

[실습 2] 클러스터 배포 및 안정성 테스트

[실습 2] 클러스터 배포 및 안정성 테스트

시작하기 전에

LAB

Kubernetes Cluster

Pod

ReplicaSet

Service

References

시작하기 전에

- kubectl 명령어 치트 시트
- <https://kubernetes.io/docs/reference/kubectl/cheatsheet/>

LAB

Kubernetes Cluster

실습을 위한 쿠버네티스 클러스터 구성 정보 확인

```
# LAB002 디렉토리로 이동
$ cd ~/labhome/lab002/

$ labctl --help
Please use corret option [restore|rebuild]

    labctl restore: Quick lab restore
    labctl rebuild: Complete lab rebuild

$ labctl restore
0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
Restoring snapshot 'init-status' (83d22d48-eac8-49a9-812d-750af4412469)
0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
Waiting for VM "minikube" to power on...
VM "minikube" has been successfully started.
Switched to context "minikube".
minikube is ready!!

$ minikube ssh
```

```
      _
     _(_)
    _(_) | |/'
 /' _ ` _ \ | | /' _ \ | | /' _ \
/ ' _ ` _ \ | | /' _ \ | | /' _ \
```

```
| ( ) ( ) || || ( ) || || | \ \ | ( _ ) || | _ ) )( _ _ /  
( _ ) ( _ ) ( _ ) ( _ ) ( _ ) ( _ ) \ _ _ / ' ( _ _ / ' \ _ _ )
```

```
$ hostname
```

```
minikube
```

```
$ df -hT
```

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
devtmpfs	devtmpfs	3.9G	0	3.9G	0%	/dev
tmpfs	tmpfs	3.9G	0	3.9G	0%	/dev/shm
tmpfs	tmpfs	3.9G	17M	3.9G	1%	/run
tmpfs	tmpfs	3.9G	0	3.9G	0%	/sys/fs/cgroup
tmpfs	tmpfs	3.9G	8.0K	3.9G	1%	/tmp
/dev/sda1	ext4	17G	1.3G	14G	9%	/mnt/sda1
/hosthome	vboxsf	234G	25G	210G	11%	/hosthome

```
$ exit
```

```
logout
```

```
$ kubectl cluster-info
```

```
Kubernetes master is running at https://192.168.99.100:8443
```

```
KubeDNS is running at https://192.168.99.100:8443/api/v1/namespaces/kube-  
system/services/kube-dns:dns/proxy
```

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

```
$ kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
minikube	Ready	master	21m	v1.10.0

```
$ kubectl describe nodes
```

```
Name: minikube  
Roles: master  
Labels: beta.kubernetes.io/arch=amd64  
        beta.kubernetes.io/os=linux  
        kubernetes.io/hostname=minikube  
        node-role.kubernetes.io/master=  
Annotations: node.alpha.kubernetes.io/ttl=0  
              volumes.kubernetes.io/controller-managed-attach-detach=true  
CreationTimestamp: Mon, 20 Aug 2018 03:15:00 +0900  
Taints: <none>  
Unschedulable: false
```

```
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```

```
$ kubectl get namespaces
```

NAME	STATUS	AGE
default	Active	5m
kube-public	Active	5m
kube-system	Active	5m

```
$ kubectl get pod --all-namespaces
```

NAMESPACE	NAME	READY	STATUS	RESTARTS
AGE				

kube-system	etcd-minikube	1/1	Running	0	6m
kube-system	kube-addon-manager-minikube	1/1	Running	0	6m
kube-system	kube-apiserver-minikube	1/1	Running	0	6m
kube-system	kube-controller-manager-minikube	1/1	Running	0	6m
kube-system	kube-dns-86f4d74b45-grwt9	3/3	Running	0	7m
kube-system	kube-proxy-hklhf	1/1	Running	0	7m
kube-system	kube-scheduler-minikube	1/1	Running	0	6m
kube-system	kubernetes-dashboard-5498ccf677-4qnnw	1/1	Running	0	7m
kube-system	metrics-server-85c979995f-tm4r8	1/1	Running	0	7m
kube-system	storage-provisioner	1/1	Running	0	7m

```
$ kubectl get pod -o wide --all-namespaces
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	
AGE	IP				NODE
kube-system	etcd-minikube	1/1	Running	0	7m
	10.0.2.15				minikube
kube-system	kube-addon-manager-minikube	1/1	Running	0	7m
	10.0.2.15				minikube
kube-system	kube-apiserver-minikube	1/1	Running	0	7m
	10.0.2.15				minikube
kube-system	kube-controller-manager-minikube	1/1	Running	0	7m
	10.0.2.15				minikube
kube-system	kube-dns-86f4d74b45-grwt9	3/3	Running	0	8m
	172.17.0.2				minikube
kube-system	kube-proxy-hklhf	1/1	Running	0	8m
	10.0.2.15				minikube
kube-system	kube-scheduler-minikube	1/1	Running	0	7m
	10.0.2.15				minikube
kube-system	kubernetes-dashboard-5498ccf677-4qnnw	1/1	Running	0	8m
	172.17.0.3				minikube
kube-system	metrics-server-85c979995f-tm4r8	1/1	Running	0	8m
	172.17.0.4				minikube
kube-system	storage-provisioner	1/1	Running	0	8m
	10.0.2.15				minikube

```
$ kubectl describe pod kube-apiserver-minikube -n kube-system
```

```

Name:          kube-apiserver-minikube
Namespace:     kube-system
Node:          minikube/10.0.2.15
Start Time:    Mon, 20 Aug 2018 03:14:18 +0900
Labels:        component=kube-apiserver
               tier=control-plane
Annotations:    kubernetes.io/config.hash=d6ed90b5a86db1591da65c1dfb8bdfc7
               kubernetes.io/config.mirror=d6ed90b5a86db1591da65c1dfb8bdfc7
               kubernetes.io/config.seen=2018-08-19T18:14:15.677572664Z
               kubernetes.io/config.source=file
               scheduler.alpha.kubernetes.io/critical-pod=
Status:        Running
IP:            10.0.2.15
Containers:
  kube-apiserver:
    Container ID:
docker://f2f05ffa9f73070558bf6951dbc62cc3b2c41625c6aaacb8ba55e68081b44843

```

Image: k8s.gcr.io/kube-apiserver-amd64:v1.10.0

Pod

Pod 명세서 예제 내용 확인 및 배포 연습

```
# LAB002 디렉토리로 이동
$ cd ~/labhome/lab002/

$ cat nginx-pod.yml
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
  labels:
    app: web
spec:
  containers:
  - name: nginx
    image: nginx
    ports:
    - containerPort: 80

$ kubectl create -f nginx-pod.yml
pod/nginx created

$ kubectl get pod
NAME          READY    STATUS             RESTARTS   AGE
nginx-pod     0/1      ContainerCreating   0           6s

$ kubectl get pod
NAME          READY    STATUS    RESTARTS   AGE
nginx-pod     1/1      Running   0           7s

$ kubectl describe pod nginx-pod
Name:          nginx-pod
Namespace:     default
Node:          minikube/10.0.2.15
Start Time:    Mon, 20 Aug 2018 03:42:54 +0900
Labels:        app=web
Annotations:   <none>
Status:        Running
IP:            172.17.0.5
Containers:
  nginx:
    Container ID:
docker://0b55ab4d2f4899de6b47beed1a58f9b18b4c8baf5527fded49b2bf96c6fb02e1
    Image:       nginx

{{ 이하 출력 생략 }}
```

```
curl: (7) Failed to connect to 172.17.0.5 port 80: 호스트로 갈 루트가 없음
```

```
$ minikube ssh
```

[illegible]

```
<p>If you see this page, the nginx web server is successfully installed and
working. Further configuration is required.</p>
```

```
<a href="http://nginx.com/">nginx.com</a>.</p>
```

</html>

app: web

```
- containerPort: 80
```

hostPort: 8080

```
$ kubectl create -f nginx-hostport-pod.yml
pod/nginx-pod-hostport created
```

```
$ kubectl get pod
```

NAME	READY	STATUS	RESTARTS	AGE
nginx-pod	1/1	Running	0	5m
nginx-pod-hostport	0/1	ContainerCreating	0	5s

```
$ kubectl get pod
```

NAME	READY	STATUS	RESTARTS	AGE
nginx-pod	1/1	Running	0	5m
nginx-pod-hostport	1/1	Running	0	6s

```
$ kubectl describe pod nginx-pod-hostport
```

Name: nginx-pod-hostport
Namespace: default
Node: minikube/10.0.2.15
Start Time: Mon, 20 Aug 2018 03:47:57 +0900
Labels: app=web
Annotations: <none>
Status: Running
IP: 172.17.0.6
Containers:
 nginx:
 Container ID: docker://cf5ba55df5e2b6fe87c7b590d9bdf4b80523be159713b8e762573548c8bc6027
 Image: nginx
 Image ID: docker-pullable://nginx@sha256:d85914d547a6c92faa39ce7058bd7529baacab7e0cd4255442b04577c4d1f424
 Port: 80/TCP
 Host Port: 8080/TCP

{{ 이하 출력 생략 }}

```
$ minikube ip
```

192.168.99.100

```
$ curl $(minikube ip):8080
```

```
<!DOCTYPE html>
<html>
<head>
<title>Welcome to nginx!</title>
<style>
  body {
    width: 35em;
    margin: 0 auto;
    font-family: Tahoma, Verdana, Arial, sans-serif;
  }
</style>
</head>
```

```

<body>
<h1>Welcome to nginx!</h1>
<p>If you see this page, the nginx web server is successfully installed and
working. Further configuration is required.</p>

<p>For online documentation and support please refer to
<a href="http://nginx.org/">nginx.org</a>.<br/>
Commercial support is available at
<a href="http://nginx.com/">nginx.com</a>.</p>

<p><em>Thank you for using nginx.</em></p>
</body>
</html>

```

```

$ kubectl get pod --show-labels=true
NAME                READY    STATUS    RESTARTS   AGE    LABELS
nginx-pod            1/1     Running   0          27m    app=web
nginx-pod-hostport   1/1     Running   0          22m    app=web

$ kubectl delete pod nginx-pod nginx-pod-hostport
pod "nginx-pod" deleted
pod "nginx-pod-hostport" deleted

```

ReplicaSet

ReplicaSet 명세서 예제 내용 확인 및 배포 연습 Pod 장애시 ReplicaSet 복구 과정 확인

```

# LAB002 디렉토리로 이동
$ cd ~/labhome/lab002/

$ cat frontend-rs.yml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: frontend
  labels:
    app: guestbook
    tier: frontend
spec:
  # modify replicas according to your case
  replicas: 3
  selector:
    matchLabels:
      tier: frontend
    matchExpressions:
      - {key: tier, operator: In, values: [frontend]}
  template:
    metadata:
      labels:
        app: guestbook
        tier: frontend

```

```
spec:
  containers:
  - name: php-redis
    image: gcr.io/google_samples/gb-frontend:v3
    resources:
      requests:
        cpu: 100m
        memory: 100Mi
    env:
    - name: GET_HOSTS_FROM
      value: dns
      # If your cluster config does not include a dns service, then to
      # instead access environment variables to find service host
      # info, comment out the 'value: dns' line above, and uncomment the
      # line below.
      # value: env
    ports:
    - containerPort: 80
```

```
$ kubectl create -f frontend-rs.yml
replicaset.apps/frontend created
```

```
$ kubectl get rs
NAME          DESIRED   CURRENT   READY   AGE
frontend      3         3         3       1m
```

```
$ kubectl describe rs frontend
Name:          frontend
Namespace:     default
Selector:      tier=frontend,tier in (frontend)
Labels:        app=guestbook
               tier=frontend
Annotations:   <none>
Replicas:      3 current / 3 desired
Pods Status:   3 Running / 0 Waiting / 0 Succeeded / 0 Failed
Pod Template:
```

```
  Labels:      app=guestbook
               tier=frontend
  Containers:
    php-redis:
      Image:     gcr.io/google_samples/gb-frontend:v3
      Port:      80/TCP
      Host Port: 0/TCP
      Requests:
        cpu:     100m
        memory:  100Mi
      Environment:
        GET_HOSTS_FROM: dns
      Mounts:      <none>
  Volumes:         <none>
```

```
Events:
  Type    Reason          Age   From          Message
  ----    -
  -----
```


Normal	SuccessfulCreate	1m	replicaset-controller	Created pod: frontend-wskjg
Normal	SuccessfulCreate	1m	replicaset-controller	Created pod: frontend-k24t7
Normal	SuccessfulCreate	1m	replicaset-controller	Created pod: frontend-xx5h8

```
$ cp frontend-rs.yml frontend-rs.yml.orig
```

```
$ sed -i 's/replicas:./replicas: 5/' frontend-rs.yml
```

```
$ grep replicas frontend-rs.yml
```

```
# modify replicas according to your case
```

```
replicas: 5
```

```
$ kubectl apply -f frontend-rs.yml
```

Warning: kubectl apply should be used on resource created by either kubectl create --save-config or kubectl apply

replicaset.apps/frontend configured

```
$ kubectl get rs
```

NAME	DESIRED	CURRENT	READY	AGE
frontend	5	5	5	5m

```
$ kubectl get pod
```

NAME	READY	STATUS	RESTARTS	AGE
frontend-nk2hn	1/1	Running	0	13s
frontend-pk7s8	1/1	Running	0	13s
frontend-vjdtm	1/1	Running	0	13s
frontend-wskjg	1/1	Running	0	14m
frontend-xx5h8	1/1	Running	0	14m

```
$ kubectl delete pod frontend-wskjg frontend-xx5h8 frontend-vjdtm
```

pod "frontend-wskjg" deleted

pod "frontend-xx5h8" deleted

pod "frontend-vjdtm" deleted

```
$ kubectl get rs
```

NAME	DESIRED	CURRENT	READY	AGE
frontend	5	5	2	15m

```
$ kubectl get rs
```

NAME	DESIRED	CURRENT	READY	AGE
frontend	5	5	3	15m

```
$ kubectl get rs
```

NAME	DESIRED	CURRENT	READY	AGE
frontend	5	5	4	15m

```
$ kubectl get rs
```

NAME	DESIRED	CURRENT	READY	AGE
frontend	5	5	5	15m

```
$ kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
frontend-njhvq	1/1	Running	0	1m
frontend-nk2hn	1/1	Running	0	1m
frontend-pk7s8	1/1	Running	0	1m
frontend-trzrk	1/1	Running	0	1m
frontend-xdmjp	1/1	Running	0	1m

```
$ kubectl describe rs frontend
Events:
  Type            Reason              Age             From              Message
  ----            -
  Normal          SuccessfulCreate    17m             replicaset-controller Created pod: frontend-wskjg
  Normal          SuccessfulCreate    17m             replicaset-controller Created pod: frontend-k24t7
  Normal          SuccessfulCreate    17m             replicaset-controller Created pod: frontend-xx5h8
  Normal          SuccessfulCreate    12m             replicaset-controller Created pod: frontend-kpwzf
  Normal          SuccessfulCreate    12m             replicaset-controller Created pod: frontend-ktsn6
  Normal          SuccessfulCreate    6m              replicaset-controller Created pod: frontend-6pjk8
  Normal          SuccessfulCreate    3m              replicaset-controller Created pod: frontend-cpj8p
  Normal          SuccessfulCreate    3m              replicaset-controller Created pod: frontend-hswrf
  Normal          SuccessfulCreate    3m              replicaset-controller Created pod: frontend-gbh77
  Normal          SuccessfulCreate    2m (x6 over 2m) replicaset-controller (combined from similar events): Created pod: frontend-njhvq

$ kubectl delete rs frontend
replicaset.extensions "frontend" deleted
```

Service

Service 명세서 예제 내용 확인 및 배포 연습 앞서 배포한 ReplicaSet 과 Service 연결

```
# LAB002 디렉토리로 이동
$ cd ~/labhome/lab002/

$ cat hello-app-rs.yml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: hello-app-rs
  labels:
    app: hello-app
    tier: frontend
spec:
  replicas: 3
  selector:
    matchLabels:
      app: hello-app
      tier: frontend
  template:
    metadata:
```

```
labels:
  app: hello-app
  tier: frontend
spec:
  containers:
  - name: hello-app
    image: gcr.io/google-samples/hello-app:2.0
    ports:
      - containerPort: 8080
```

```
$ kubectl create -f hello-app-rs.yml
replicaset.apps/hello-app-rs created
```

```
$ kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
hello-app-rs-5jlpp	1/1	Running	0	4s
hello-app-rs-dp2kn	1/1	Running	0	4s
hello-app-rs-wz4bw	1/1	Running	0	4s

```
$ kubectl describe pod hello-app-rs-5jlpp | grep IP
```

```
IP: 172.17.0.7
```

#minikube 에 SSH 로 접근하는 대신에 busybox 이미지로 curl 실행

```
$ kubectl run busyboxplus --image=radial/busyboxplus:curl -i --tty --rm
```

If you don't see a command prompt, try pressing enter.

```
[ root@busyboxplus-5697648fcc-vgkhj:/ ]$ curl 172.17.0.7:8080
```

```
Hello, world!
```

```
Version: 2.0.0
```

```
Hostname: hello-app-rs-5jlpp
```

```
[ root@busyboxplus-5697648fcc-vgkhj:/ ]$ exit
```

```
Session ended, resume using 'kubectl attach busyboxplus-5697648fcc-vgkhj -c busyboxplus
-i -t' command when the pod is running
deployment.apps "busyboxplus" deleted
```

```
$ cat hello-app-svc.yml
```

```
apiVersion: v1
```

```
kind: Service
```

```
metadata:
```

```
  name: hello-app-svc
```

```
  labels:
```

```
    app: hello-app
```

```
spec:
```

```
  selector:
```

```
    app: hello-app
```

```
    tier: frontend
```

```
  ports:
```

```
    - port: 80
```

```
      targetPort: 8080
```

```
$ kubectl create -f hello-app-svc.yml
```

```
service/hello-app-svc created
```

```
$ kubectl get svc
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
hello-app-svc	ClusterIP	10.99.224.94	<none>	80/TCP	5s
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	1h


```
$ kubectl get svc -o wide
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE	SELECTOR
hello-app-svc	ClusterIP	10.99.224.94	<none>	80/TCP	1m	app=hello-app,tier=frontend
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	1h	<none>


```
$ kubectl get pod --show-labels=true
```

NAME	READY	STATUS	RESTARTS	AGE	LABELS
busybox-5858cc4697-bbrhr	1/1	Running	0	10m	pod-template-hash=1414770253,run=busybox
hello-app-rs-5jlpp	1/1	Running	0	13m	app=hello-app,tier=frontend
hello-app-rs-dp2kn	1/1	Running	0	13m	app=hello-app,tier=frontend
hello-app-rs-wz4bw	1/1	Running	0	13m	app=hello-app,tier=frontend


```
$ kubectl run busyboxplus --image=radial/busyboxplus:curl -i --tty --rm
```

If you don't see a command prompt, try pressing enter.

```
[ root@busyboxplus-5697648fcc-8ljqp:/ ]$ curl 10.99.224.94
```

Hello, world!

Version: 2.0.0

Hostname: hello-app-rs-dp2kn

```
[ root@busyboxplus-5697648fcc-8ljqp:/ ]$ curl 10.99.224.94
```

Hello, world!

Version: 2.0.0

Hostname: hello-app-rs-5jlpp

```
[ root@busyboxplus-5697648fcc-8ljqp:/ ]$ curl 10.99.224.94
```

Hello, world!

Version: 2.0.0

Hostname: hello-app-rs-wz4bw

```
[ root@busyboxplus-5697648fcc-8ljqp:/ ]$ exit
```

Session ended, resume using 'kubectl attach busyboxplus-5697648fcc-8ljqp -c busyboxplus -i -t' command when the pod is running

deployment.apps "busyboxplus" deleted


```
$ kubectl create -f hello-app-svc-nodeport.yml
```

service/hello-app-svc-nodeport created


```
$ kubectl get svc
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
hello-app-svc	ClusterIP	10.99.224.94	<none>	80/TCP	6m
hello-app-svc-nodeport	NodePort	10.109.169.162	<none>	80:32045/TCP	5s
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	1h


```
$ cat hello-app-svc-nodeport.yml
```

```
apiVersion: v1
kind: Service
metadata:
```

```

name: hello-app-svc-nodeport
labels:
  app: hello-app
spec:
  type: NodePort
  selector:
    app: hello-app
    tier: frontend
  ports:
    - port: 80
      targetPort: 8080

```

```
$ kubectl create -f hello-app-svc-nodeport.yml
```

```
service/hello-app-svc-nodeport created
```

```
$ kubectl get svc
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
hello-app-svc	ClusterIP	10.99.224.94	<none>	80/TCP	6m
hello-app-svc-nodeport	NodePort	10.109.169.162	<none>	80:32045/TCP	5s
kubernetes	ClusterIP	10.96.0.1	<none>	443/TCP	1h

```
$ minikube service list
```

NAMESPACE	NAME	URL
default	hello-app-svc	No node port
default	hello-app-svc-nodeport	http://192.168.99.100:32045
default	kubernetes	No node port
kube-system	kube-dns	No node port
kube-system	kubernetes-dashboard	http://192.168.99.100:30000
kube-system	metrics-server	No node port

```
$ minikube service hello-app-svc-nodeport
```

```
Opening kubernetes service default/hello-app-svc-nodeport in default browser...
```

```
$ minikube service hello-app-svc-nodeport --url
```

```
http://192.168.99.100:32045
```

```
$ curl $(minikube service hello-app-svc-nodeport --url)
```

```
Hello, world!
```

```
Version: 2.0.0
```

```
Hostname: hello-app-rs-dp2kn
```

```
$ curl $(minikube service hello-app-svc-nodeport --url)
```

```
Hello, world!
```

```
Version: 2.0.0
```

```
Hostname: hello-app-rs-5jlp
```

```
$ curl $(minikube service hello-app-svc-nodeport --url)
```

```
Hello, world!
```

```
Version: 2.0.0
```

```
Hostname: hello-app-rs-wz4bw
```

```
$ labctl restore
```

```
0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
```

```
Restoring snapshot 'init-status' (01419346-a9c2-4ca6-8375-2e8f12c6762f)
0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
Waiting for VM "minikube" to power on...
VM "minikube" has been successfully started.
Switched to context "minikube".
minikube is ready!!
```

References

- <https://kubernetes.io/docs/concepts/workloads/pods/pod-overview/>
- <https://kubernetes.io/docs/concepts/workloads/pods/pod/>
- <https://kubernetes.io/docs/concepts/workloads/pods/pod-lifecycle/>
- <https://kubernetes.io/docs/concepts/workloads/controllers/replicaset/>
- <https://kubernetes.io/docs/concepts/services-networking/service/>
- <https://kubernetes.io/docs/reference/kubectl/cheatsheet/>