
```

LOGGING

```
D:\kubernetes>kubectl apply -f labs/logging/specs/fulfilment-api
deployment.apps/fulfilment-api created
service/fulfilment-api-lb created
service/fulfilment-api-np created

D:\kubernetes>kubectl logs -l app=fulfilment,component=api
Error from server (BadRequest): container "app" in pod "fulfilment-api-786b57f647-kx
h8h" is waiting to start: ContainerCreating
```

```
D:\kubernetes>kubectl apply -f labs/logging/specs/jumpbox
pod/jumpbox created
```

```
D:\kubernetes>kubectl exec -it jumpbox -- sh
/ # ls /var/log/containers
coredns-668d6bf9bc-f9rjq_kube-system_coredns-524448efe102ae2d810f80e3adfc0c7685c95ba99fb31da04eb6462e0f8f187e.log
coredns-668d6bf9bc-w6swq_kube-system_coredns-fe6f9e2b27e18ca05fe27eefee71dff1edfa6fb4995b69232f9b94eecba1e3bd.log
elasticsearch-669fb856bf-g6bt8_logging_elasticsearch-a67d12f66d9834d0903daf11bd8fb91b66fe9058bc3f6c9f46cfa9c6542c0354.lo
g
etcd-docker-desktop_kube-system_etcd-0643ec0312ae5fc28f4c96f84b3bc6d09ddc83a5e462eef099b24e84d001b6cc.log
fluent-bit-8nfg7_logging_fluent-bit-2ca41497617c81381d391e6381a347ca406b7cc9470c73b577b6c3685396ff1b.log
fulfilment-api-786b57f647-kxh8h_default_app-013cec5cbc502d430f80c1f5bd8e90a6aa00b1a505502801a13e4e3497079033.log
ingress-nginx-controller-pfp88_ingress-nginx_controller-4757eef5e9bb7b7f17988d478cfb01e4461ef49d638374b24ab9240e9ab8fb5f
.log
jumpbox_default_sleep-29ea3be2cd7c3796303d4f78df7a5c2048498c5ed44f550ac5e370e597cfe00f.log
kibana-76c47d444-mqhd9_logging_kibana-e6dfd16fb138fe17fcdb6b5ee5a7f2c5573233282e06b91bbe2690ff5d15ff5c.log
kube-apiserver-docker-desktop_kube-system_kube-apiserver-ad3416ff74af1ed989e1cbf535a021cd7a17c7781d6968394e1a84054c26bbe
b.log
kube-controller-manager-docker-desktop_kube-system_kube-controller-manager-00b8e1a8ff4ba816ca91c2486b2f0198aa22d9353a4c2
497bf7aee2c186113b4.log
kube-proxy-sbp9z_kube-system_kube-proxy-eab3fabb0a39b499218f04d7fd14d1fdfec14c8ba290988283c5bfa938d8fa80.log
kube-scheduler-docker-desktop_kube-system_kube-scheduler-31d044364f1e146e5cd74b63dfe4fce9efb3ba44e2ef46f98c576c48922359b
3.log
metrics-server-8467fcc7b7-vrlzb_kube-system_metrics-server-8ec583e535b4ec669050f7ae91d4672fd0250b363eec3ae5b7a581f42958a
f1d.log
storage-provisioner_kube-system_storage-provisioner-7bcaa3f2c6c9d9b755c9a39b258c14e80d14b5e17772e15d236cd8d71b288ce3.log
storage-provisioner_kube-system_storage-provisioner-ba4c1ba348934747fb420c02b60b37cc2e928cec7f1f29031f7f60407c76d3b0.log
```

```
D:\kubernetes>kubectl apply -f labs/logging/specs/logging
namespace/logging configured
service/elasticsearch unchanged
deployment.apps/elasticsearch unchanged
configmap/fluent-bit-config unchanged
daemonset.apps/fluent-bit unchanged
serviceaccount/fluent-bit unchanged
clusterrole.rbac.authorization.k8s.io/fluent-bit unchanged
clusterrolebinding.rbac.authorization.k8s.io/fluent-bit unchanged
service/kibana-lb configured
service/kibana-np configured
deployment.apps/kibana unchanged
```

```
D:\kubernetes>kubectl get all -n logging
NAME                             READY   STATUS    RESTARTS      AGE
pod/elasticsearch-669fb856bf-g6bt8   1/1    Running   2 (110m ago)   7d7h
pod/fluent-bit-8nfg7             1/1    Running   2 (110m ago)   7d7h
pod/kibana-76c47d444-mqhd9       1/1    Running   2 (110m ago)   7d7h

NAME                     TYPE           CLUSTER-IP       EXTERNAL-IP    PORT(S)           AGE
service/elasticsearch    ClusterIP      10.96.108.71     <none>         9200/TCP          7d7h
service/kibana-lb        LoadBalancer   10.100.190.117   localhost      5601:30370/TCP    7d7h
service/kibana-np        NodePort       10.99.169.143    <none>         5601:30016/TCP    7d7h

NAME                        DESIRED   CURRENT   READY   UP-TO-DATE   AVAILABLE   NODE SELECTOR   AGE
daemonset.apps/fluent-bit   1         1         1       1            1           <none>          7d7h

NAME                             READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/elasticsearch    1/1     1            1           7d7h
deployment.apps/kibana           1/1     1            1           7d7h

NAME                                        DESIRED   CURRENT   READY   AGE
replicaset.apps/elasticsearch-669fb856bf    1         1         1       7d7h
replicaset.apps/kibana-76c47d444            1         1         1       7d7h

D:\kubernetes>
```

```
D:\kubernetes>curl http://localhost:30018/documents
[{"id":25911881,"fileName":"contract.pdf","size":872801,"fulfilmentStatus":1,"submittedByUserId":"0421"},{"id":28061452,
"fileName":"timetable.docx","size":369597,"fulfilmentStatus":1,"submittedByUserId":"0443"},{"id":27173396,"fileName":"ob
sfun.pptx","size":404,"fulfilmentStatus":2,"submittedByUserId":"0401"}]
D:\kubernetes>curl http://localhost:8011/documents
[{"id":25911881,"fileName":"contract.pdf","size":872801,"fulfilmentStatus":1,"submittedByUserId":"0421"},{"id":28061452,
"fileName":"timetable.docx","size":369597,"fulfilmentStatus":1,"submittedByUserId":"0443"},{"id":27173396,"fileName":"ob
sfun.pptx","size":404,"fulfilmentStatus":2,"submittedByUserId":"0401"}]
D:\kubernetes>
```

```
D:\kubernetes>kubectl exec -it jumpbox -- sh
/ # curl http://elasticsearch.logging.svc.cluster.local:9200/_cat/indices
yellow open sys-logs   i4X5pDTJQOOCfGP3PcCiBA 1 1 164 0 551.9kb 551.9kb
yellow open app-logs   gF-k-NnsSw-LYH-FVa3JCg 1 1 292 0 156.7kb 156.7kb
green  open .kibana_1  pxVLNvsZRxe6xoZstoDGyA 1 0   2 0   9.2kb   9.2kb
/ #
```

```
D:\kubernetes>curl localhost:30018/documents
[{"id":25911881,"fileName":"contract.pdf","size":872801,"fulfilmentStatus":1,"submittedByUserId":"0421"},{"id":28061452,"fileName":"timetable.docx","
e":369597,"fulfilmentStatus":1,"submittedByUserId":"0443"},{"id":27173396,"fileName":"obsfun.pptx","size":404,"fulfilmentStatus":2,"submittedByUserId
0401"}]
```