
KODEKLOUD

Rolling Updates & Rollbacks

Rollout and Versioning

Revision 1


nginx:1.7.0


nginx:1.7.0


nginx:1.7.0


nginx:1.7.0


nginx:1.7.0


nginx:1.7.0


nginx:1.7.0


nginx:1.7.0


nginx:1.7.0

Revision 2


nginx:1.7.1


nginx:1.7.1


nginx:1.7.1


nginx:1.7.1


nginx:1.7.1


nginx:1.7.1


nginx:1.7.1


nginx:1.7.1

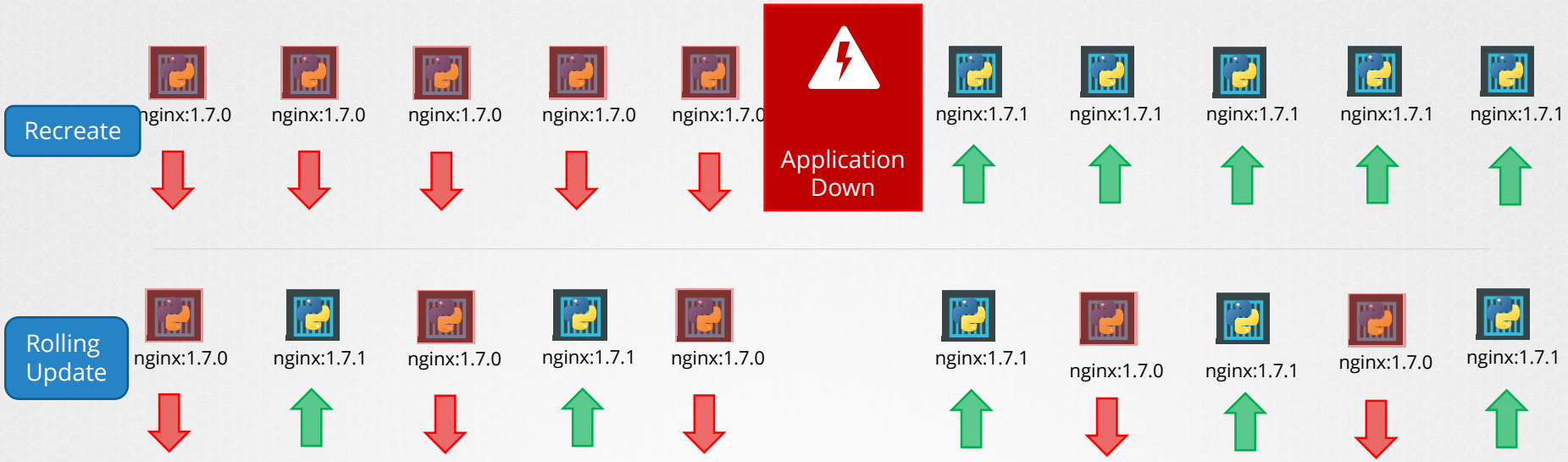

nginx:1.7.1

Rollout Command

```
> kubectl rollout status deployment/myapp-deployment
Waiting for rollout to finish: 0 of 10 updated replicas are available...
Waiting for rollout to finish: 1 of 10 updated replicas are available...
Waiting for rollout to finish: 2 of 10 updated replicas are available...
Waiting for rollout to finish: 3 of 10 updated replicas are available...
Waiting for rollout to finish: 4 of 10 updated replicas are available...
Waiting for rollout to finish: 5 of 10 updated replicas are available...
Waiting for rollout to finish: 6 of 10 updated replicas are available...
Waiting for rollout to finish: 7 of 10 updated replicas are available...
Waiting for rollout to finish: 8 of 10 updated replicas are available...
Waiting for rollout to finish: 9 of 10 updated replicas are available...
deployment "myapp-deployment" successfully rolled out
```

```
> kubectl rollout history deployment/myapp-deployment
deployments "myapp-deployment"
REVISION  CHANGE-CAUSE
1         <none>
2         kubectl apply --filename=deployment-definition.yml --record=true
```

Deployment Strategy



Kubectl apply

```
> kubectl apply -f deployment-definition.yml
deployment "myapp-deployment" configured
```

```
> kubectl set image deployment/myapp-deployment \
                    nginx=nginx:1.9.1
deployment "myapp-deployment" image is updated
```

deployment-definition.yml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: myapp-deployment
  labels:
      app: myapp
      type: front-end
spec:
  template:
    metadata:
      name: myapp-pod
      labels:
         app: myapp
         type: front-end
    spec:
      containers:
      - name: nginx-container
        image: nginx:1.7.1
  replicas: 3
  selector:
    matchLabels:
       type: front-end
```

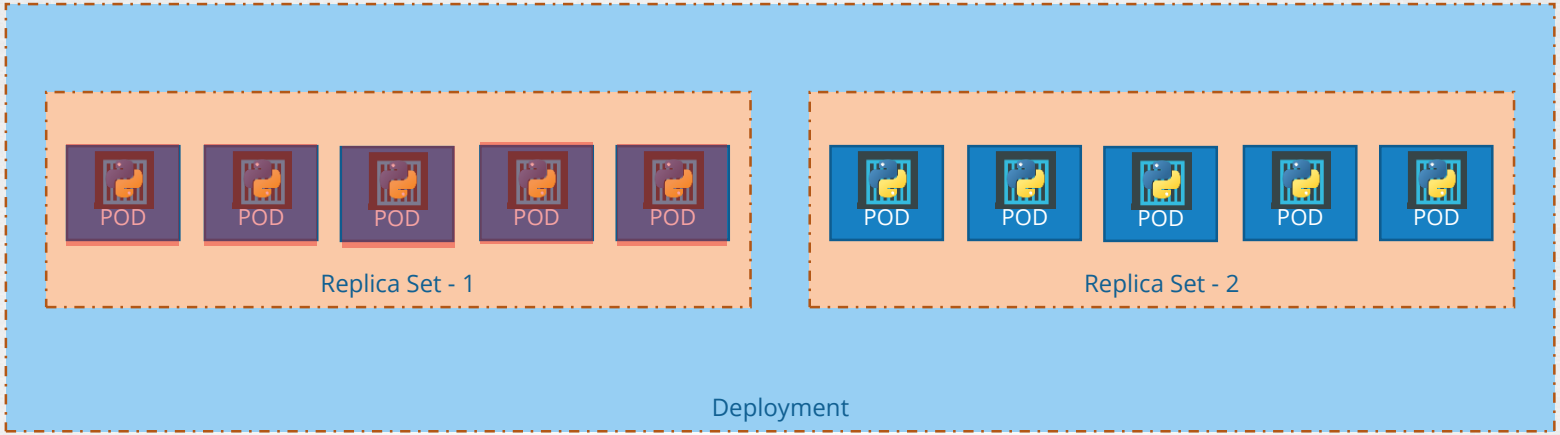
```
C:\Kubernetes>kubectl describe deployment myapp-deployment
Name:                   myapp-deployment
Namespace:              default
CreationTimestamp:      Sat, 03 Mar 2018 17:01:55 +0800
Labels:                 app=myapp
                        type=front-end
Annotations:            deployment.kubernetes.io/revision=2
                        kubectl.kubernetes.io/last-applied-configuration={"apiVersion":"apps/v1","kind":"Deployment","me
s\\Google...
                        kubernetes.io/change-cause=kubectl apply --filename=d:\Mumshad Files\Google Drive\Udemy\Kubernet
Selector:               type=front-end
Replicas:               5 desired | 5 updated | 5 total | 5 available | 0 unavailable
StrategyType:           Recreate
MinReadySeconds:        0
Pod Template:
  Labels:  app=myapp
           type=front-end
  Containers:
   nginx-container:
    Image:        nginx:1.7.1
    Port:         <none>
    Environment:  <none>
    Mounts:       <none>
  Volumes:        <none>
Conditions:
  Type           Status  Reason
  ----           ------  ------
  Available      True    MinimumReplicasAvailable
  Progressing    True    NewReplicaSetAvailable
OldReplicaSets:  <none>
NewReplicaSet:   myapp-deployment-54c7d6ccc (5/5 replicas created)
Events:
  Type    Reason             Age   From                   Message
  ----    ------             ----  ----                   -------
  Normal  ScalingReplicaSet  11m   deployment-controller  Scaled up replica set myapp-deployment-6795844b58 to 5
  Normal  ScalingReplicaSet  1m    deployment-controller  Scaled down replica set myapp-deployment-6795844b58 to 0
  Normal  ScalingReplicaSet  56s   deployment-controller  Scaled up replica set myapp-deployment-54c7d6ccc to 5
```

Recreate

```
C:\Kubernetes>kubectl describe deployment myapp-deployment
Name:                   myapp-deployment
Namespace:              default
CreationTimestamp:      Sat, 03 Mar 2018 17:16:53 +0800
Labels:                 app=myapp
                        type=front-end
Annotations:            deployment.kubernetes.io/revision=2
                        kubectl.kubernetes.io/last-applied-configuration={"apiVersion":"apps/v1","kind":"Deployment","metadata
Files\\Google...
                        kubernetes.io/change-cause=kubectl apply --filename=d:\Mumshad Files\Google Drive\Udemy\Kubernetes\Dem
Selector:               type=front-end
Replicas:               5 desired | 5 updated | 6 total | 4 available | 2 unavailable
StrategyType:           RollingUpdate
MinReadySeconds:        0
RollingUpdateStrategy:  25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=myapp
           type=front-end
  Containers:
   nginx-container:
    Image:        nginx
    Port:         <none>
    Environment:  <none>
    Mounts:       <none>
  Volumes:        <none>
Conditions:
  Type           Status  Reason
  ----           ------  ------
  Available      True    MinimumReplicasAvailable
  Progressing    True    ReplicaSetUpdated
OldReplicaSets:  myapp-deployment-67c749c58c (1/1 replicas created)
NewReplicaSet:   myapp-deployment-7d57dbdb8d (5/5 replicas created)
Events:
  Type    Reason             Age   From                   Message
  ----    ------             ----  ----                   -------
  Normal  ScalingReplicaSet  1m    deployment-controller  Scaled up replica set myapp-deployment-67c749c58c to 5
  Normal  ScalingReplicaSet  1s    deployment-controller  Scaled up replica set myapp-deployment-7d57dbdb8d to 2
  Normal  ScalingReplicaSet  1s    deployment-controller  Scaled down replica set myapp-deployment-67c749c58c to 4
  Normal  ScalingReplicaSet  1s    deployment-controller  Scaled up replica set myapp-deployment-7d57dbdb8d to 3
  Normal  ScalingReplicaSet  0s    deployment-controller  Scaled down replica set myapp-deployment-67c749c58c to 3
  Normal  ScalingReplicaSet  0s    deployment-controller  Scaled up replica set myapp-deployment-7d57dbdb8d to 4
  Normal  ScalingReplicaSet  0s    deployment-controller  Scaled down replica set myapp-deployment-67c749c58c to 2
  Normal  ScalingReplicaSet  0s    deployment-controller  Scaled up replica set myapp-deployment-7d57dbdb8d to 5
  Normal  ScalingReplicaSet  0s    deployment-controller  Scaled down replica set myapp-deployment-67c749c58c to 1
```

RollingUpdate

Upgrades

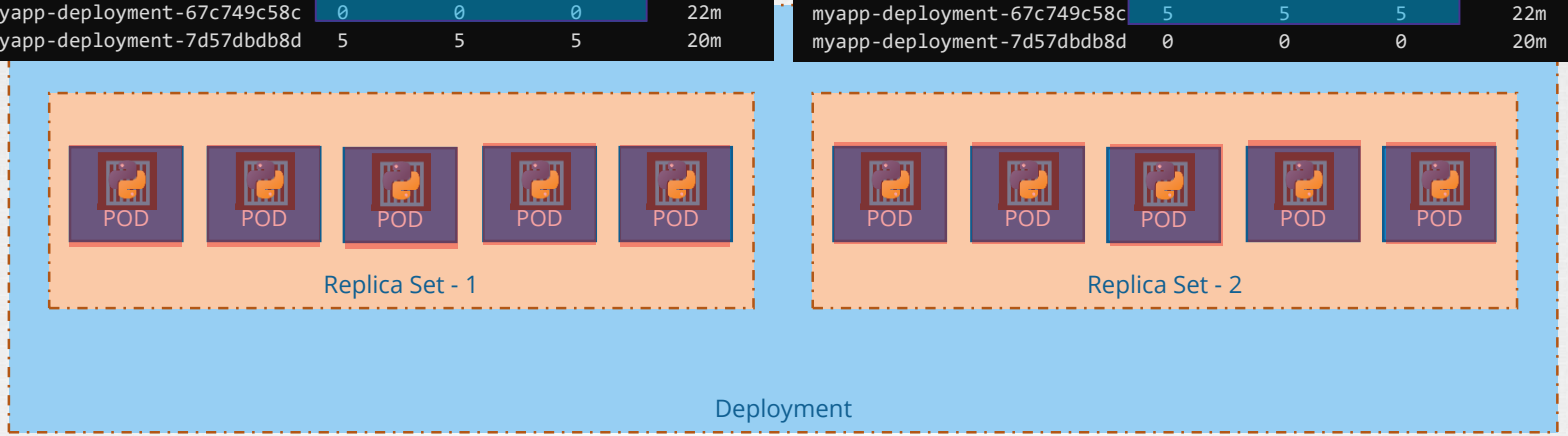



```
> kubectl get replicasets
NAME                          DESIRED   CURRENT   READY     AGE
myapp-deployment-67c749c58c   0         0         0         22m
myapp-deployment-7d57dbdb8d   5         5         5         20m
```

Rollback

```
> kubectl get replicasets
NAME                          DESIRED   CURRENT   READY   AGE
myapp-deployment-67c749c58c   0         0         0       22m
myapp-deployment-7d57dbdb8d   5         5         5       20m
```

```
> kubectl get replicasets
NAME                          DESIRED   CURRENT   READY   AGE
myapp-deployment-67c749c58c   5         5         5       22m
myapp-deployment-7d57dbdb8d   0         0         0       20m
```




```
> kubectl rollout undo deployment/myapp-deployment
deployment “myapp-deployment” rolled back
```

kubectl run

```
> kubectl run nginx --image=nginx
deployment "nginx" created
```

Summarize Commands

Create

```
> kubectl create –f deployment-definition.yml
```

Get

```
> kubectl get deployments
```

Update

```
> kubectl apply –f deployment-definition.yml
```

```
> kubectl set image deployment/myapp-deployment nginx=nginx:1.9.1
```

Status

```
> kubectl rollout status deployment/myapp-deployment
```

```
> kubectl rollout history deployment/myapp-deployment
```

Rollback

```
> kubectl rollout undo deployment/myapp-deployment
```

COMMANDS & ARGUMENTS

```
docker run ubuntu
```

```
docker ps
```

```
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
```

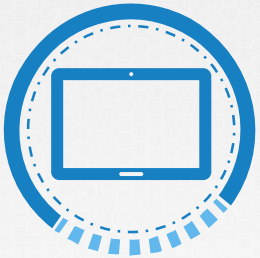
```
docker ps -a
```

```
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS                      PORTS
45aacca36850        ubuntu              "/bin/bash"         43 seconds ago      Exited (0) 41 seconds ago
```

```
# Install Nginx.
RUN \
  add-apt-repository -y ppa:nginx/stable && \
  apt-get update && \
  apt-get install -y nginx && \
  rm -rf /var/lib/apt/lists/* && \
  echo "\ndaemon off;" >> /etc/nginx/nginx.conf && \
  chown -R www-data:www-data /var/lib/nginx

# Define mountable directories.
VOLUME ["/etc/nginx/sites-enabled", "/etc/nginx/certs", "/etc/nginx/cor

# Define working directory.
WORKDIR /etc/nginx

# Define default command.
CMD ["nginx"]
```

```
ARG MYSQL_SERVER_PACKAGE_URL=https://repo.mysql.com/yum/mysql-8.0-community/docker/x86_
ARG MYSQL_SHELL_PACKAGE_URL=https://repo.mysql.com/yum/mysql-tools-community/el/7/x86_6

# Install server
RUN rpmkeys --import https://repo.mysql.com/RPM-GPG-KEY-mysql \
  && yum install -y $MYSQL_SERVER_PACKAGE_URL $MYSQL_SHELL_PACKAGE_URL libpwquality \
  && yum clean all \
  && mkdir /docker-entrypoint-initdb.d

VOLUME /var/lib/mysql

COPY docker-entrypoint.sh /entrypoint.sh
COPY healthcheck.sh /healthcheck.sh
ENTRYPOINT ["/entrypoint.sh"]
HEALTHCHECK CMD /healthcheck.sh
EXPOSE 3306 33060
CMD ["mysqld"]
```

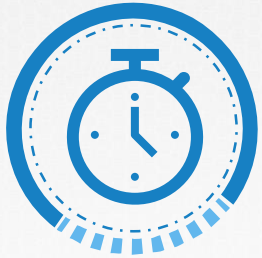
```
# Pull base image.
FROM ubuntu:14.04

# Install.
RUN \
  sed -i 's/# \(.*multiverse$\)/\1/g' /etc/apt/sources.list && \
  apt-get update && \
  apt-get -y upgrade && \
  apt-get install -y build-essential && \
  apt-get install -y software-properties-common && \
  apt-get install -y byobu curl git htop man unzip vim wget && \
  rm -rf /var/lib/apt/lists/*

# Add files.
ADD root/.bashrc /root/.bashrc
ADD root/.gitconfig /root/.gitconfig
ADD root/.scripts /root/.scripts

# Set environment variables.
ENV HOME /root

# Define working directory.
WORKDIR /root

# Define default command.
CMD ["bash"]
```



??

```
docker run ubuntu [COMMAND]
```

```
docker run ubuntu sleep 5
```



```
FROM Ubuntu

CMD sleep 5
```

CMD command param1

CMD [“command”, “param1”]

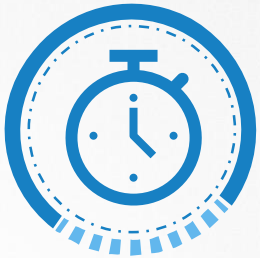
CMD sleep 5

CMD [“sleep”, “5”]

CMD [“sleep 5”]

```
docker build -t ubuntu-sleeper .
```

```
docker run ubuntu-sleeper
```



```
FROM Ubuntu

CMD sleep 5
```

```
docker run ubuntu-sleeper sleep 10
```

Command at Startup: sleep 10

```
FROM Ubuntu

ENTRYPOINT ["sleep"]
```

```
docker run ubuntu-sleeper 10
```

Command at Startup:

```
docker run ubuntu-sleeper
sleep: missing operand
Try 'sleep --help' for more information.
```

Command at Startup:

```
FROM Ubuntu

ENTRYPOINT ["sleep"]

CMD ["5"]
```

```
docker run ubuntu-sleeper
sleep: missing operand
Try 'sleep --help' for more information.
```

Command at Startup:

```
docker run ubuntu-sleeper 10
```

Command at Startup:

```
docker run --entrypoint sleep2.0 ubuntu-sleeper 10
```

Command at Startup:

```
docker run --name ubuntu-sleeper ubuntu-sleeper
```

```
docker run --name ubuntu-sleeper ubuntu-sleeper 10
```

pod-definition.yml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: ubuntu-sleeper-pod
spec:
  containers:
    - name:
      image:
      args:
```

```
kubectl create -f pod-definition.yml
```

```
FROM Ubuntu

ENTRYPOINT ["sleep"]

CMD ["5"]
```

```
docker run --name ubuntu-sleeper \
    --entrypoint ["sleep2.0"]
    ubuntu-sleeper 10
```

pod-definition.yml

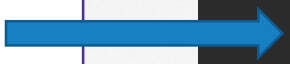
```
apiVersion: v1
kind: Pod
metadata:
  name: ubuntu-sleeper-pod
spec:
  containers:
    - name: ubuntu-sleeper
      image: ubuntu-sleeper
      command: ["10"]
```

```
kubectl create -f pod-definition.yml
```

FROM Ubuntu

ENTRYPOINT [“sleep”]

CMD [“5”]



pod-definition.yml

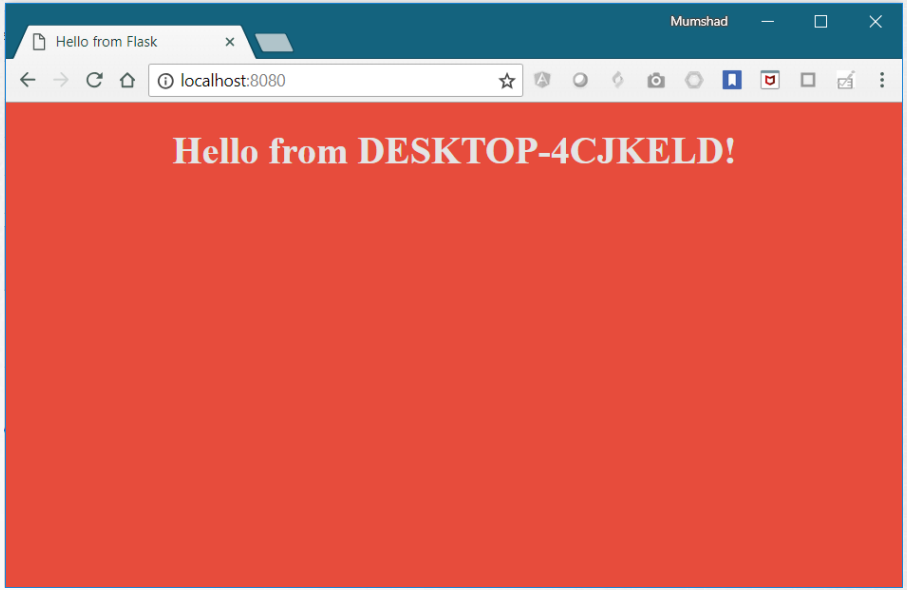
```
apiVersion: v1
kind: Pod
metadata:
  name: ubuntu-sleeper-pod
spec:
  containers:
    - name: ubuntu-sleeper
      image: ubuntu-sleeper
      command:[“sleep2.0”]
      args: [“10”]
```

ENVIRONMENT VARIABLES

Environment Variables

app.py

```python
import os
from flask import Flask

app = Flask(__name__)

…
…

color = "red"

@app.route("/")
def main():
    print(color)
    return render_template('hello.html', color=color)


if __name__ == "__main__":
    app.run(host="0.0.0.0", port="8080")
```




```
python app.py
```

Environment Variables

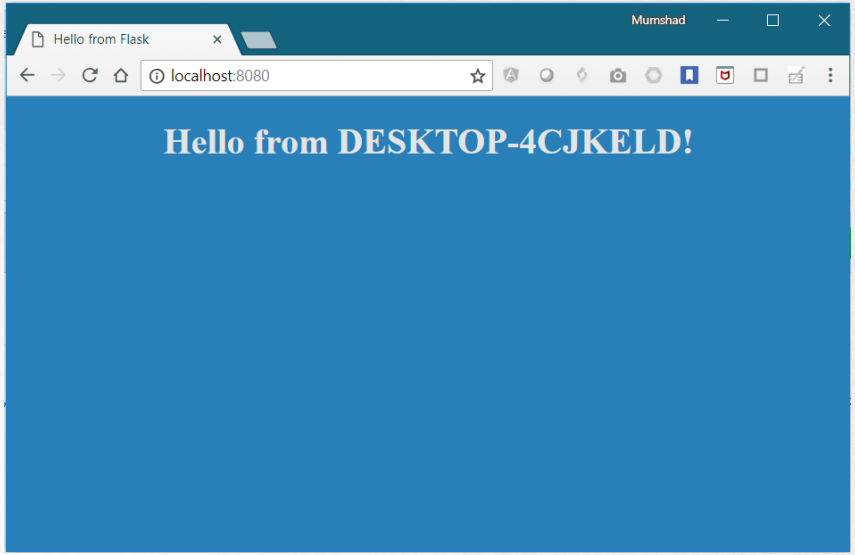
app.py

```
import os
from flask import Flask

app = Flask(__name__)

…
…

color = "red"

@app.route("/")
def main():
    print(color)
    return render_template('hello.html', color=color)


if __name__ == "__main__":
    app.run(host="0.0.0.0", port="8080")
```

Environment Variables

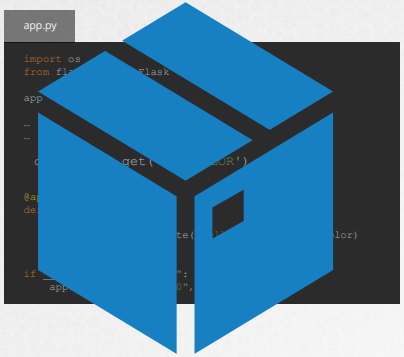
app.py

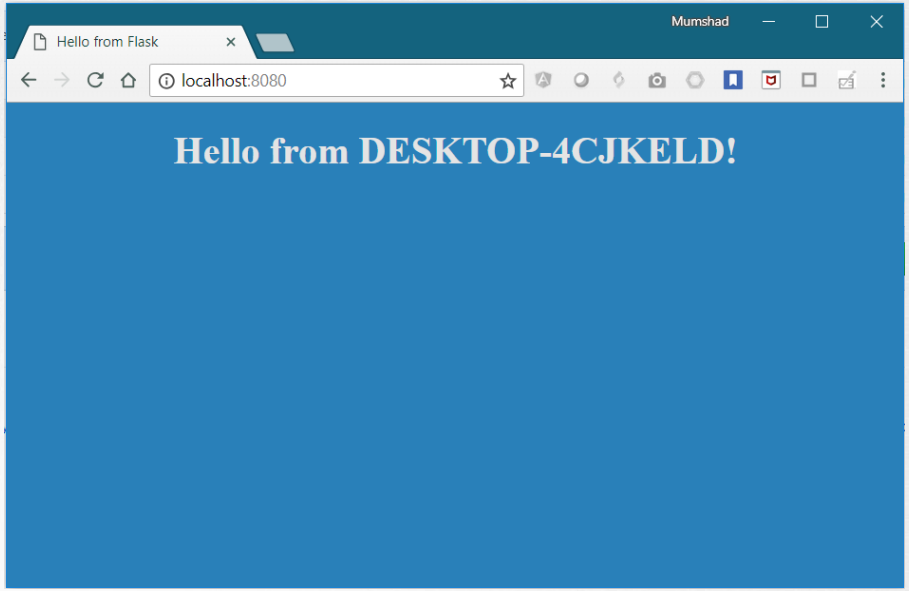
```
import os
from flask import Flask

app = Flask(__name__)

…
…

color = os.environ.get('APP_COLOR')

@app.route("/")
def main():
    print(color)
    return render_template('hello.html', color=color)


if __name__ == "__main__":
    app.run(host="0.0.0.0", port="8080")
```




```
export APP_COLOR=blue; python app.py
```

ENV Variables in Docker

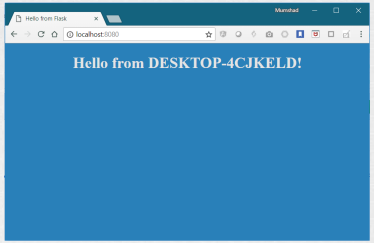




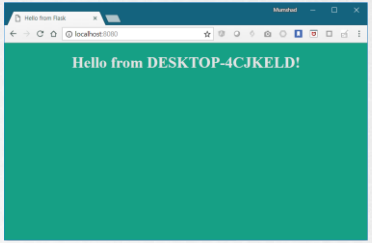

```
docker run -e APP_COLOR=blue simple-webapp-color
```

ENV Variables in Docker

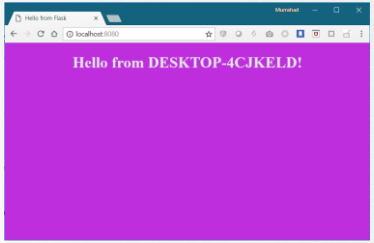
```
docker run  -e APP_COLOR=blue    simple-webapp-color
```




```
docker run  -e APP_COLOR=green simple-webapp-color
```




```
docker run  -e APP_COLOR=pink simple-webapp-color
```

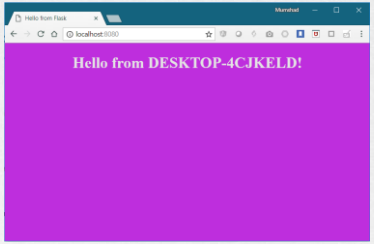


ENV Variables in Kubernetes

```
docker run  -e APP_COLOR=pink simple-webapp-color
```

pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080

    env:
      - name: APP_COLOR
        value: pink
```



ENV Value Types

```
env:
  - name: APP_COLOR
    value: pink
```

```
env:
  - name: APP_COLOR
    valueFrom:
      configMapKeyRef:
```

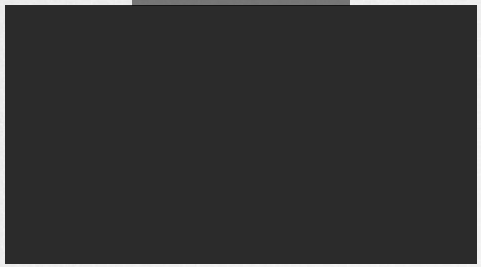
```
env:
  - name: APP_COLOR
    valueFrom:
      secretKeyRef:
```

Course Objectives

- Core Concepts
- Configuration
  - ConfigMaps
  - SecurityContexts
  - Resource Requirements
  - Secrets
  - ServiceAccounts
- Multi-Container Pods
- Observability
- Pod Design
- Services & Networking
- State Persistence

ConfigMaps

ConfigMap



pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080

    env:
      - name: APP_COLOR
        value: blue
      - name: APP_MODE
        value: prod
```

ConfigMaps

ConfigMap

```
APP_COLOR: blue
APP_MODE: prod
```

pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080

    envFrom:
    - configMapRef:
        name: app-config
```

Create ConfigMap

Inject into Pod

Create ConfigMaps

ConfigMap

```
APP_COLOR: blue
APP_MODE: prod
```

Imperative

```
kubectl create configmap
```

Declarative

```
kubectl create -f
```

Create ConfigMap

Create ConfigMaps

ConfigMap

```
APP_COLOR: blue
APP_MODE: prod
```

Create ConfigMap

Imperative

```
kubectl create configmap
    <config-name> --from-literal=<key>=<value>
```

```
kubectl create configmap \
    app-config --from-literal=APP_COLOR=blue \
               --from-literal=APP_MOD=prod
```

```
kubectl create configmap
    <config-name> --from-file=<path-to-file>
```

```
kubectl create configmap \
    app-config --from-file=app_config.properties
```

Create ConfigMaps

ConfigMap

```
APP_COLOR: blue
APP_MODE: prod
```

Declarative

```
kubectl create -f
```

config-map.yaml

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: app-config
data:
  APP_COLOR: blue
  APP_MODE: prod
```

Create ConfigMap

```
kubectl create -f config-map.yaml
```

Create ConfigMaps

app-config

```
APP_COLOR: blue
APP_MODE: prod
```

mysql-config

```
port: 3306
max_allowed_packet: 128M
```

redis-config

```
port: 6379
rdb-compression: yes
```

Create ConfigMap

View ConfigMaps

```
kubectl get configmaps
```

```
NAME         DATA      AGE
app-config   2         3s
```

```
kubectl describe configmaps
```

```
Name:         app-config
Namespace:    default
Labels:       <none>
Annotations:  <none>

Data
====
APP_COLOR:
----
blue
APP_MODE:
----
prod
Events:  <none>
```

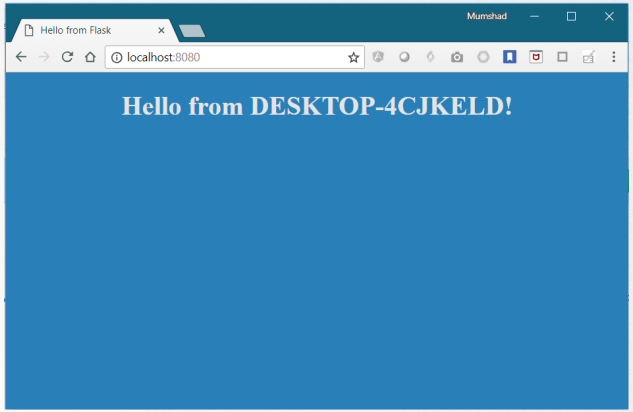
ConfigMap in Pods

pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
  labels:
    name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080
    envFrom:
      - configMapRef:
          name: app-config
```

config-map.yaml

```yaml
apiVersion: v1
kind: ConfigMap
metadata:
  name: app-config
data:
  APP_COLOR: blue
  APP_MODE: prod
```




```
kubectl create -f pod-definition.yaml
```

ConfigMap in Pods

```
envFrom:
  - configMapRef:
      name: app-config
```

ENV

SINGLE ENV

```
env:
  - name: APP_COLOR
    valueFrom:
      configMapKeyRef:
        name: app-config
        key: APP_COLOR
```

```
volumes:
- name: app-config-volume
  configMap:
    name: app-config
```

VOLUME

Kubernetes Secrets

Web-MySQL Application

app.py

```
import os
from flask import Flask

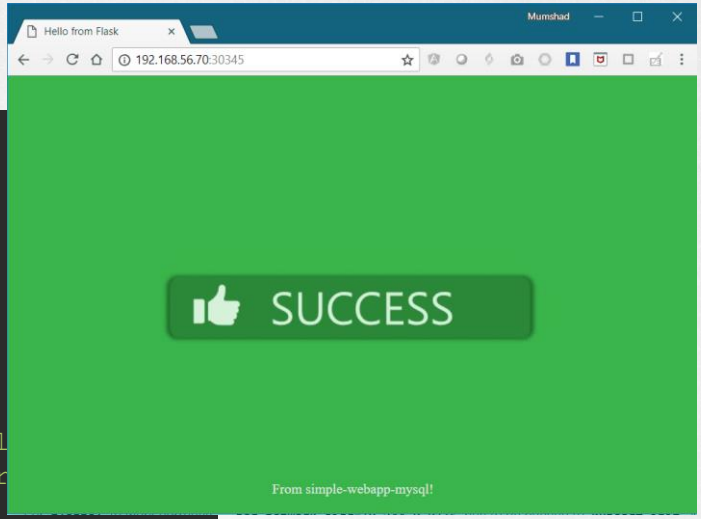
app = Flask(__name__)


@app.route("/")
def main():

    mysql.connector.connect(host='mysql', database='mysql
                            user='root', password='paswr

    return render_template('hello.html', color=fetchcolor())


if __name__ == "__main__":
    app.run(host="0.0.0.0", port="8080")
```



Web-MySQL Application

app.py

```
import os
from flask import Flask

app = Flask(__name__)


@app.route("/")
def main():

     mysql.connector.connect(host='mysql', database='mysql',
                             user='root', password='paswrd')

    return render_template('hello.html', color=fetchcolor())


if __name__ == "__main__":
    app.run(host="0.0.0.0", port="8080")
```

Web-MySQL Application

app.py

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import os
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app = Flask(__name__)


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def main():

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                            user='root', password='paswrd')

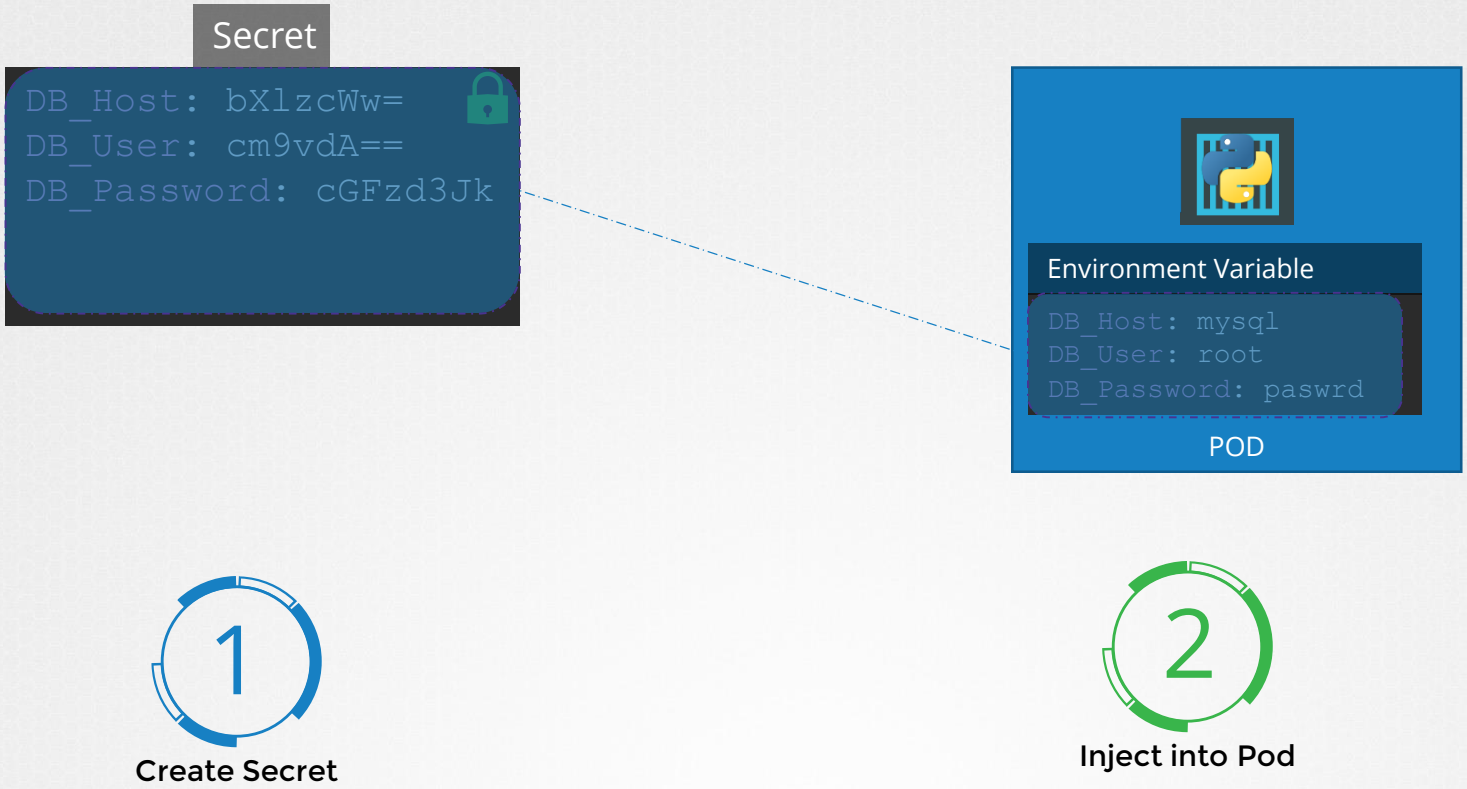
    return render_template('hello.html', color=fetchcolor())


if __name__ == "__main__":
    app.run(host="0.0.0.0", port="8080")
```

config-map.yaml

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: app-config
data:
  DB_Host: mysql
  DB_User: root
  DB_Password: paswrd
```

Secret


Secret
DB_Host: bXlzcWw=
DB_User: cm9vdA==
DB_Password: cGFzd3Jk
Environment Variable
DB_Host: mysql
DB_User: root
DB_Password: paswrd
POD
1
Create Secret
2
Inject into Pod

Create Secrets

Secret

```
DB_Host: mysql
DB_User: root
DB_Password: paswrd
```

Imperative

```
kubectl create secret generic
```

Declarative

```
kubectl create -f
```

Create Secret

Create Secrets

Secret

```
DB_Host: mysql
DB_User: root
DB_Password: paswrd
```

Imperative

```
kubectl create secret generic
    <secret-name> --from-literal=<key>=<value>
```

```
kubectl create secret generic \
    app-secret --from-literal=DB_Host=mysql      \
               --from-literal=DB_User=root
               --from-literal=DB_Password=paswrd
```

```
kubectl create secret generic
    <secret-name> --from-file=<path-to-file>
```

```
kubectl create secret generic \
    app-secret --from-file=app_secret.properties
```

Create Secret

Create Secrets

Secret

```
DB_Host: mysql
DB_User: root
DB_Password: paswrd
```

Create Secret

Declarative

```
kubectl create -f
```

secret-data.yaml

```
apiVersion: v1
kind: Secret
metadata:
  name: app-secret
data:
  DB_Host: bXlzcWw=
  DB_User: cm9vdA==
  DB_Password: cGFzd3Jk
```

```
kubectl create -f secret-data.yaml
```

Encode Secrets

```
DB_Host: mysql
DB_User: root
DB_Password: paswrd
```

```
DB_Host: bXlzcWw=
DB_User: cm9vdA==
DB_Password: cGFzd3Jk
```

```
echo -n 'mysql' | base64
bXlzcWw=
```

```
echo -n 'root' | base64
cm9vdA==
```

```
echo -n 'paswrd' | base64
cGFzd3Jk
```

View Secrets

```
kubectl get secrets
```

```
NAME                  TYPE                                  DATA      AGE
app-secret            Opaque                                3         10m
default-token-mvtkv   kubernetes.io/service-account-token   3         2h
```

```
kubectl describe secrets
```

```
Name:         app-secret
Namespace:    default
Labels:       <none>
Annotations:  <none>

Type:  Opaque

Data
====
DB_Host:      10 bytes
DB_Password:  6 bytes
DB_User:      4 bytes
```

```
kubectl get secret app-secret -o yaml
```

```
apiVersion: v1
data:
  DB_Host: bXlzcWw=
  DB_Password: cGFzd3Jk
  DB_User: cm9vdA==
kind: Secret
metadata:
  creationTimestamp: 2018-10-18T10:01:12Z
  labels:
    name: app-secret
  name: app-secret
  namespace: default
uid: be96e989-d2bc-11e8-a545-080027931072
type: Opaque
```

Decode Secrets

```
DB_Host: mysql
DB_User: root
DB_Password: paswrd
```

```
DB_Host: bXlzcWw=
DB_User: cm9vdA==
DB_Password: cGFzd3Jk
```

```
echo -n 'bXlzcWw=' | base64 --decode
mysql
```

```
echo -n 'cm9vdA==' | base64 --decode
root
```

```
echo -n 'cGFzd3Jk' | base64 --decode
paswrd
```

Secrets in Pods

pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp-color
  labels:
    name: simple-webapp-color
spec:
  containers:
  - name: simple-webapp-color
    image: simple-webapp-color
    ports:
      - containerPort: 8080
    envFrom:
      - secretRef:
          name: app-secret
```

secret-data.yaml

```yaml
apiVersion: v1
kind: Secret
metadata:
  name: app-secret
data:
  DB_Host: bXlzcWw=
  DB_User: cm9vdA==
  DB_Password: cGFzd3Jk
```

Inject into Pod

```
kubectl create -f pod-definition.yaml
```

Secrets in Pods

```
envFrom:
  - secretRef:
      name: app-config
```

ENV

SINGLE ENV

```
env:
  - name: DB_Password
    valueFrom:
      secretKeyRef:
        name: app-secret
        key: DB_Password
```

```
volumes:
- name: app-secret-volume
  secret:
    secretName: app-secret
```

VOLUME

Secrets in Pods as Volumes

```
volumes:
- name: app-secret-volume
  secret:
    secretName: app-secret
```

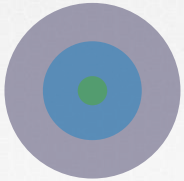
VOLUME

```
ls /opt/app-secret-volumes
DB_Host      DB_Password  DB_User
```

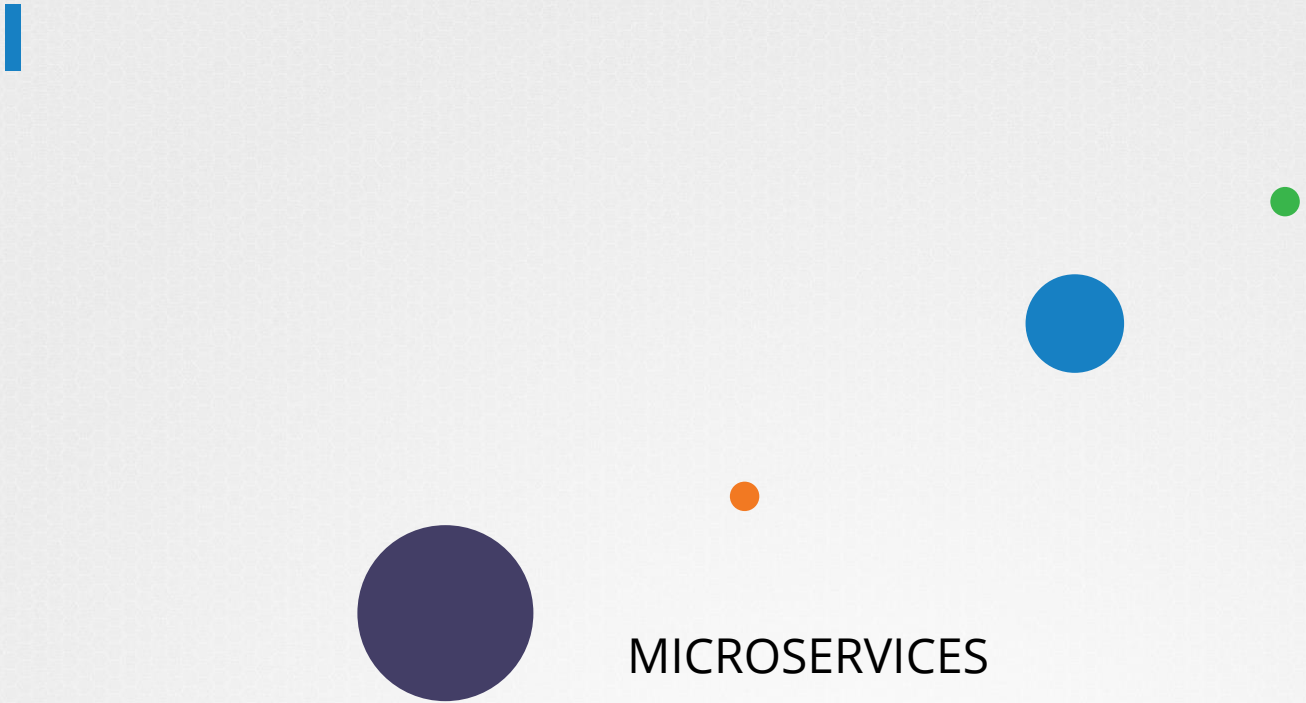
```
cat /opt/app-secret-volumes/DB_Password
paswrd
```

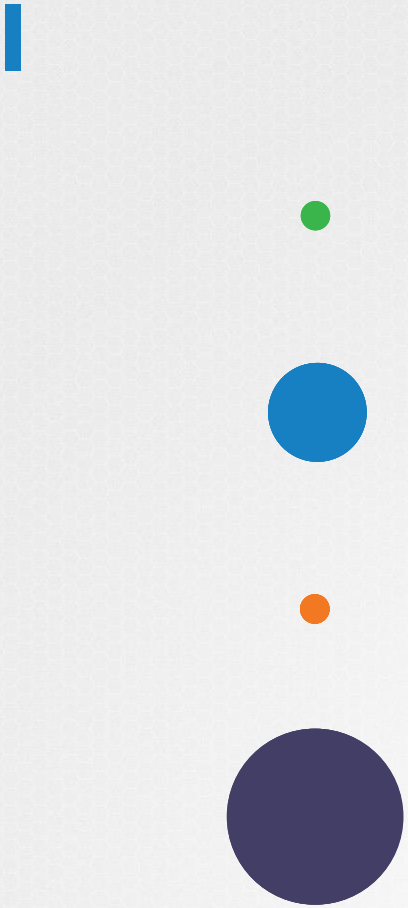
Inside the Container

Kubernetes Multi-Container PODs

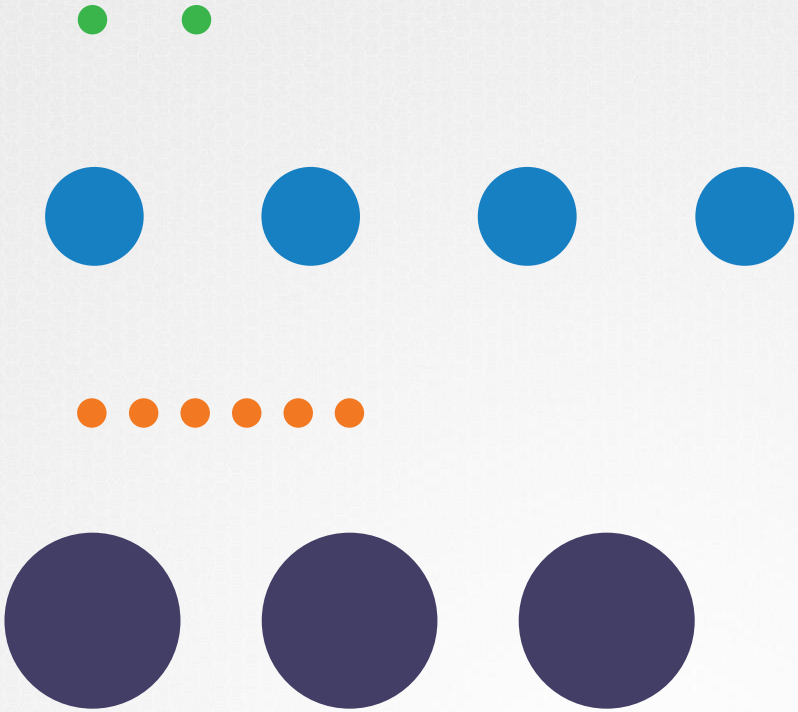


MONOLITH

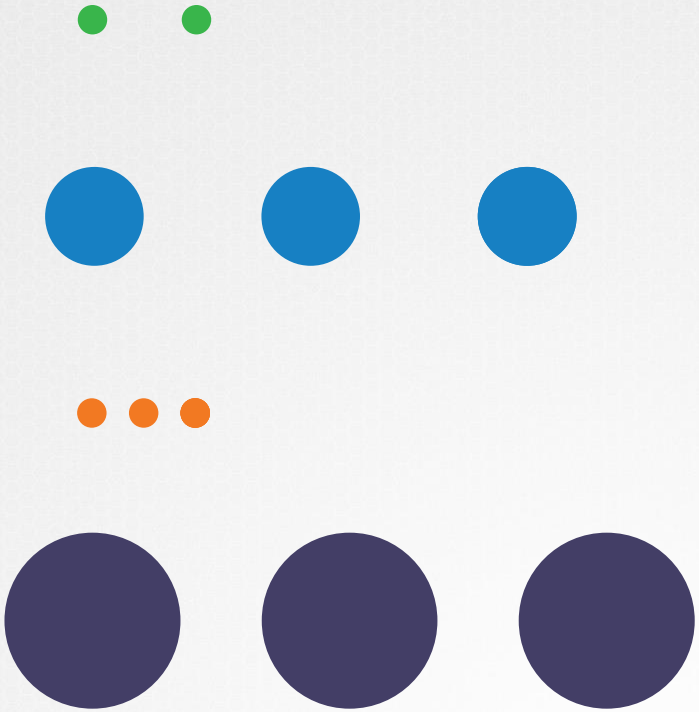

MICROSERVICES



MICROSERVICES



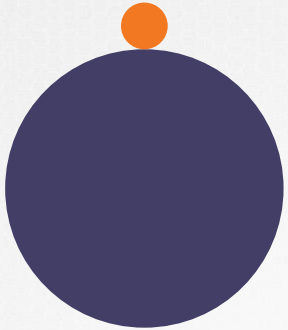
MICROSERVICES



MICROSERVICES

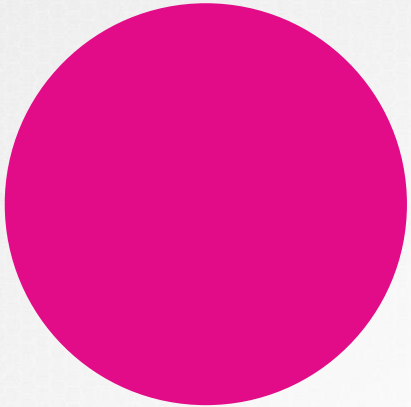
LOG Agent

WEB Server



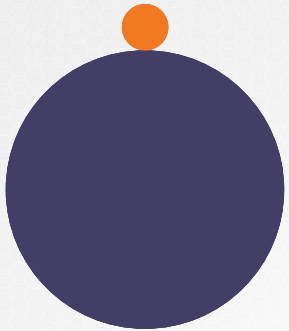
LOG Agent

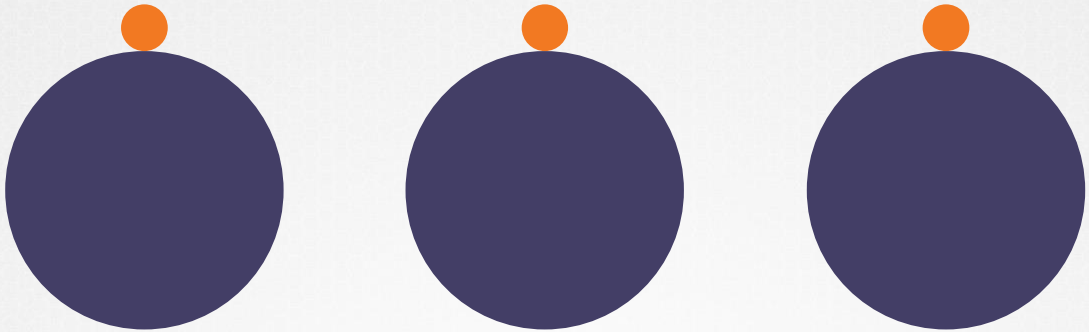
WEB Server



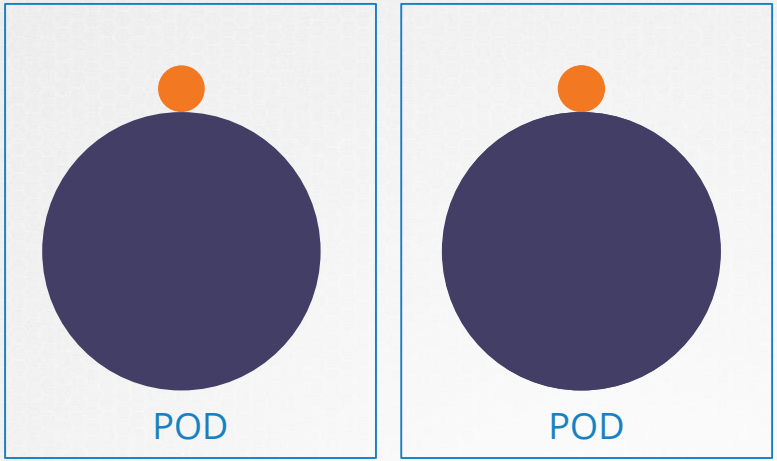
LOG Agent

WEB Server



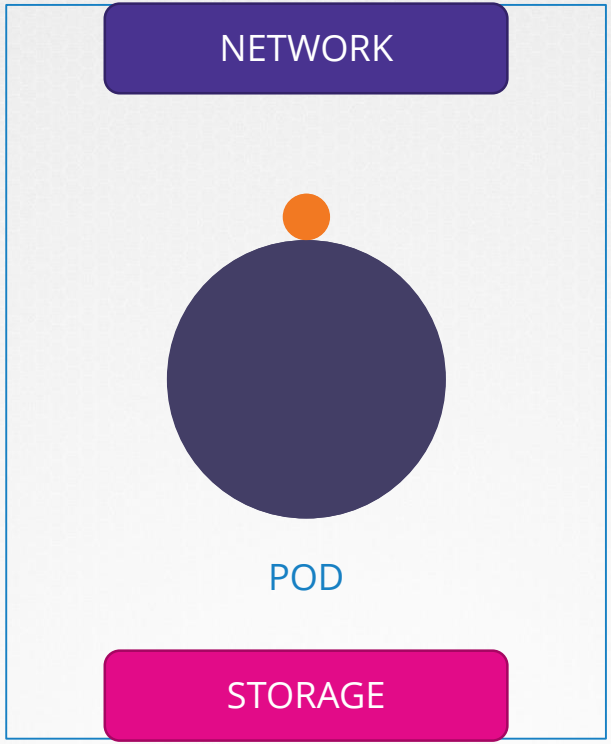


Multi-Container PODs



Multi-Container PODs

LIFECYCLE



Create

pod-definition.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: simple-webapp
  labels:
    name: simple-webapp
spec:
  containers:
  - name: simple-webapp
    image: simple-webapp
    ports:
      - containerPort: 8080

  - name: log-agent
    image: log-agent
```