Lab 3 - Implementing Canary Release for Prod

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Prepare Prod Environment

Create and switch to prod namespace

```
kubectl create ns prod

kubectl get ns

kubectl config set-context --current --namespace=prod
```

validate

```
kubectl config get-contexts
```

[sample output]

```
CURRENT   NAME        CLUSTER     AUTHINFO    NAMESPACE
*         kind-kind   kind-kind   kind-kind   prod
```

Create a copy of the kustomization code to set up prod with:

```
cd argo-labs
cp -r staging prod
```

update NodePort for prod

File : `prod/service.yaml`

```
apiVersion: v1
kind: Service
metadata:
  name: vote
spec:
  ports:
  - name: "80"
    nodePort: 30200
    port: 80
    protocol: TCP
    targetPort: 80
  type: NodePort
```

create previw service kustomization overlay

File: `prod/preview-service.yaml`

```
apiVersion: v1
kind: Service
metadata:
  name: vote-preview
spec:
  ports:
  - name: "80"
    nodePort: 30300
    port: 80
    protocol: TCP
    targetPort: 80
  type: NodePort
```

update `kustomization` with

- namespace set to `prod`
- path for `preview-service.yaml` added to patches section

File: `prod/kustomization.yaml`

```
apiVersion: kustomize.config.k8s.io/v1beta1
kind: Kustomization
```

```
resources:
- ../base
namespace: prod
commonAnnotations:
  supported-by: sre@example.com
labels:
- includeSelectors: false
  pairs:
    project: instavote
patches:
- path: service.yaml
- path: preview-service.yaml
```

check

```
kustomize build prod
```

apply with

```
kubectl apply -k prod/
```

validate as

```
kubectl get all
```

Create Canary Release

Create `prod/rollout.yaml` with the patch configurations to update

- Replicas Count
- Strategy

as

Filename: `prod/rollout.yaml`

```yaml
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: vote
spec:
  replicas: 5
  strategy:
    blueGreen: null
    canary:
      steps:
      - setWeight: 20
      - pause:
          duration: 10s
      - setWeight: 40
      - pause:
          duration: 10s
      - setWeight: 60
      - pause:
          duration: 10s
      - setWeight: 80
      - pause:
          duration: 10s
      - setWeight: 100
```

add this rollout overlay spec to `prod/kustomization.yaml` in patches section as:

```yaml
apiVersion: kustomize.config.k8s.io/v1beta1
kind: Kustomization
resources:
- ../base
namespace: prod
commonAnnotations:
  supported-by: sre@example.com
labels:
- includeSelectors: false
  pairs:
    project: instavote
patches:
- path: service.yaml
- path: preview-service.yaml
- path: rollout.yaml
```

If you have `kustomize` installed, verify the configs from `argo-labs` as

```
kustomize build prod
```

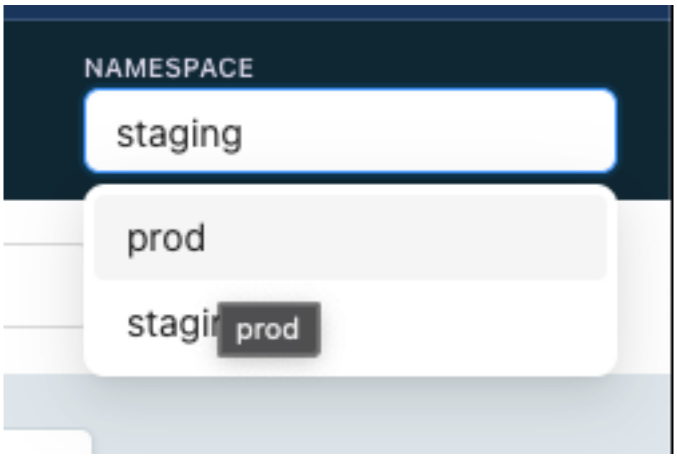
apply

```
kubectl apply -k prod/
```

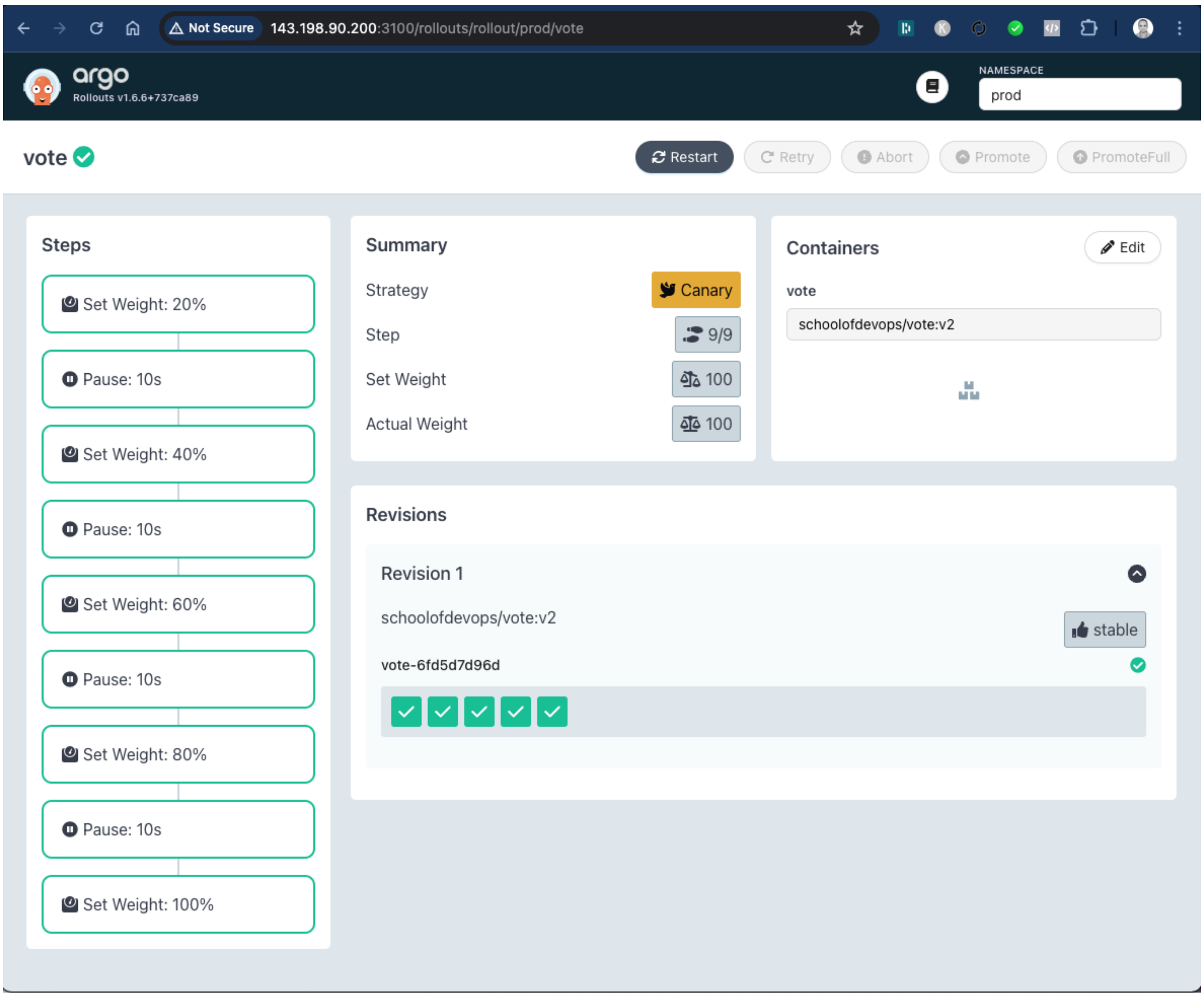
validate

```
kubectl get all,ro
```

If you have the Argo Rollouts Dashboard, switch the namespace from top right corner to `prod`



and check the Canary Release as



Before starting rollout start wathing for the following in 3 different terminals

[Termina 1]

```
watch kubectl get ro,all --show-labels
```

[Terminal 2]

```
watch kubectl describe svc vote
```

[Terminal 3]

```
watch kubectl describe svc vote-preview
```

You could also keep monitoring the Argo Rollouts Dashboard. Launch it if required as

```
kubectl argo rollouts dashboard -p 3100
```

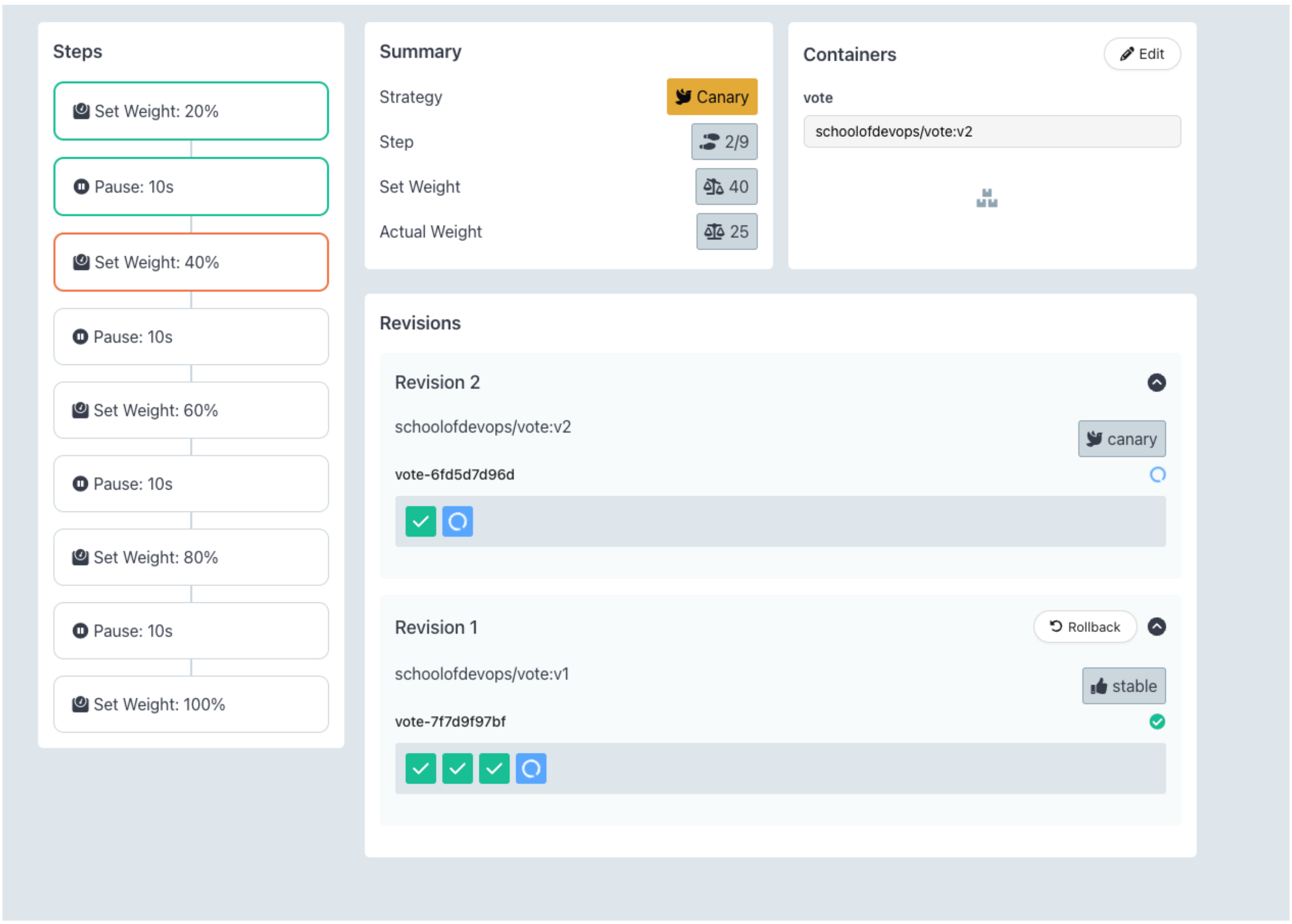
Trigger a new rollout by modifying `base/rollouts.yaml` file with new image tag as

```
spec:
  containers:
  - image: schoolofdevops/vote:v2
```

and apply

```
kubectl apply -k prod
kubectl argo rollouts status vote
```

Here you could see the progressive canary in action, implementing it step by step, ultimately rolling out the new version.



Steps
Set Weight: 20%
Pause: 10s
Set Weight: 40%
Pause: 10s
Set Weight: 60%
Pause: 10s
Set Weight: 80%
Pause: 10s
Set Weight: 100%

Summary
Strategy: Canary
Step: 2/9
Set Weight: 40
Actual Weight: 25

Containers
vote: schoolofdevops/vote:v2

Revisions
Revision 2
schoolofdevops/vote:v2 — canary
vote-6fd5d7d96d

Revision 1
schoolofdevops/vote:v1 — stable
vote-7f7d9f97bf

- A new replicaset is created to maintain the canary deployment during the rollout.
- Based on the weightage set in the strategy, proportionate number of pods are maintained for each replicaSet.
- Gradually, all pods are replaced with new version, shifting 100% traffic to it.

here is the output of the rollout status command above

[sample output]

```
Progressing - more replicas need to be updated
Paused - CanaryPauseStep
Progressing - more replicas need to be updated
Paused - CanaryPauseStep
Progressing - more replicas need to be updated
Paused - CanaryPauseStep
Progressing - more replicas need to be updated
Paused - CanaryPauseStep
Progressing - more replicas need to be updated
Progressing - updated replicas are still becoming available
Progressing - waiting for all steps to complete
Healthy
```

Getting Ready to add Traffic Management - Set up Nginx Ingress Controller

Install helm to setup Nginx Ingress Controller. To install helm version 3 on Linux or MacOS, you can follow following instructions.

```
curl https://raw.githubusercontent.com/helm/helm/master/scripts/get-helm-3 |
bash
```

You could further refer to Official HELM Install Instructions for alternative options.

Verify the installtion is successful,

```
helm --help
helm version
```

Launch Nginx Ingress controller using helm as :

```
helm upgrade --install ingress-nginx ingress-nginx \
  --repo https://kubernetes.github.io/ingress-nginx \
  --namespace ingress-nginx --create-namespace \
  --set controller.hostPort.enabled=true \
  --set controller.service.type=NodePort \
  --set controller.hostPort.ports.http=80 \
  --set-string controller.nodeSelector."kubernetes\.io/os"=linux \
  --set-string controller.nodeSelector.ingress-ready="true"
```

Check the pod for Nginx Ingress, if its running

```
kubectl get pods -n ingress-nginx
```

You may see the pod in pending state. Check why its pending by describing it.

Once you describe, you will see that its pending because it has a `nodeSelector` defined which is looking for a node with label set to `ingress-ready="true"`.

Check the label on the current nodes

```
kubectl get nodes --show-labels
```

Add this lable to first of the worker nodes as

```
kubectl label node kind-worker ingress-ready="true"
```

validate

```
kubectl get nodes --show-labels
```

This time you should see the label added, and nginx ingress controller running, which can be validated using

```
kubectl get pods -n ingress-nginx --watch
```

Wait for the container for nginx ingress controller to be up. You could also validate by connecting to the IPADDRESS of your node where the cluster is beeng setup on port 80, where you should see `**404 Not Found**` error. This is the sign that nginx is set up as a ingress controller and looking for a request with hostname/path defined.

Add Ingress Rule with Host based Routing

Once you have the ingress controller working, add the following ingress rule

File : `prod/ingress.yaml`

```
---
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: vote
  namespace: instavote
spec:
  ingressClassName: nginx
  rules:
  - host: vote.example.com
    http:
      paths:
      - path: /
        pathType: Prefix
        backend:
          service:
            name: vote
            port:
              number: 80
```

add this new manifest resources section of kustomization.yaml so that it gets applied as

File: `prod/kustomization.yaml`

```
apiVersion: kustomize.config.k8s.io/v1beta1
kind: Kustomization
resources:
```

```
- ../base
- ingress.yaml
```

and apply with

```
kubectl apply -k prod/
```

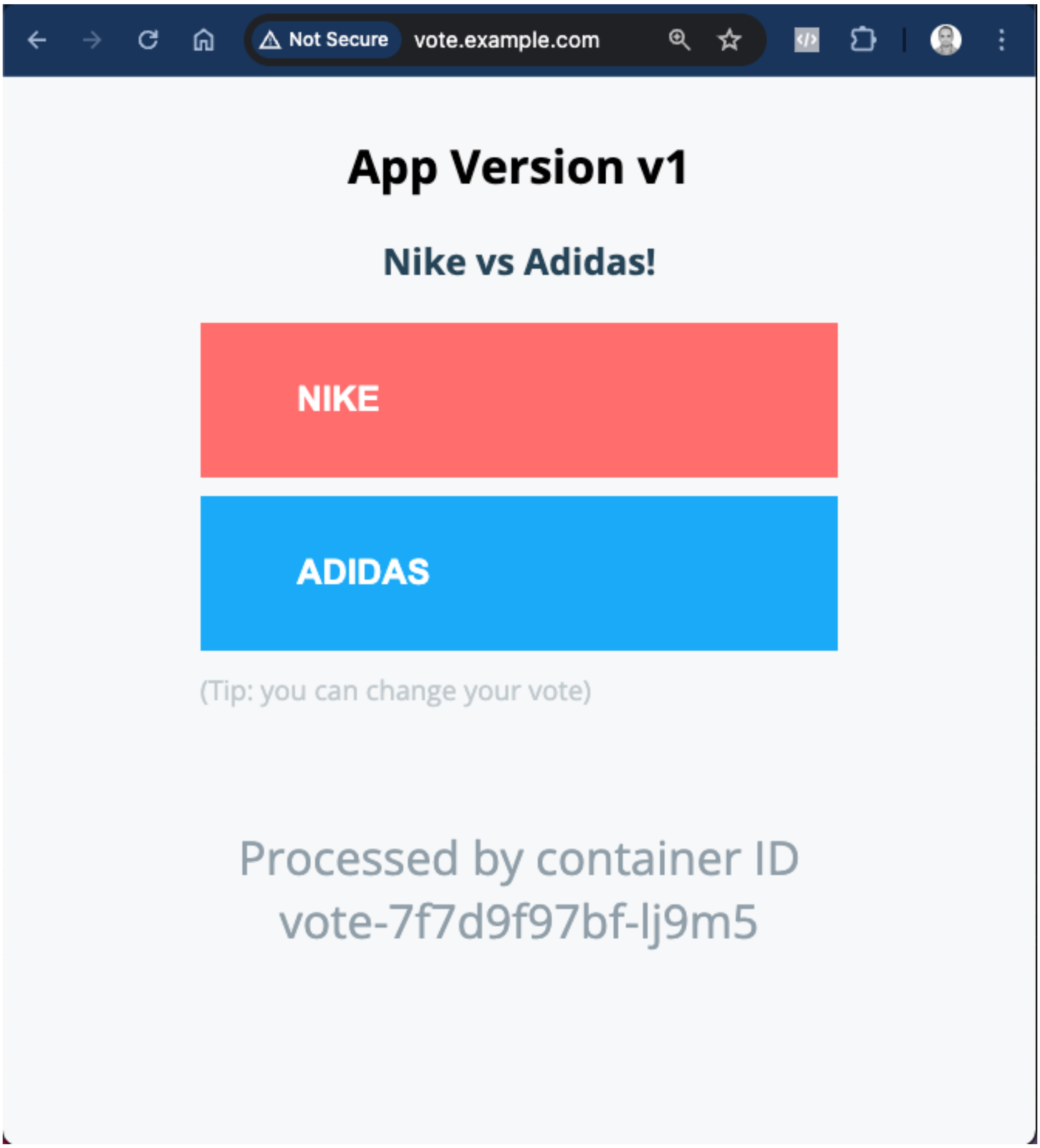
At this time, you would have ingress rule applied.

You could validate it using

```
kubectl get ing

kubectl describe ing vote
```

Also add the host file configuration as per this lab guide and validate you are able to use http://vote.example.com/ to access vote service via ingress.

If you browse to the nginx ingress URI, you should see the app as



App Version v1

Nike vs Adidas!

NIKE

ADIDAS

(Tip: you can change your vote)

Processed by container ID vote-7f7d9f97bf-lj9m5

With this you have successfully set up Nginx Ingress Controller in front of your prod app and are ready to use Traffic Management features of Argo Rollouts.

Canary with Traffic Routing

Read this document to understand the need for traffic routing. You could set up the traffic routing rules with Nginx by modifying the rollout spec as

File : `prod/rollout.yaml`

```
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: vote
spec:
  replicas: 5
  strategy:
    blueGreen: null
    canary:
      canaryService: vote-preview
      stableService: vote
      trafficRouting:
        nginx:
          stableIngress: vote
      steps:
      - setCanaryScale:
          replicas: 3
      - setWeight: 20
      - pause:
          duration: 10s
      - setWeight: 40
      - pause:
          duration: 10s
      - setWeight: 60
      - pause:
          duration: 10s
      - setWeight: 80
      - pause:
          duration: 10s
      - setWeight: 100
```

You could refer to Nginx Ingress Controller for Traffic Routing document to understand this spec.

and apply as

```
kubectl apply -k prod/
```

Once the new configuration is applied, you could try rolling out a few times by updating the image tag in `base/rollout.yaml`.

You could watch using the same commands as earlier as well as using Argo Dashboard. You could also watch for a new ingress created for canary service created during rollout as

```
kubectl describe ing vote-vote-canary
```

where you will see the weight changing as the release progresses.

e.g.

when weight is set to 20%

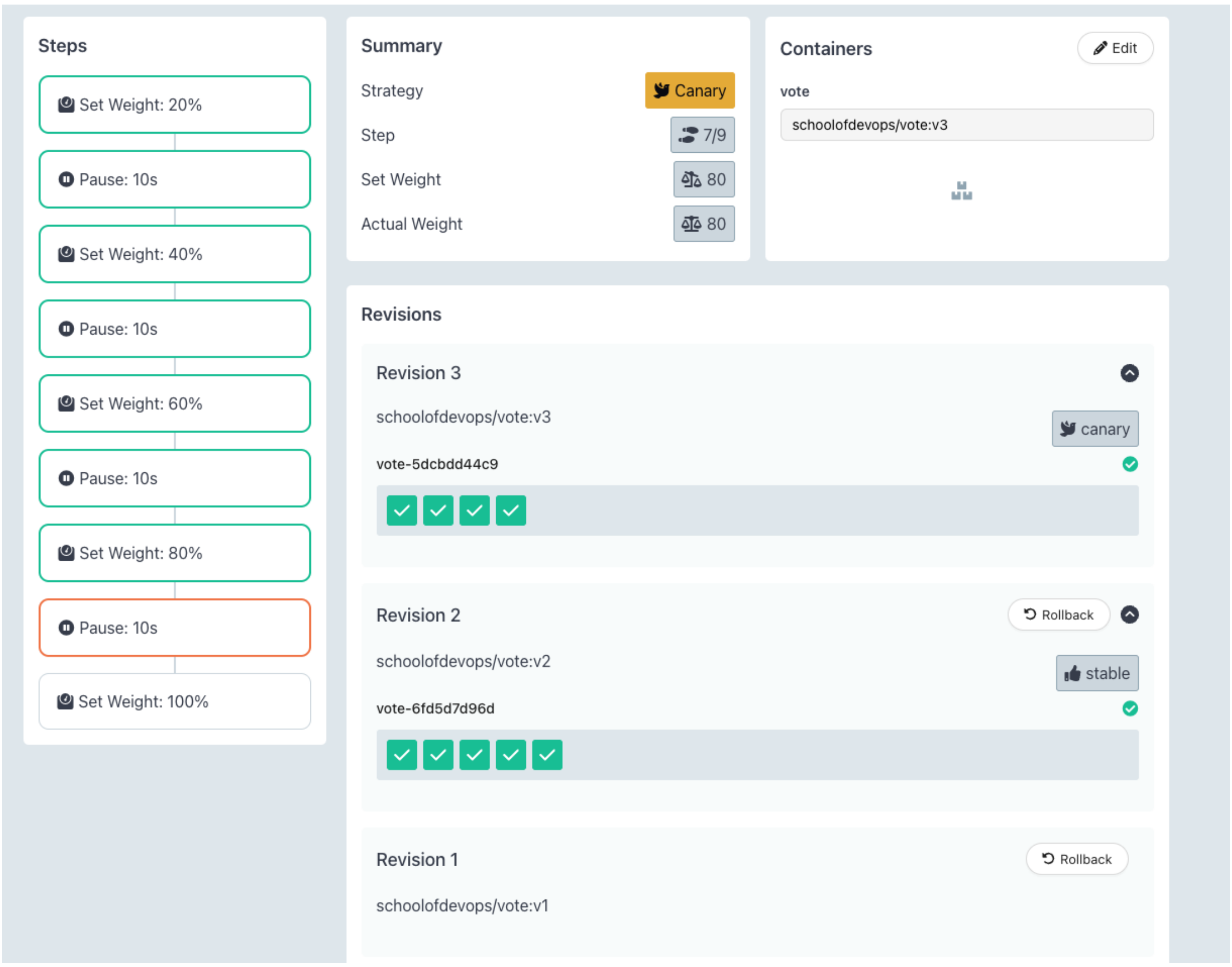
```
Every 2.0s: kubectl describe ing vote-vote-canary
argo-01: Tue Jun  4 08:08:10 2024

Name:             vote-vote-canary
Labels:           <none>
Namespace:        prod
Address:
Ingress Class:    nginx
Default backend:  <default>
Rules:
  Host              Path  Backends
  ----              ----  --------
  vote.example.com
                    /   vote-preview:80 (10.244.1.18:80)
Annotations:        nginx.ingress.kubernetes.io/canary: true
                    nginx.ingress.kubernetes.io/canary-weight: 20
Events:
  Type    Reason  Age                 From                      Message
  ----    ------  ----                ----                      -------
  Normal  Sync    20s (x2 over 2m)  nginx-ingress-controller  Scheduled for sync
```

after weight changed to 40%

```
Annotations:        nginx.ingress.kubernetes.io/canary: true
                    nginx.ingress.kubernetes.io/canary-weight: 40
```

While you are rolling our a Canary with traffic routing this time, you will observe that

- While the release is in progress, unlike earlier, the stable/main replicaSet does not reduce proportionate to step capacity percentage.
- Ingress Controller/Service Mesh, in this case Nginx, does the job of routing between stable and canary versions, not tied to the proportationte number of pods.
- This is to make sure that, any time there is a need to abort and roll back, 100% capacity is available with the stable version.


Steps
Set Weight: 20%
Pause: 10s
Set Weight: 40%
Pause: 10s
Set Weight: 60%
Pause: 10s
Set Weight: 80%
Pause: 10s
Set Weight: 100%

Summary
Strategy Canary
Step 7/9
Set Weight 80
Actual Weight 80

Containers
vote
schoolofdevops/vote:v3

Revisions
Revision 3
schoolofdevops/vote:v3 canary
vote-5dcbdd44c9

Revision 2
schoolofdevops/vote:v2 stable
vote-6fd5d7d96d

Revision 1
schoolofdevops/vote:v1

Try rolling out a few times to understand the nuances of how canary works with nginx ingress controller and traffic routing rules.

Publish Changes to Repo

Commit all the changes that you have made so far to the repo as:

```
git status
git add base/*.yaml
git add prod/*.yaml
git status
git commit -am "added canary releases for prod"
git push origin main
```

Cleaning Up

Once you are done with this lab, clean up the environment with

```
kubectl delete -k prod/
```

#courses/argo/labs/v1