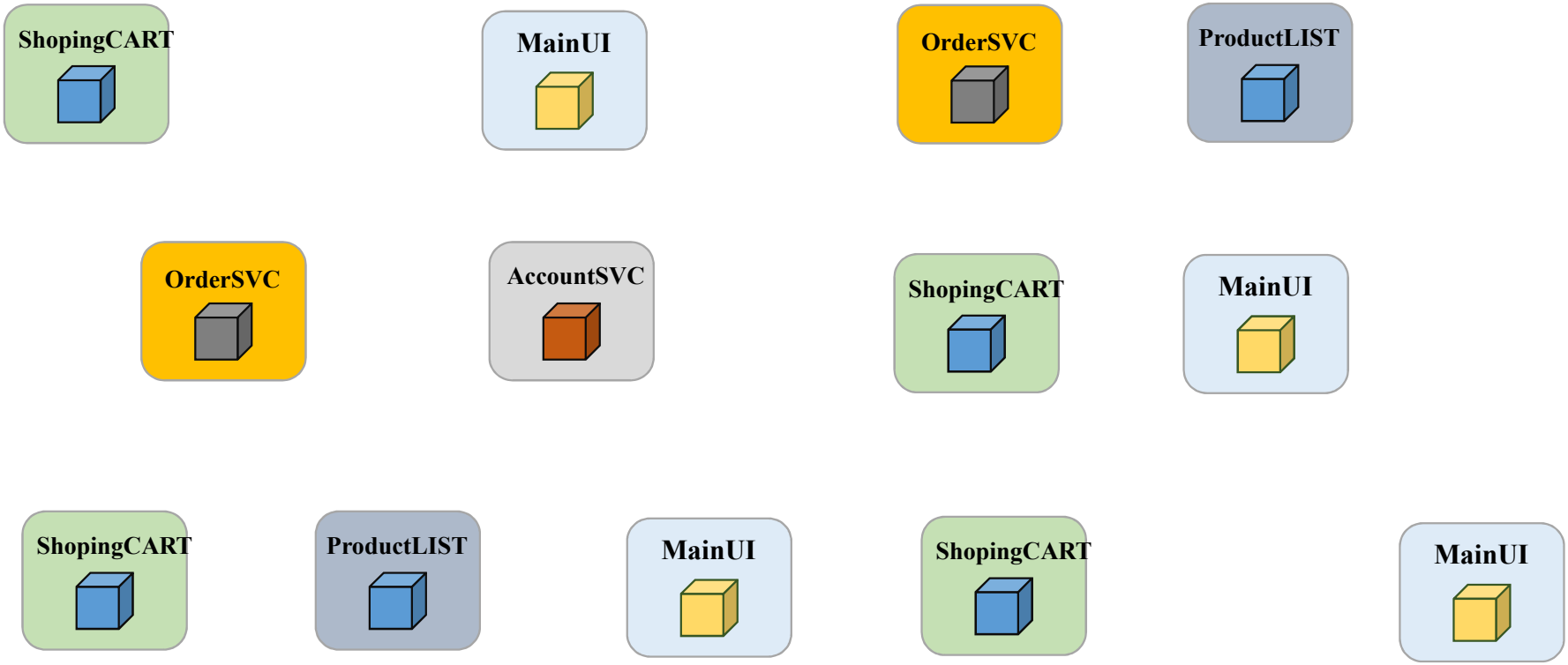
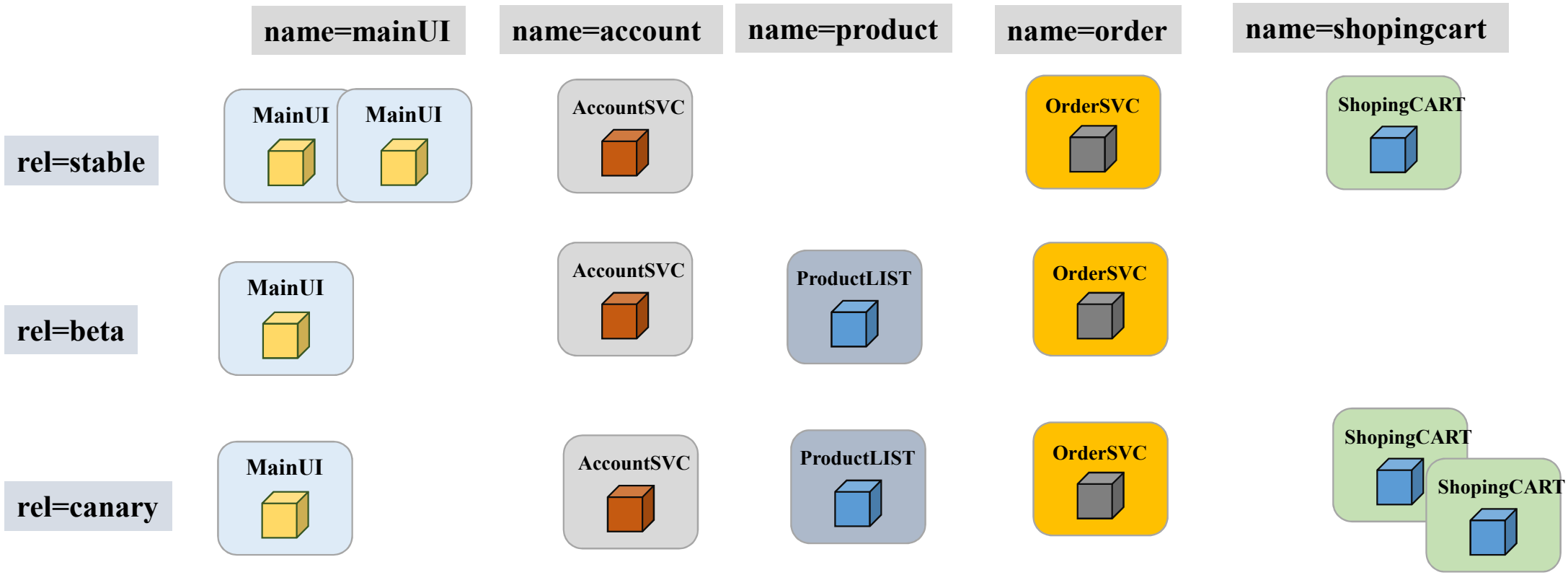
Label & Selector

- https://kubernetes.io/docs/concepts/overview/working-with-objects/labels/
- Pod 와 같은 오브젝트에 첨부된 키(key)와 값(value)의 쌍
  - Node를 포함하여 pod, service, deployment 등 모든 오브젝트에 할당
- 레이블은 오브젝트의 특성을 식별하는 데 사용
  - 리소스의 특성을 분류
  - selector를 이용해서 선택

생성된 PODS


ShopingCART
MainUI
OrderSVC
ProductLIST
OrderSVC
AccountSVC
ShopingCART
MainUI
ShopingCART
ProductLIST
MainUI
ShopingCART
MainUI

Label로 분류된 PODS



Label이 없는 경우	Label이 있은 경우

apiVersion: v1
kind: Pod
metadata:
  name: label-pod-demo
 	
spec:
containers:
 - name: nginx
  image: nginx:1.14
  ports:
  - containerPort: 80
	apiVersion: v1
	kind: Pod
	metadata:
	  name: label-pod-demo
	  labels:
	  name: mainui
	  rel: stable
	
	spec:
	  containers:
	  - name: nginx
	  image: nginx:1.14
	  ports:
	  - containerPort: 80

1) Label

```
metadata:
  name: label-pod-demo
  labels:
    name: mainui
    rel: stable
```

2) selector

```
  matchLabels:
    key: value
  matchExpressions:
    - {key:name, operator:In, values:[mainui]}
    - {key:rel, operator:NotIn, values[“beta”,”canary”]}
```

<<Label 확인>>

kubectl get pods –show-lables

kubectl get pods –l <labe_name>

<<Label 생성 및 변경>>

kubectl label pod <name> key=value

kubectl label pod <name> key=value –overwrite

<<Label 제거>>

kubectl label pod <name> key-

❶ kubectl run labpod01 –image=nginx:1.14 --port=80

```
root@master:/# kubectl run lablepod01 --image=nginx:1.14 --port=80
pod/lablepod01 created
```

❷ nano labelpod02.yaml

```
root@master:/# nano labelpod02.yaml
root@master:/# cat labelpod02.yaml
apiVersion: v1
kind: Pod
metadata:
  name: labelpod02
spec:
  containers:
  - name: nginx
    image: nginx:1.14
    ports:
    - containerPort: 80
```

❸ nano labelpod02.yaml

```
root@master:/# nano labelpod03.yaml
root@master:/# cat labelpod03.yaml
apiVersion: v1
kind: Pod
metadata:
  name: labelpod03
  labels:
    name: testlabel
    app: nginx
spec:
  containers:
  - name: nginx
    image: nginx:1.14
    ports:
    - containerPort: 80
```

❶ kubectl get pods --show-lables

```
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod02   1/1     Running   0          16m   <none>
labelpod03   1/1     Running   0          16m   app=nginx,name=testlabel
lablepod01   1/1     Running   0          23m   run=lablepod01
```

❷ kubectl get pods --show-lables –o wide

```
root@master:/# kubectl get pods --show-labels -o wide
NAME         READY   STATUS    RESTARTS   AGE   IP          NODE      NOMINATED NODE   READINESS GATES   LABELS
labelpod02   1/1     Running   0          16m   10.40.0.1   wnode01   <none>           <none>            <none>
labelpod03   1/1     Running   0          16m   10.46.0.1   wnode03   <none>           <none>            app=nginx,name=testlabel
lablepod01   1/1     Running   0          23m   10.32.0.2   wnode02   <none>           <none>            run=lablepod01
```

❸ kubectl get pods –l name=testlabel

```
root@master:/# kubectl get pods -l name=testlabel
NAME         READY   STATUS    RESTARTS   AGE
labelpod03   1/1     Running   0          16m
```

❹ kubectl get pods --selector name=testlabel

```
root@master:/# kubectl get pods --selector name=testlabel
NAME         READY   STATUS    RESTARTS   AGE
labelpod03   1/1     Running   0          17m
```

❶ kubectl delete pods --selector run=labelpod01

```
root@master:/# kubectl delete  pods --selector run=lablepod01
pod "lablepod01" deleted
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod02   1/1     Running   0          17m   <none>
labelpod03   1/1     Running   0          17m   app=nginx,name=testlabel
root@master:/#
```

❷ kubectl get pods --show-lables

```
root@master:/#
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod02   1/1     Running   0          30m   <none>
labelpod03   1/1     Running   0          30m   app=nginx,name=testlabel
root@master:/#
root@master:/# kubectl label pod labelpod02 name=testlabel00
pod/labelpod02 labeled
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod02   1/1     Running   0          31m   name=testlabel00
labelpod03   1/1     Running   0          31m   app=nginx,name=testlabel
root@master:/#
```

kubectl label pod labelpod02 name=test1
kubectl label pod labelpod02 name=test --overwrite

```
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod02   1/1     Running   0          32m   name=testlabel00
labelpod03   1/1     Running   0          32m   app=nginx,name=testlabel
root@master:/#
root@master:/# kubectl label pod labelpod02 name=testl
error: 'name' already has a value (testlabel00), and --overwrite is false
root@master:/# kubectl label pod labelpod02 name=testl --overwrite
pod/labelpod02 labeled
root@master:/#
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod02   1/1     Running   0          33m   name=testl
labelpod03   1/1     Running   0          33m   app=nginx,name=testlabel
root@master:/#
root@master:/# kubectl label pod labelpod02 name=test --overwrite
pod/labelpod02 labeled
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod02   1/1     Running   0          33m   name=test
labelpod03   1/1     Running   0          33m   app=nginx,name=testlabel
```

kubectl run labelpod --image=nginx:1.14 --port=80

kubectl get pods --show-lables

kubectl label pod labelpod name=test01

kubectl get pods --show-lables

```
root@master:/# kubectl run labelpod --image=nginx:1.14 --port=80
pod/labelpod created
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod     1/1     Running   0          3s    run=labelpod
labelpod02   1/1     Running   0          36m   name=test
labelpod03   1/1     Running   0          36m   app=nginx,name=testlabel
root@master:/# kubectl label pod labelpod name=test01
pod/labelpod labeled
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod     1/1     Running   0          36s   name=test01,run=labelpod
labelpod02   1/1     Running   0          36m   name=test
labelpod03   1/1     Running   0          36m   app=nginx,name=testlabel
```

kubectl get pods --show-lables

kubectl label pod labelpod run-

kubectl get pods --show-lables

```
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE   LABELS
labelpod     1/1     Running   0          36s   name=test01,run=labelpod
labelpod02   1/1     Running   0          36m   name=test
labelpod03   1/1     Running   0          36m   app=nginx,name=testlabel
root@master:/#
root@master:/# kubectl label pod labelpod run-
pod/labelpod unlabeled
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE     LABELS
labelpod     1/1     Running   0          2m38s   name=test01
labelpod02   1/1     Running   0          38m     name=test
labelpod03   1/1     Running   0          38m     app=nginx,name=testlabel
root@master:/#
```

Label 명 뒤에 -(대시문자) : label 삭제

```
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE     LABELS
labelpod     1/1     Running   0          5m27s   name=test01
labelpod02   1/1     Running   0          41m     name=test
labelpod03   1/1     Running   0          41m     app=nginx,name=testlabel
```

```
root@master:/# kubectl get pods --show-labels
NAME         READY   STATUS    RESTARTS   AGE     LABELS
labelpod     1/1     Running   0          9m22s   name=test01,rel=beta
labelpod02   1/1     Running   0          45m     name=test02,rel=statble
labelpod03   1/1     Running   0          45m     app=nginx,name=test03,rel=statble
```

kubectl label pod labelpod rel=beta

kubectl label pod labelpod02 name=test02 rel=stable --overwrite

kubectl label pod labelpod03 name=test02 rel=stable –overwrite

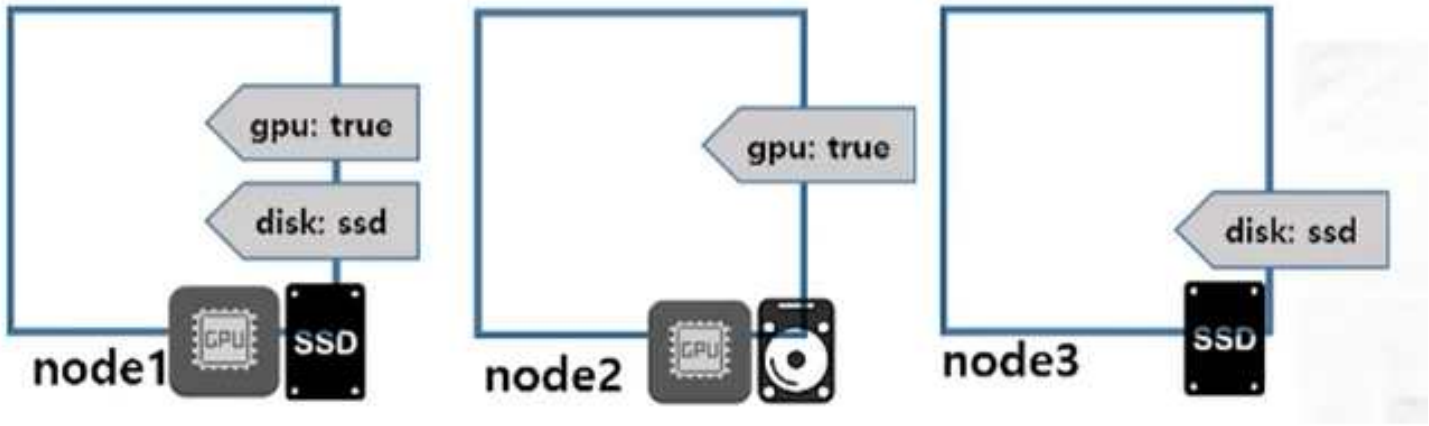
kubectl label pod labelpod02 app-

```
root@master:/# kubectl label pod labelpod rel=beta
pod/labelpod labeled
root@master:/#
root@master:/# kubectl label pod labelpod02 name=test02 rel=statble --overwrite
pod/labelpod02 labeled
root@master:/#
root@master:/# kubectl label pod labelpod03 name=test03 rel=statble --overwrite
pod/labelpod03 labeled
root@master:/# kubectl label pod labelpod03 app-
pod/labelpod03 unlabeled
```

```
root@master:/# kubectl get pods --show-labels
NAME          READY   STATUS    RESTARTS   AGE   LABELS
labelpod      1/1     Running   0          14m   name=test01,rel=beta
labelpod02    1/1     Running   0          50m   name=test02,rel=statble
labelpod03    1/1     Running   0          50m   name=test03,rel=statble
root@master:/#
root@master:/# kubectl delete pods --selector rel=statble
pod "labelpod02" deleted
pod "labelpod03" deleted
root@master:/# kubectl get pods --show-labels
No resources found in default namespace.
root@master:/#
```

Node Label

- Worker node의 하드웨어 특성을 label로 설정
- 노드를 선택해서 파드를 배치할 수 있음
- kubectl label nodes <노드이름> <key>=<value>



```
apiVersion: v1
kind: Pod
metadata:
  name: pod-node
spec:
  containers:
  - name: nginx
    image: nginx:1.14
  nodeSelector:
    key1: value1
    key2: value2
```

#kubectl get nodes --show-labels

```
root@master:/# kubectl get nodes --show-labels
NAME      STATUS   ROLES           AGE   VERSION   LABELS
master    Ready    control-plane   69d   v1.25.0   beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=lin
name=master,kubernetes.io/os=linux,node-role.kubernetes.io/control-plane=,node.kubernetes.io/exclude-from-
wnode01   Ready    <none>          69d   v1.25.0   beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=lin
name=wnode01,kubernetes.io/os=linux
wnode02   Ready    <none>          69d   v1.25.0   beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=lin
name=wnode02,kubernetes.io/os=linux
wnode03   Ready    <none>          69d   v1.25.0   beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=lin
name=wnode03,kubernetes.io/os=linux
```

#kubectl label nodes wnode01 gpu=true disk=ssd

#kubectl label nodes wnode02 gpu=true

#kubectl label nodes wnode03 disk=ssd

```
root@master:/# kubectl label nodes wnode01 gpu=true disk=ssd
node/wnode01 labeled
root@master:/# kubectl label nodes wnode02 gpu=true
node/wnode02 labeled
root@master:/# kubectl label nodes wnode03 disk=ssd
node/wnode03 labeled
```

#kubectl get nodes --show-labels

```
root@master:/# kubectl get nodes --show-labels
NAME      STATUS   ROLES           AGE   VERSION   LABELS
master    Ready    control-plane   69d   v1.25.0   beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=linux,kubernetes.io/arch=amd64
name=master,kubernetes.io/os=linux,node-role.kubernetes.io/control-plane=,node.kubernetes.io/exclude-from-external-load-balancers=
wnode01   Ready    <none>          69d   v1.25.0   beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=linux,disk=ssd,gpu=true,kubern
kubernetes.io/hostname=wnode01,kubernetes.io/os=linux
wnode02   Ready    <none>          69d   v1.25.0   beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=linux,gpu=true,kubernetes.io/a
s.io/hostname=wnode02,kubernetes.io/os=linux
wnode03   Ready    <none>          69d   v1.25.0   beta.kubernetes.io/arch=amd64,beta.kubernetes.io/os=linux,disk=ssd,kubernetes.io/a
s.io/hostname=wnode03,kubernetes.io/os=linux
```

#kubectl get nodes –L disk,gpu

```
root@master:/# kubectl get nodes -L disk,gpu
NAME      STATUS   ROLES           AGE   VERSION   DISK   GPU
master    Ready    control-plane   69d   v1.25.0
wnode01   Ready    <none>          69d   v1.25.0   ssd    true
wnode02   Ready    <none>          69d   v1.25.0          true
wnode03   Ready    <none>          69d   v1.25.0   ssd
root@master:/#
```

#cat nodeselector.yaml

```
root@master:/# cat nodeselector.yaml
apiVersion: v1
kind: Pod
metadata:
  name: pod-nodeselector
spec:
  nodeSelector:
    gpu: "true"
    disk: ssd
  containers:
  - name: nginx
    image: nginx:1.14
    ports:
    - containerPort: 80
root@master:/#
```

#kubectl create –f nodeselector.yaml
#kubectrl get pods -o wide

```
root@master:/# kubectl create -f nodeselector.yaml
pod/pod-nodeselector created
root@master:/#
root@master:/# kubectl get pods -o wide
NAME               READY   STATUS    RESTARTS   AGE   IP          NODE      NOMINATED NODE
pod-nodeselector   1/1     Running   0          25s   10.40.0.1   wnode01   <none>
```

#kubectl delete pod node-selector

```
root@master:/# kubectl delete pod pod-nodeselector
pod "pod-nodeselector" deleted
root@master:/#
```

Annotation

- Label과 동일하게 key-vaule를 통해 리소스의 특성을 기록
  - K8S에게 특정한 정도를 전달할 용도로 사용

  (예) Deployment의 rolling update 정보 기록

```
annotations:
    kubernetes.io/change-cause: version 1.15
```

- 관리를 위해 필요한 정보를 기록할 용도로 사용
  - 릴리스, 로깅, 모니터링에 필요한 정보 기록

  (예) 개발자 정보, 개발 일자, 등록 사이트 등

```
annotations:
    builder: "Hong Gildong"
    bulidDate: "20221124"
    imageRegistry: https://hub.docker.com
```

#kubectl create –f nodeselector.yaml

#kubectrl get pods -o wide

```
root@master:/# cat annotation.yaml
apiVersion: v1
kind: Pod
metadata:
  name: pod-annotation
  annotations:
    builder: "Gildong"
    buildDate: "20221101"
    imageRegistry: https://hub.docker.com/
spec:
  containers:
  - name: nginx
    image: nginx:1.14
    ports:
    - containerPort: 80
```

#kubectl create –f annotation.yaml

#kubectrl get pods

#kubectl describe pod pod-annotation

```
root@master:/# kubectl create -f annotation.yaml
pod/pod-annotation created
root@master:/# kubectl get pods
NAME             READY   STATUS    RESTARTS   AGE
pod-annotation   1/1     Running   0          44s
root@master:/# kubectl describe pod pod-annotation
Name:             pod-annotation
Namespace:        default
Priority:         0
Service Account:  default
Node:             wnode02/192.168.10.220
Start Time:       Wed, 16 Nov 2022 21:02:53 +0900
Labels:           <none>
Annotations:      buildDate: 20221101
                  builder: Gildong
                  imageRegistry: https://hub.docker.com/
```

Annotation

- Label과 동일하게 key-vaule를 통해 리소스의 특성을 기록
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(예) 개발자 정보, 개발 일자, 등록 사이트 등

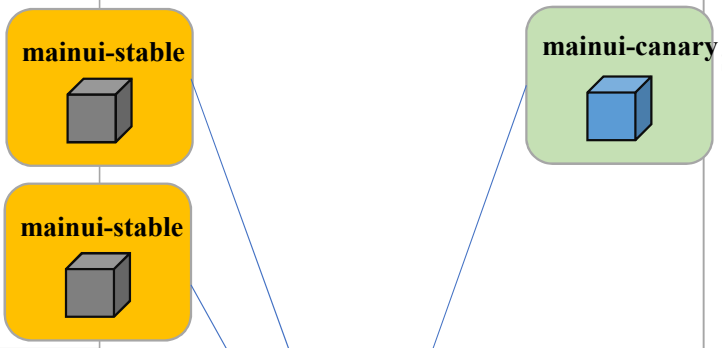
```
annotations:
    builder: "Hong Gildong"
    bulidDate: "20221124"
    imageRegistry: https://hub.docker.com
```

Canary Deployment

- Pod를 배포(업데이트)하는 방법
  - Blue-Green update
  - Canary update
  - Rolling update

- Canary 배포
  - 기존 버전을 유지한 채로 일부 버전만 신규버전으로 올려서 신규 버전에 버그만 이상이 없는지 확인

```
apiVersion: apps/v1
kind: Deploymentmetadata:
  name: mainui-stable
spec:
  replicas: 2
  selector:
    matchLabels:
      app: mainui
       version: stable
```




```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: mainui-canary
spec:
  replicas: 1
  selector:
    matchLabels:
      app: mainui
      version: canary
```

```
apiVersion: v1
kind: Service
metadata:
  name:
 mainui-svc
spec:
  selector:
    app: mainui
```

#cat mainui-stable.yaml

```
root@master:/# cat mainui-stable.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: mainui-stable
spec:
  replicas: 2
  selector:
    matchLabels:
      app: mainui
      version: stable
  template:
    metadata:
      labels:
        app: mainui
        version: stable
    spec:
      containers:
      - name: mainui
        image: nginx:1.14
        ports:
        - containerPort: 80
```

#kubectl create –f mainui-stable.yaml

#kubectrl get pods

```
root@master:/# kubectl create -f mainui-stable.yaml
deployment.apps/mainui-stable created
root@master:/# kubectl get pods
NAME                              READY   STATUS    RESTARTS        AGE
mainui-stable-5b7b6cc49f-2nrlw    1/1     Running   0               7s
mainui-stable-5b7b6cc49f-lpzq2    1/1     Running   0               7s
```

#kubectrl get pods –show-lables

```
root@master:/# kubectl get pods --show-labels
NAME                              READY   STATUS    RESTARTS   AGE     LABELS
mainui-stable-5b7b6cc49f-2nrlw    1/1     Running   0          3m20s   app=mainui,pod-template-hash=5b7b6cc49f,version=stable
mainui-stable-5b7b6cc49f-lpzq2    1/1     Running   0          3m20s   app=mainui,pod-template-hash=5b7b6cc49f,version=stable
root@master:/#
```

#cat mainui-canary.yaml

#kubectl create –f mainui-canary.yaml

```
root@master:/# nano mainui-canary.yaml
root@master:/# cat  mainui-canary.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: mainui-canary
spec:
  replicas: 1
  selector:
    matchLabels:
      app: mainui
      version: canary
  template:
    metadata:
      labels:
        app: mainui
        version: canary
    spec:
      containers:
      - name: mainui
        image: nginx:1.15
        ports:
        - containerPort: 80
root@master:/#
root@master:/# kubectl create -f mainui-canary.yaml
deployment.apps/mainui-canary created
```

#cat mainui-service.yaml

#kubectl create –f mainui-service.yaml

#kubectrl get svc

```
root@master:/# cat mainui-service.yaml
apiVersion: v1
kind: Service
metadata:
  name: mainui-svc
spec:
  selector:
    app: mainui
  ports:
  - port: 8080
    protocol: TCP
    targetPort: 8080
root@master:/#
root@master:/# kubectl create -f mainui-service.yaml
service/mainui-svc created
root@master:/# kubectl get svc
NAME         TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)    AGE
kubernetes   ClusterIP   10.96.0.1      <none>        443/TCP    70d
mainui-svc   ClusterIP   10.102.74.50   <none>        8080/TCP   10s
root@master:/#
```

#kubectl describe service mainui-svc

```
root@master:/# kubectl describe service mainui-svc
Name:              mainui-svc
Namespace:         default
Labels:            <none>
Annotations:       <none>
Selector:          app=mainui
Type:              ClusterIP
IP Family Policy:  SingleStack
IP Families:       IPv4
IP:                10.102.74.50
IPs:               10.102.74.50
Port:              <unset>  8080/TCP
TargetPort:        8080/TCP
Endpoints:         10.40.0.1:8080,10.46.0.1:8080
Session Affinity:  None
Events:            <none>
root@master:/#
```

#kubectl get pods –o wide

```
root@master:/# kubectl get pods -o wide
NAME                              READY   STATUS    RESTARTS   AGE   IP           NODE      NOMINATED NODE
mainui-canary-689b8b566c-9r4pf    1/1     Running   0          99s   10.32.0.2    wnode02   <none>
mainui-stable-5b7b6cc49f-2nrlw    1/1     Running   0          17m   10.40.0.1    wnode01   <none>
mainui-stable-5b7b6cc49f-lpzq2    1/1     Running   0          17m   10.46.0.1    wnode03   <none>
root@master:/#
```

#kubectl get deployment.apps

```
root@master:/# kubectl get deployments.apps
NAME            READY   UP-TO-DATE   AVAILABLE   AGE
mainui-canary   1/1     1            1           3m15s
mainui-stable   2/2     2            2           18m
root@master:/#
```

#kubectl scale deployment mainui-canary --replicas=2

#kubectl get deployment.apps

```
root@master:/# kubectl scale deployment mainui-canary --replicas=2
deployment.apps/mainui-canary scaled
root@master:/#
root@master:/# kubectl get deployments.apps
NAME             READY   UP-TO-DATE   AVAILABLE   AGE
mainui-canary    2/2     2            2           4m58s
mainui-stable    2/2     2            2           20m
root@master:/#
```

#kubectl delete deployment.apps mainui-canary

```
root@master:/#
root@master:/# kubectl delete deployment.apps mainui-canary
deployment.apps "mainui-canary" deleted
root@master:/#
```