



Kubernetes (k8s)

Qui êtes vous ?

>_

whoami



KΣ

CAPITAL ENERGY



BUREAU
VERITAS

SOLUTIONS

RESPONSABLE
D'APPLICATION



Microsoft
for Startups



Carrefour
numérique²



FACLAB
APPRENDRE
CRÉER
PARTAGER



IMT Atlantique
Bretagne - Pays de la Loire
Ecole Mines-Télécom



Pré-requis



- Docker, PHP et Node installés
- Créer un container
- Créer une image
- Entrer en ligne de commande dans un container
- Comprendre les volumes

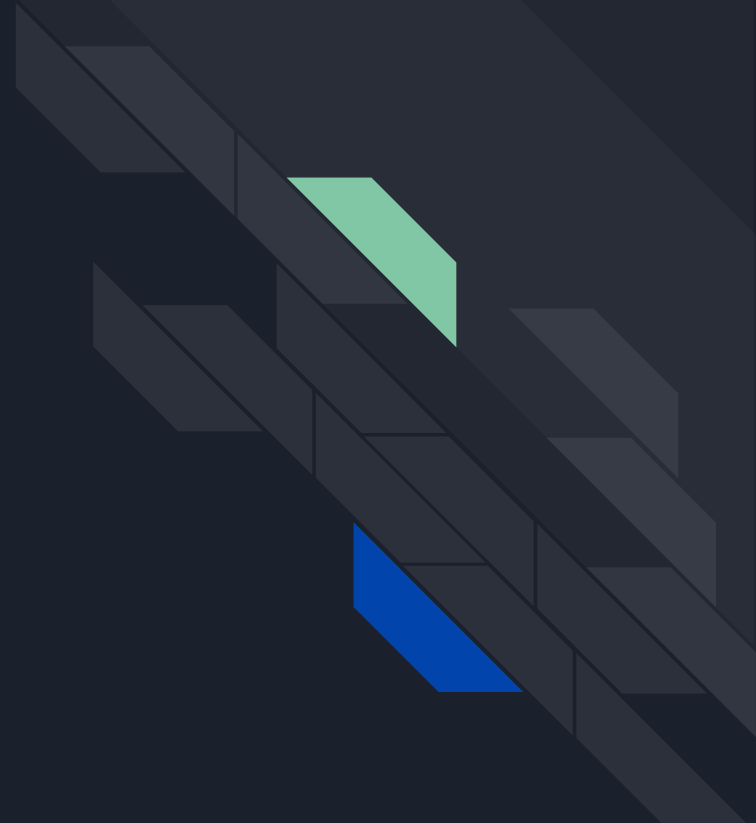


Objectifs



- Comprendre le fonctionnement de kubernetes
- Savoir déployer des applications sous Kubernetes

Partie I : Intro



Kubernetes



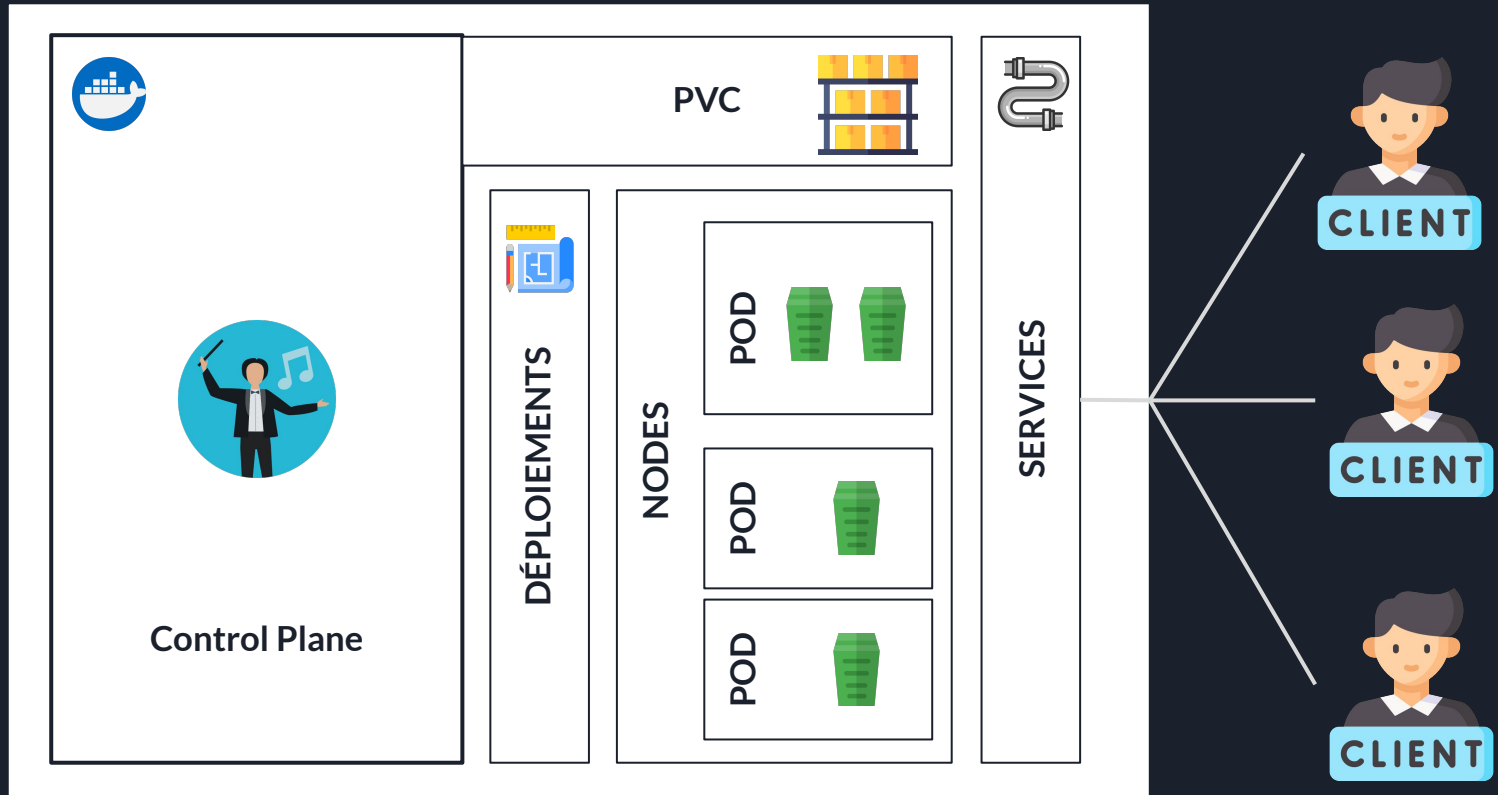
Orchestration de conteneur



Gestion d'applications
conteneurisées



Kubernetes with minikube



Minikube installation

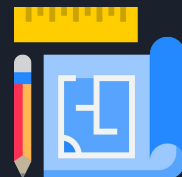


<https://minikube.sigs.k8s.io/docs/start/>

- 2 CPUs or more
- 2GB of free memory
- 20GB of free disk space
- Container or virtual machine manager, such as: Docker, QEMU, Hyperkit, Hyper-V, KVM, Parallels, Podman, VirtualBox, or VMware Fusion/Workstation

Deployment.yaml (Créer des pods)

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: <nom>-deployment
spec:
  replicas: 1
  selector:
    matchLabels:
      app: <nom>
  template:
    metadata:
      labels:
        app: <nom>
    spec:
      containers:
        - name: <nom>
          image: <image_docker>
          imagePullPolicy: Never (optionnel, si image personnalisée)
          ports:
            - containerPort: <PORT ex: 80>
```



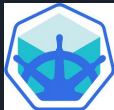
Service.yaml (Rend les pods accessibles)

```
apiVersion: v1
kind: Service
metadata:
  name: <nom>-service
spec:
  type: NodePort
  ports:
    - port: <PORT>
      nodePort: <PORT entre 30000 et 32767>
  selector:
    app: <nom>
```



Commandes essentielles

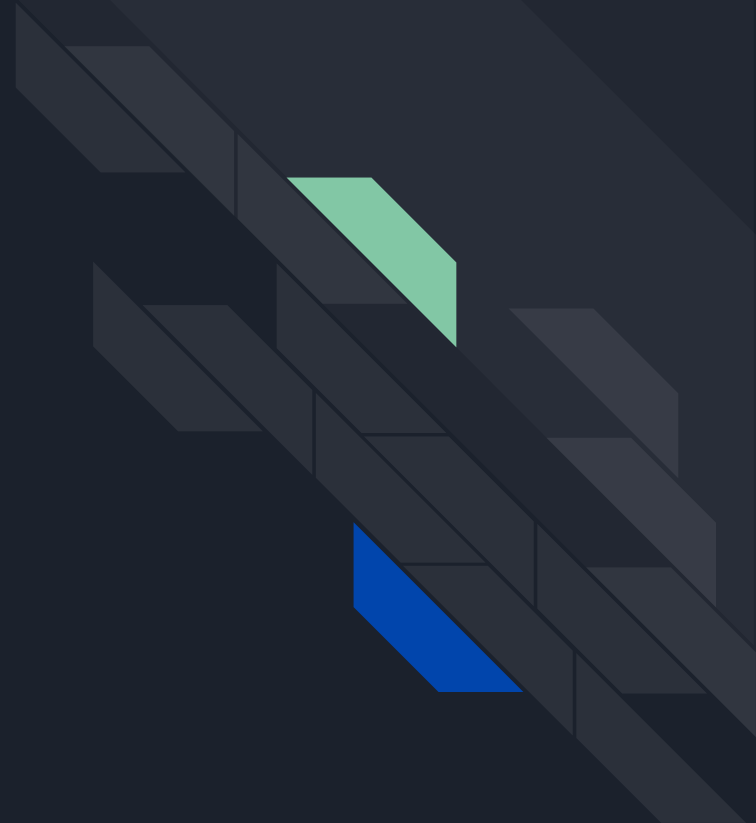
```
kubectl apply -f <nom_du_fichier>.yaml  
kubectl delete -f <nom_du_fichier>.yaml  
kubectl get deployment/services/pods
```



Lier le registry docker de minikube au terminal pour pouvoir construire une image au sein de minikube :

```
eval $(minikube -p minikube docker-env)
```

Partie II : Défis 1 à 4

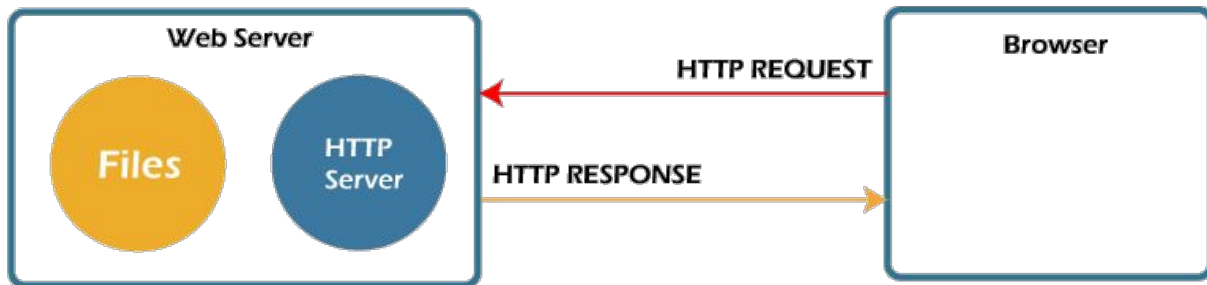




NGINX



Web Servers





NGINX

Google

where is index.html in nginx



Tous

Vidéos

Actualités

Images

Livres

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Outils

Environ 12 600 000 résultats (0,33 secondes)

Nginx generally keeps the index HTML file in the `/usr/share/nginx/html` directory. 28 déc. 2023



```
>_
```

```
mkdir k8s
```

```
cd k8s
```

```
mkdir defi1 defi2 defi3 defi4
```



- ❑ **Défi 1 : HTML**

- ❑ **Défi 2 : HTML personnalisé**

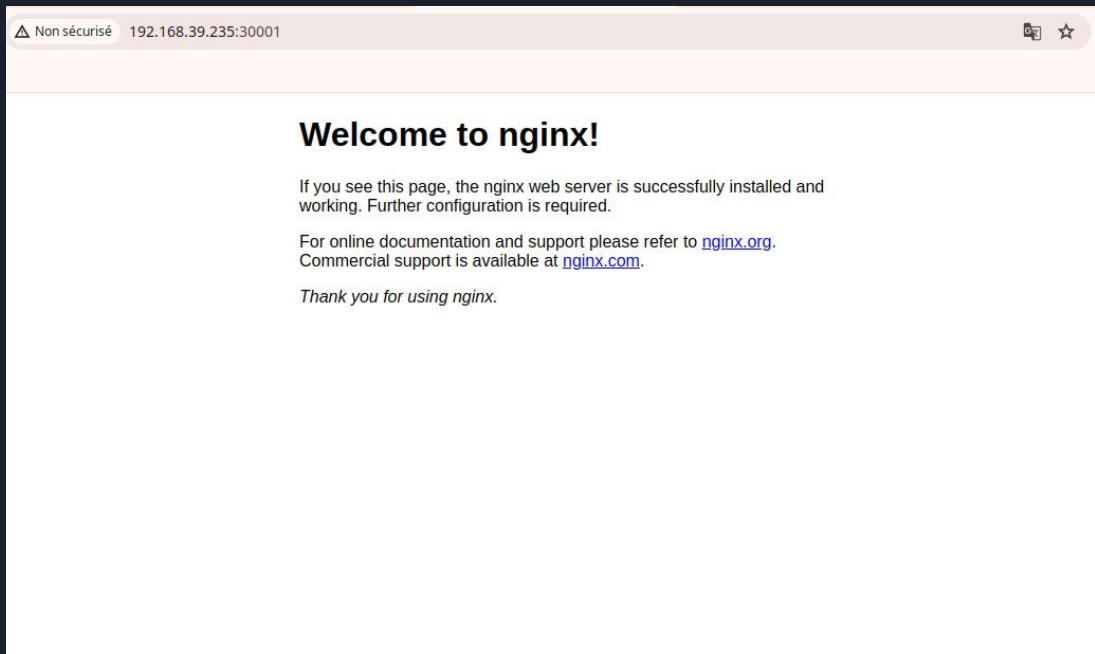
- ❑ **Défi 3 : REACT.JS**

- ❑ **Défi 4 : PHP**



Défi 1 : HTML

Déploiement + Service



30min



Toujour vérifié

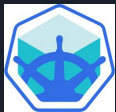
```
kubectl get deployment
```

```
kubectl get pods
```

```
kubectl get services
```

```
minikube service <mon_service>
```

Docker registry Minikube



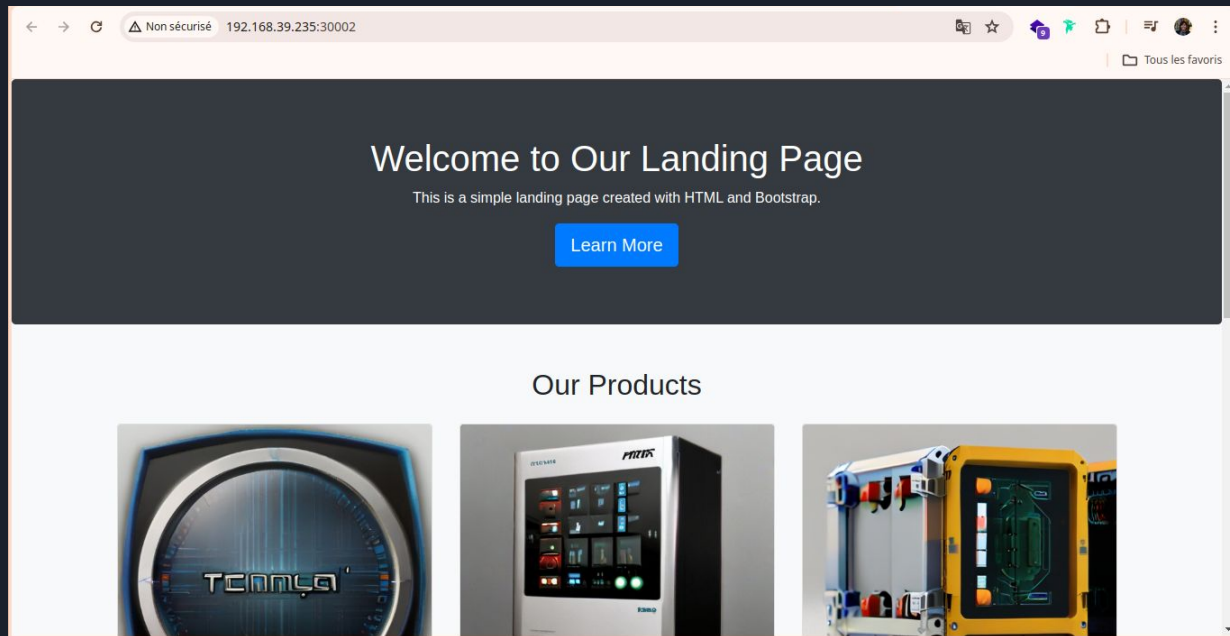
Lier le registry docker de minikube au terminal pour pouvoir construire une image au sein de minikube :

```
eval $(minikube -p minikube docker-env)
```



Défi 2 : HTML personnalisé

HTML (avec bootstrap) + Dockerfile + Déploiement + Service

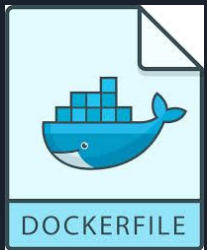


1h



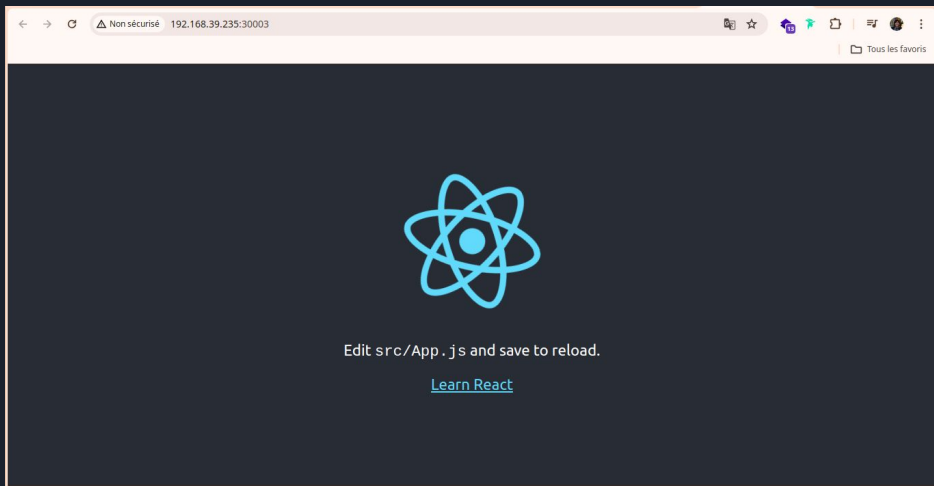
PRENOM & PRENOM





Défi 3 : REACT.JS

REACT.JS (with build) + Dockerfile + Déploiement + Service



45min

Tips:

`npx create-react-app`

`npm run start`

`npm run build`

Un bon nommage

```
Terminal - office9x@office9x-ThinkPad-X230: ~/Bureau/test-kubernetes/niveau3
Fichier  Édition  Affichage  Terminal  Onglets  Aide
office9x@office9x-ThinkPad-X230:~/Bureau/test-kubernetes/niveau3$ kubectl apply -f react-deployment.yaml
deployment.apps/react-deployment created
office9x@office9x-ThinkPad-X230:~/Bureau/test-kubernetes/niveau3$ kubectl apply -f react-service.yaml
service/react-service created
office9x@office9x-ThinkPad-X230:~/Bureau/test-kubernetes/niveau3$ kubectl get deployment
NAME                    READY   UP-TO-DATE   AVAILABLE   AGE
html-bootstrap-deployment 1/1     1            1           6m11s
html-deployment          2/2     2            2           12h
react-deployment          1/1     1            1           17s
office9x@office9x-ThinkPad-X230:~/Bureau/test-kubernetes/niveau3$ kubectl get pods
NAME                                                            READY   STATUS    RESTARTS   AGE
html-bootstrap-deployment-78fdc9dc4b-srf69                    1/1     Running   0           6m16s
html-deployment-8544c579cd-5v2cv                              1/1     Running   1 (8h ago)  12h
html-deployment-8544c579cd-zpcm9                              1/1     Running   1 (8h ago)  12h
react-deployment-696c5b5db5-t7cwX                             1/1     Running   0           22s
office9x@office9x-ThinkPad-X230:~/Bureau/test-kubernetes/niveau3$ kubectl get services
NAME                TYPE        CLUSTER-IP    EXTERNAL-IP   PORT(S)          AGE
html-bootstrap-service NodePort    10.110.174.212 <none>        80:30002/TCP     6m16s
html-service        NodePort    10.105.28.45   <none>        80:30001/TCP     12h
kubernetes           ClusterIP   10.96.0.1      <none>        443/TCP          12h
react-service        NodePort    10.105.235.52  <none>        80:30003/TCP     19s
office9x@office9x-ThinkPad-X230:~/Bureau/test-kubernetes/niveau3$ minikube service react-service
|-----|-----|-----|-----|
| NAMESPACE | NAME      | TARGET PORT | URL                               |
|-----|-----|-----|-----|
| default    | react-service | 80          | http://192.168.39.235:30003     |
|-----|-----|-----|-----|
% Ouvverture du service default/react-service dans le navigateur par défaut...
office9x@office9x-ThinkPad-X230:~/Bureau/test-kubernetes/niveau3$ Ouvverture dans une session de navigateur existante.
^C
office9x@office9x-ThinkPad-X230:~/Bureau/test-kubernetes/niveau3$
```

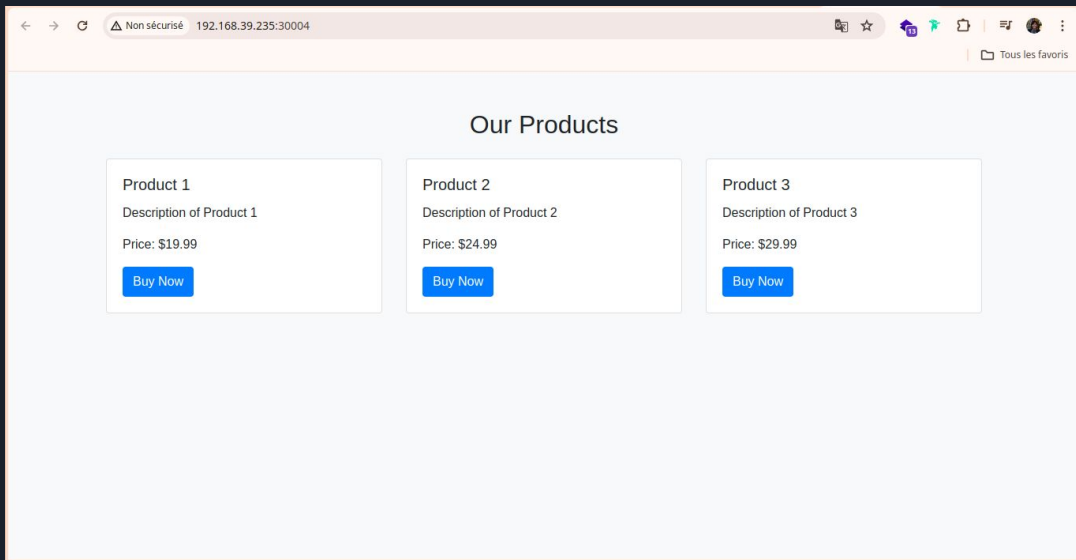
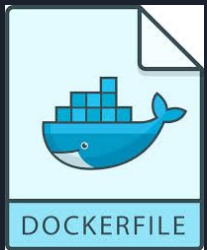


PRENOM & PRENOM



Défi 4 : PHP

PHP + Dockerfile(trafex/php-nginx) + Déploiement + Service



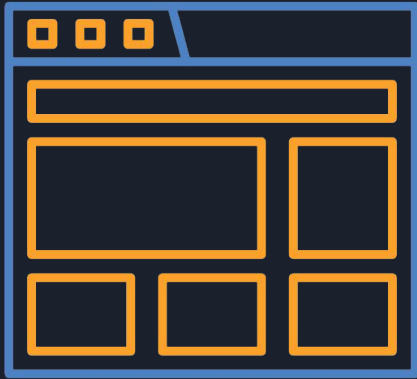
1h

Tips pour tester en local : `php -S localhost:8081`

Partie III : Persistent volume and job



Stateless & stateful





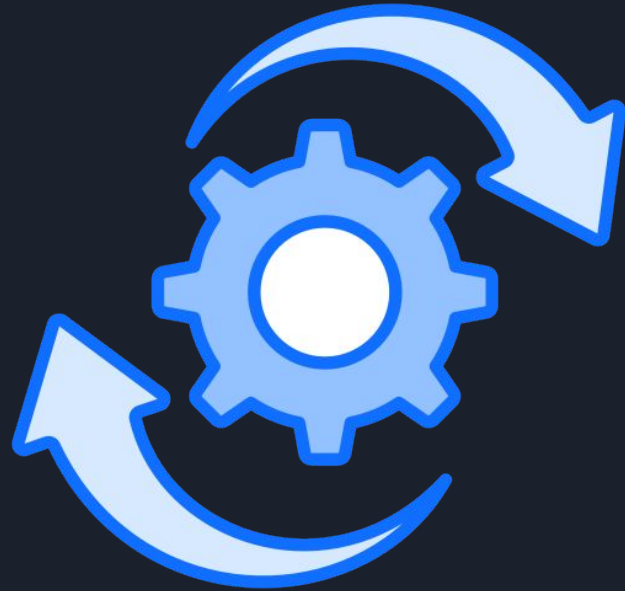
PVC.yaml

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: <nom>-pvc
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: <Gi ex: 1Gi>
```





Job

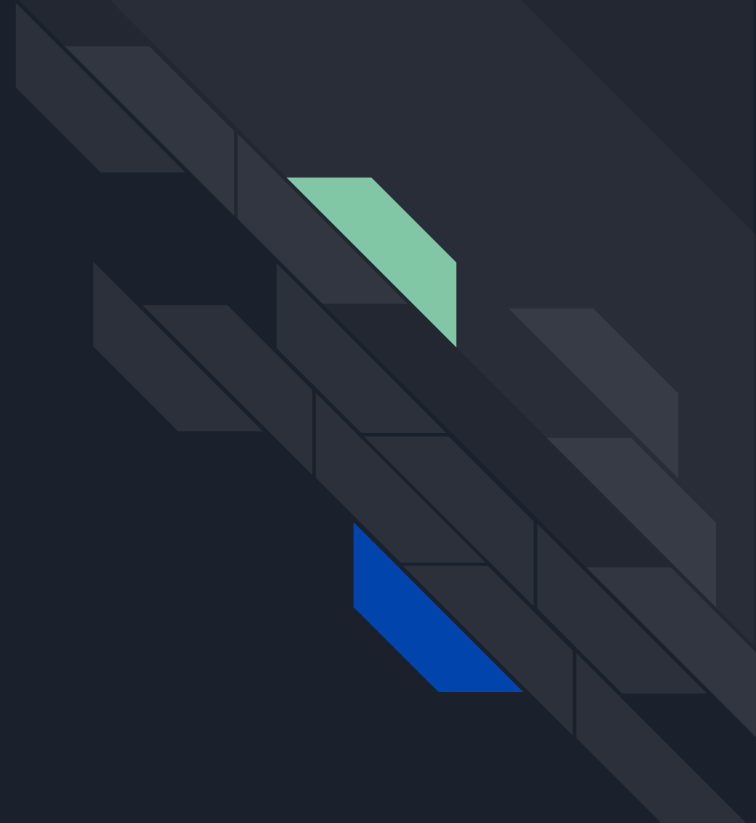




Job.yaml

```
apiVersion: batch/v1
kind: Job
metadata:
  name: <nom>-job
spec:
  template:
    spec:
      containers:
        - name: <nom>-container
          image: <image_docker>
          command: ["/bin/sh"] (ou bash)
          args: ["-c", "php bin/console doctrine:migrations:diff -n --allow-empty-diff && php bin/c
          env: (variable d'environnement)
        - name: DATABASE_URL
          value: "mysql://root@mysql/khuit"
      restartPolicy: Never
    backoffLimit: 4
```


Partie IV : Défis 5



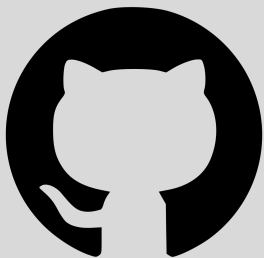


```
>_
```

```
mkdir defi5
```

Défi 5 : Symfony + MySQL

- Symfony + Dockerfile (image php-fpm avec composer) + Déploiement + Service
- MySQL + Déploiement + Service
- Job migration



Projet Symfony :
<https://github.com/hmicn/k8s-base-app>



Clone and change .env

Changer le fichier .env ligne 27 :

```
DATABASE_URL="mysql://root:mysql:3306/khuit?serverVersion=mariadb-10.3.31"
```

```
docker build . -t symfony-app
```



Exemple sous Docker

Fichier Dockerfile

Fichier docker-compose

Migration

Symfony + MySQL



Non sécurisé 192.168.39.235:30005/login

Kubernetes (k8s) ...

S'identifier

Email Mot de passe

[S'enregistrer](#)

Symfony Exception

PDOException > Exception > TableNotFoundException

HTTP 500 Internal Server Error

An exception occurred while executing a query: SQLSTATE[42S02]: Base table or view not found: 1146 Table 'khuit.user' doesn't exist

Exceptions 3 Logs 1 Stack Traces 3

Doctrine\DBAL\Exception

TableNotFoundException

- In vendor/doctrine/dbal/src/Driver/API/MySQL/ExceptionConverter.php (line 49)
- In vendor/doctrine/dbal/src/Connection.php -> convert (line 1939)
- In vendor/doctrine/dbal/src/Connection.php -> handleDriverException (line 1881)
- In vendor/doctrine/dbal/src/Connection.php -> convertExceptionDuringQuery (line 1106)
- In vendor/doctrine/orm/src/Persisters/Entry/BasicEntityPersister.php -> executeQuery (line 944)
- In vendor/doctrine/orm/src/EntityRepository.php -> loadAll (line 225)
- In vendor/symfony/doctrine-bridge/Validator/Constraints/UniqueEntityValidator.php -> findBy (line 153)
- In vendor/symfony/validator/Validator/RecursiveContextualValidator.php -> validate (line 759)

app_login ... 719 ms 38.0 MiB 1 418 h 63.50 ms n/a 5 ms 1 h 1.24 ms

Khuit

Dashboard Incidents

Incident

ID	Titre	Fait
1	test	

1 result

@ app_login 249 ms 24.0 MiB 5 n/a 34 ms



Déploiement de mysql peut prendre jusqu'à plus de 5 min



```
>_
```

```
kubectl logs <mon_pods>
```



PRENOM & PRENOM





Si tu es arrivé jusque là c'est que tu es à l'aise. Bravo !

Maintenant quelles autres technologies pourrais tu déployer ?

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: <nom>-deployment
```

```
spec:
  replicas: 1
  selector:
    matchLabels:
      app: <nom>
  template:
    metadata:
      labels:
        app: <nom>
    spec:
      containers:
        - name: <nom>
          image: <image_docker>
          imagePullPolicy: Never (optionnel, si image personnalisée)
          ports:
            - containerPort: <PORT ex: 80>
```

```
apiVersion: v1
kind: Service
metadata:
  name: <nom>-service
```

```
spec:
  type: NodePort
  ports:
    - port: <PORT>
      nodePort: <PORT entre 30000 et 32767>
  selector:
    app: <nom>
```

```
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: <nom>-pvc
```

```
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: <Gi ex: 1Gi>
```

```
apiVersion:
kind: Job
metadata:
  name: <nom>
```

```
spec:
  template:
    spec:
      containers:
        - name:
          image:
          command:
          arguments:
          environment:
            - name:
              value:
          restartPolicy:
      backoffLimit:
```

En vrai

