First Steps on Kubernetes

MindSwap - Mindera, 3 October

Who Am I?

- Full Cycle Developer / People Enabler
- Tech Lead@Solverde - SGA
  - Around Mindera almost for 6 years
- @pontoporponto
  - LinkedIn
  - Twitter
  - GitHub
- 20 years of backend development (mostly!)

Mindera

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We use technology to build products we are proud of,
with people we love.

Handbook

What is Kubernetes? (k8s)

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kubernetes.io

Container Orchestration Tool

Control Plane
+
Nodes

Declarative Config

Robust & Resilient

Extensible

Managed vs As-a-Service

Topics Covered

- Pod
- Deployment
  - Probes
  - Replicas
- Service
- Volumes & Secrets
- Related Topics

Setup

- https://github.com/pontoporponto/k8s-workshop
- Install kubectl (https://kubernetes.io/docs/tasks/tools/)
- Install gcloud (https://cloud.google.com/sdk/docs/install)
- Follow setup.txt instructions
- kubectl get nodes
- kubectl create namespace workshopXX
- kubectl config set-context --current --namespace=workshopXX

Pod

1 Pod == 1 Container

```
kubectl apply -f simple-container-pod.yaml
kubectl get pods
kubectl logs simple-container-workshop
```

Pod

```yaml
apiVersion: v1
kind: Pod
metadata:
 name: simple-container-workshop
spec:
 containers:
 - name: simple-container
   image: gcr.io/pontoporponto/simple-container:latest
   resources:
     limits:
       cpu: 250m
     requests:
       memory: 250Mi
```

Deployment

Stateless Pods Management

```
kubectl apply -f simple-service-deployment.yaml
kubectl port-forward simple-service-workshop-XXXXXX 8080
```

http://localhost:8080/workshop/XX/simple

```
kubectl describe pod simple-service-workshop-XXXXXX
```

Deployment

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
 name: simple-service-workshop
spec:
 selector:
   matchLabels:
     app: simple-service
 template:
   metadata:
     labels:
       app: simple-service
   spec:
     containers:
     - name: simple-container
       image: gcr.io/pontoporponto/simple-service:latest
       resources:
         limits:
           memory: 50M
```

Liveness Probe

Readiness Probe

Exec

TCP

HTTP

periodSeconds

timeoutSeconds

failureThreshold

successThreshold

Probes

```
livenessProbe:
 httpGet:
   path: /workshop/XX/simple
   port: 8080
 periodSeconds: 10
 timeoutSeconds: 5
 failureThreshold: 2
```

kubectl port-forward simple-service-workshop-XXXXXX 8080

http://localhost:8080/workshop/shutdown

http://localhost:8080/workshop/XX/simple

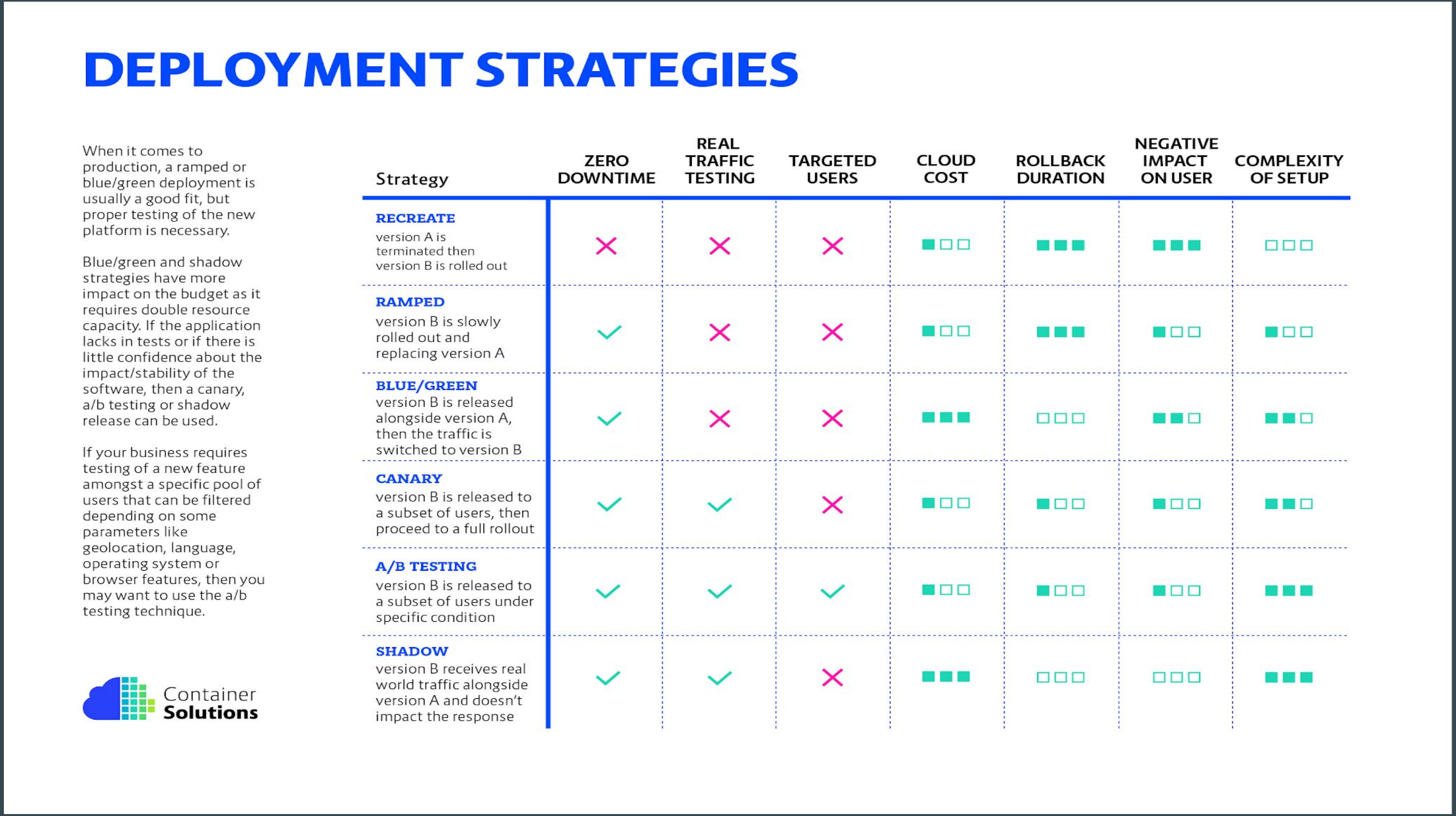
Replicas

kubectl scale deployment simple-service-workshop --replicas=2

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
 name: simple-service-workshop
spec:
 selector:
   matchLabels:
     app: simple-service
 replicas: 2
 template:
   metadata:
     labels:
       app: simple-service
   spec:
     containers:
     - name: simple-container
       image: gcr.io/pontoporponto/simple-service:latest
```

Deployment Strategies

Source: https://github.com/ContainerSolutions/k8s-deployment-strategies



DEPLOYMENT STRATEGIES

When it comes to production, a ramped or blue/green deployment is usually a good fit, but proper testing of the new platform is necessary.

Blue/green and shadow strategies have more impact on the budget as it requires double resource capacity. If the application lacks in tests or if there is little confidence about the impact/stability of the software, then a canary, a/b testing or shadow release can be used.

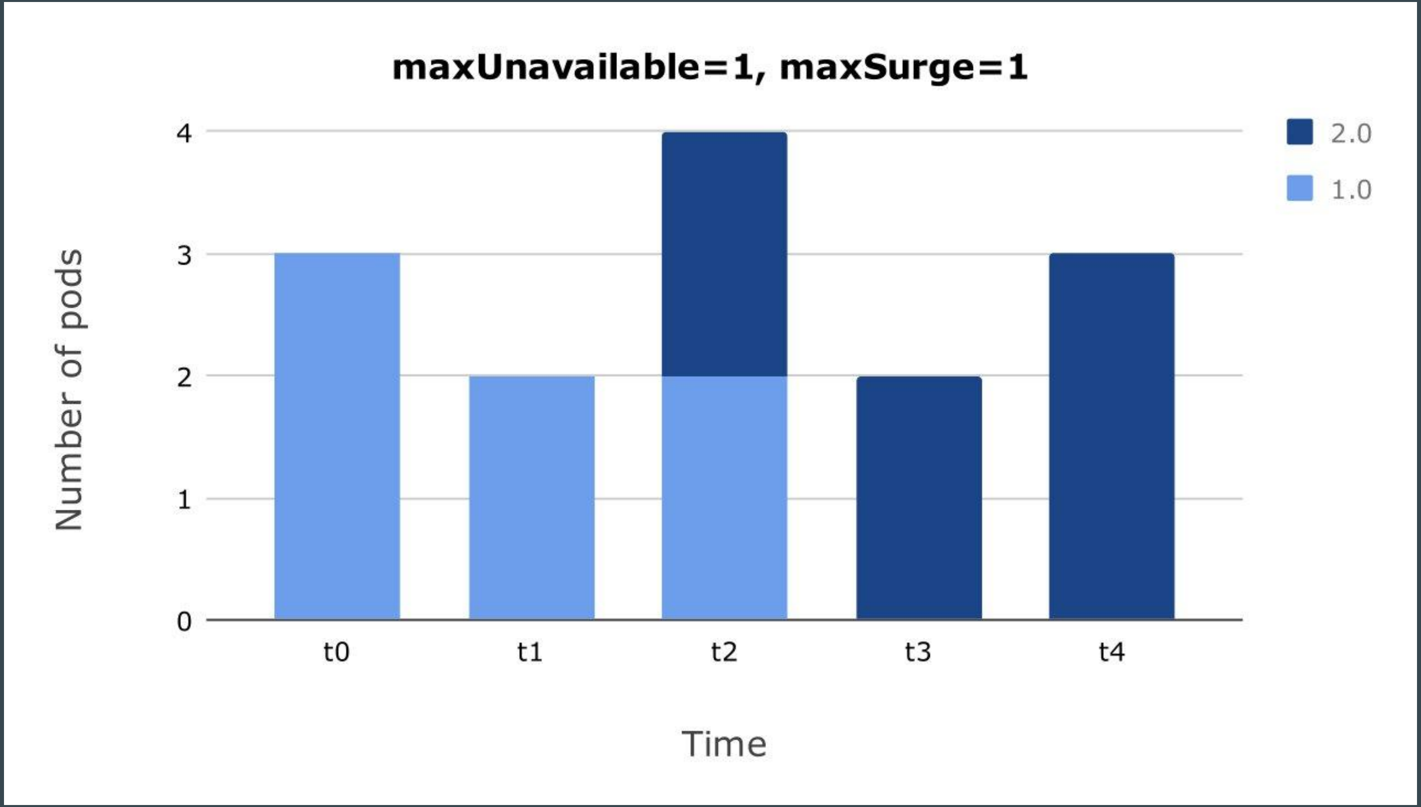
If your business requires testing of a new feature amongst a specific pool of users that can be filtered depending on some parameters like geolocation, language, operating system or browser features, then you may want to use the a/b testing technique.

Strategy	ZERO DOWNTIME	REAL TRAFFIC TESTING	TARGETED USERS	CLOUD COST	ROLLBACK DURATION	NEGATIVE IMPACT ON USER	COMPLEXITY OF SETUP
RECREATE version A is terminated then version B is rolled out	✗	✗	✗	■□□	■■■	■■■	□□□
RAMPED version B is slowly rolled out and replacing version A	✓	✗	✗	■□□	■■■	■□□	■□□
BLUE/GREEN version B is released alongside version A, then the traffic is switched to version B	✓	✗	✗	■■■	□□□	■■□	■■□
CANARY version B is released to a subset of users, then proceed to a full rollout	✓	✓	✗	■□□	■□□	■□□	■■□
A/B TESTING version B is released to a subset of users under specific condition	✓	✓	✓	■□□	■□□	■□□	■■■
SHADOW version B receives real world traffic alongside version A and doesn't impact the response	✓	✓	✗	■■■	□□□	□□□	■■■

Container Solutions

Deployment Strategies

Source: https://www.exoscale.com/syslog/kubernetes-zero-downtime-deployment/



Service

```
kubectl apply -f simple-service-service.yaml
kubectl exec -it simple-container-workshop sh
curl -X GET http://service-endpoint/workshop/XX/simple
```

Service

```yaml
apiVersion: v1
kind: Service
metadata:
 name: service-endpoint
spec:
 type: ClusterIP
 selector:
   app: simple-service
 ports:
  - port: 80
    name: workshop
    targetPort: 8080
```

Service

```
type: NodePort
###########
###########
nodePort: 320XX
```

http://34.110.133.215/workshop/XX/simple

Volumes - Secrets

```
kubectl create secret generic custom-configuration
--from-file=placeholder.txt=placeholder.txt
```

```
kubectl get secrets custom-configuration -o yaml
```

```
kubectl apply -f simple-service-deployment-secret.yaml
```

```
kubectl exec -it simple-service-workshop-XXXX sh
```

```
more config/placeholder.txt
```

Helm

Service Mesh

GitOps

Developer Platforms

Serverless

Certification (CKAD)

Feedback