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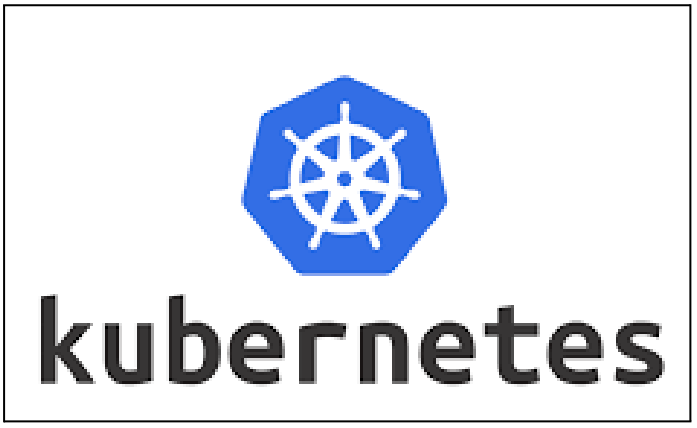
Groupe 5B

Document de groupe de rendu pour Travaux Pratiques



Le document qui va suivre relate l'ensemble des TPs réalisés pour l'étude de Docker et Kubernetes.

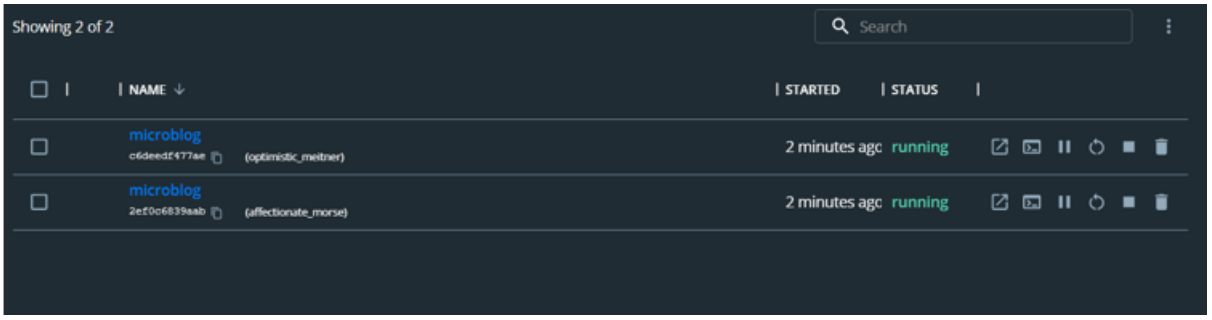
Sommaire:

Docker

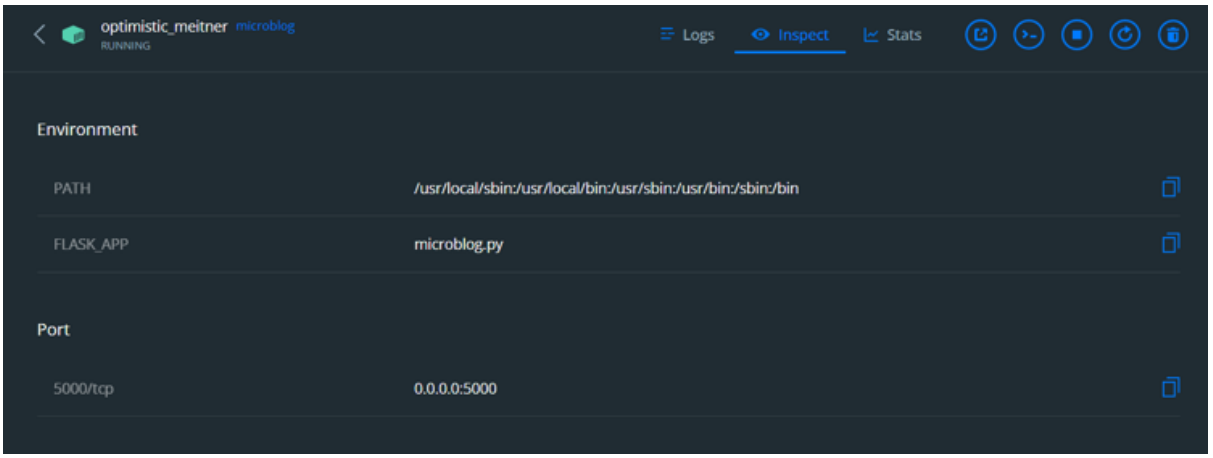
TP 2 - Images et conteneurs

https://cours.hadrienpelissier.fr/02-docker/2-tp_les-dockerfiles/

I started 2 docker containers simultaneously:



First on port 5000:



Second on port 5001:

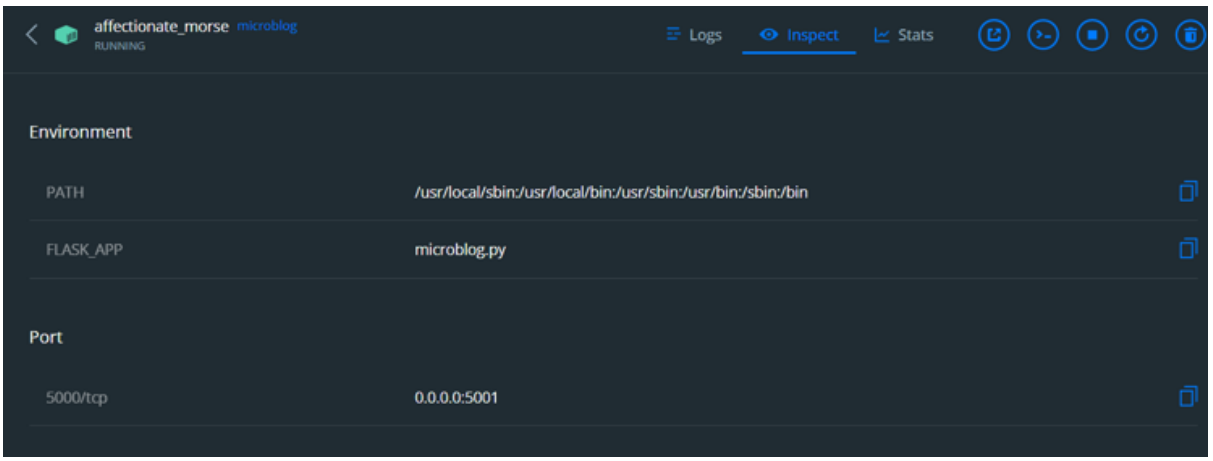
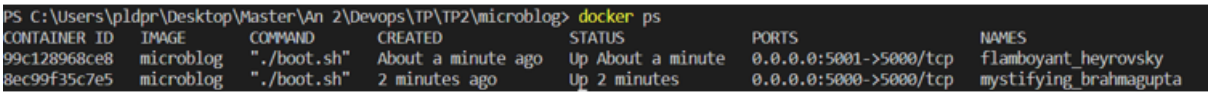


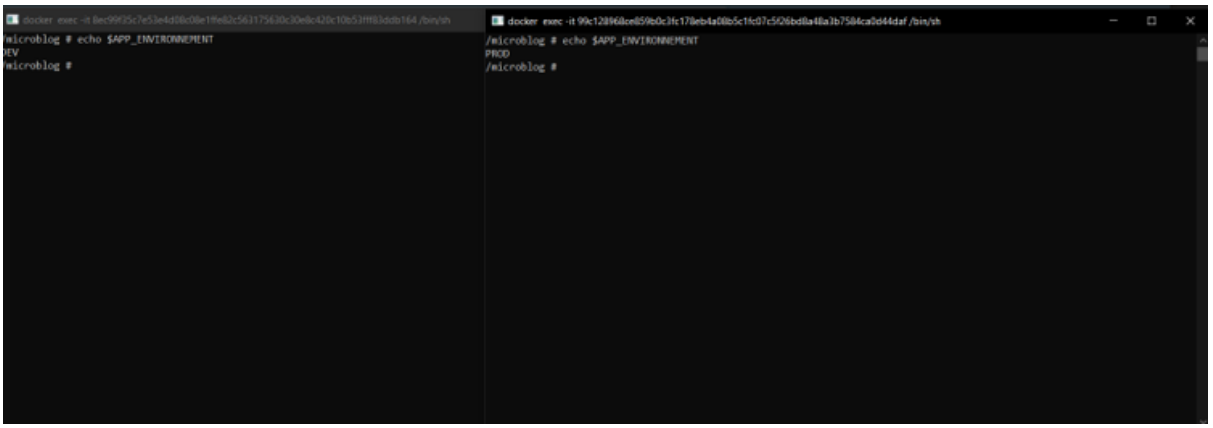
Image pushed here : https://hub.docker.com/r/paulefrei/microblog/tags

Difference between normal python image and the light one:

Checking the states of containers:

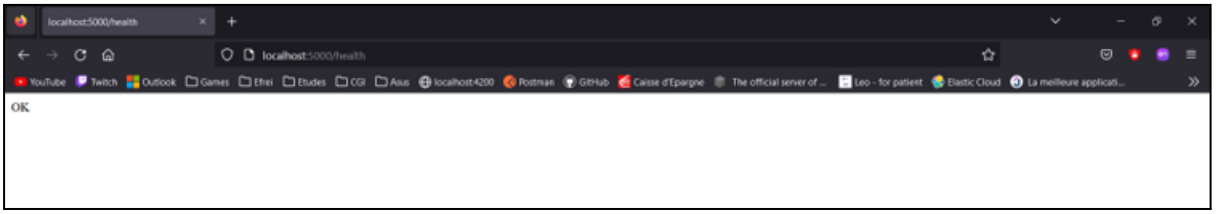


After starting the DEV and PROD python-alpine containers:

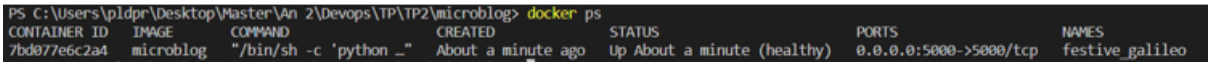


(I printed the env variables)

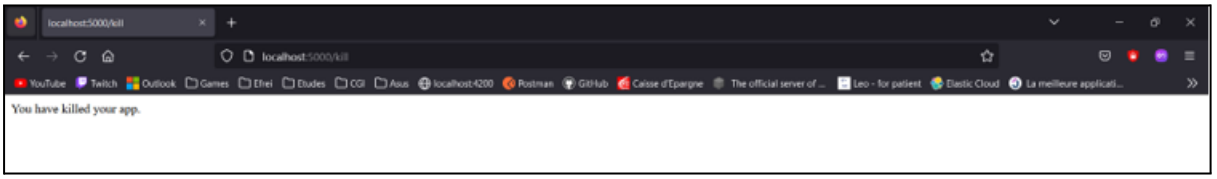
Docker with app.py and routes:
Route health:



Docker ps:



Route kill:



Docker route difference:

```
127.0.0.1 - - [25/Oct/2022 11:04:47] "GET /health HTTP/1.1" 200 -
172.17.0.1 - - [25/Oct/2022 11:04:56] "GET /kill HTTP/1.1" 200 -
127.0.0.1 - - [25/Oct/2022 11:05:17] "GET /health HTTP/1.1" 500 -
127.0.0.1 - - [25/Oct/2022 11:05:47] "GET /health HTTP/1.1" 500 -
```

TP 3 partie - Réseaux

https://cours.hadrienpelissier.fr/02-docker/3-tp_reseaux/

TP 3 partie - Volumes

https://cours.hadrienpelissier.fr/02-docker/3-tp_volumes/

TP 4 - Créer une application multi conteneur

https://cours.hadrienpelissier.fr/02-docker/4-docker-compose/

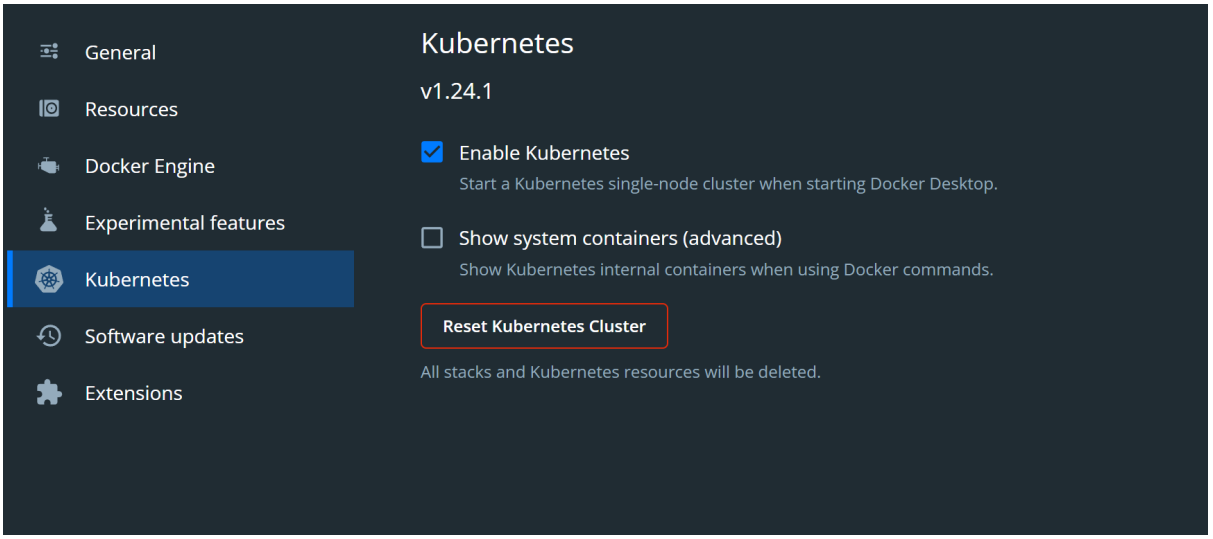
Kubernetes

TP1 - Installation et configuration de Kubernetes

https://cours.hadrienpelissier.fr/03-kubernetes/tp1_k8s_setup/

Installation kubernetes

Installer docker desktop, puis aller dans les paramètres afin d'accéder à l'activation de Kubernetes et cochez la case " **Enable Kubernetes** "



1. Utilisation des commandes Kubernetes

```
PS C:\Users\pldpr> kubectl get all
NAME                 TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.96.0.1    <none>        443/TCP   23h
```

```
PS C:\Users\pldpr> kubectl get namespaces
NAME              STATUS   AGE
default           Active   23h
kube-node-lease   Active   23h
kube-public       Active   23h
kube-system       Active   23h
```

Lister les ressources

```
PS C:\Users\pldpr> kubectl get all -A
NAMESPACE     NAME                                         READY   STATUS    RESTARTS       AGE
kube-system   pod/coredns-6d4b75cb6d-jtx2z                 1/1     Running   1 (12m ago)    23h
kube-system   pod/coredns-6d4b75cb6d-thkxs                 1/1     Running   1 (12m ago)    23h
kube-system   pod/etcd-docker-desktop                      1/1     Running   1 (12m ago)    23h
kube-system   pod/kube-apiserver-docker-desktop            1/1     Running   1 (12m ago)    23h
kube-system   pod/kube-controller-manager-docker-desktop   1/1     Running   1 (12m ago)    23h
kube-system   pod/kube-proxy-c4wdx                         1/1     Running   1 (12m ago)    23h
kube-system   pod/kube-scheduler-docker-desktop            1/1     Running   1 (12m ago)    23h
kube-system   pod/storage-provisioner                      1/1     Running   2 (12m ago)    23h
kube-system   pod/vpnkit-controller                        1/1     Running   19 (12m ago)   23h

NAMESPACE     NAME                 TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)                  AGE
default       service/kubernetes   ClusterIP   10.96.0.1    <none>        443/TCP                  23h
kube-system   service/kube-dns     ClusterIP   10.96.0.10   <none>        53/UDP,53/TCP,9153/TCP   23h

NAMESPACE     NAME                        DESIRED   CURRENT   READY   UP-TO-DATE   AVAILABLE   NODE SELECTOR
AGE
kube-system   daemonset.apps/kube-proxy   1         1         1       1            1           kubernetes.io/os=linux
23h

NAMESPACE     NAME                     READY   UP-TO-DATE   AVAILABLE   AGE
kube-system   deployment.apps/coredns   2/2     2            2           23h

NAMESPACE     NAME                                 DESIRED   CURRENT   READY   AGE
kube-system   replicaset.apps/coredns-6d4b75cb6d   2         2         2       23h
```

Pour avoir des informations sur un namespace

```
PS C:\Users\pldpr> kubectl describe namespace/kube-system
Name:         kube-system
Labels:       kubernetes.io/metadata.name=kube-system
Annotations:  <none>
Status:       Active

No resource quota.

No LimitRange resource.
```

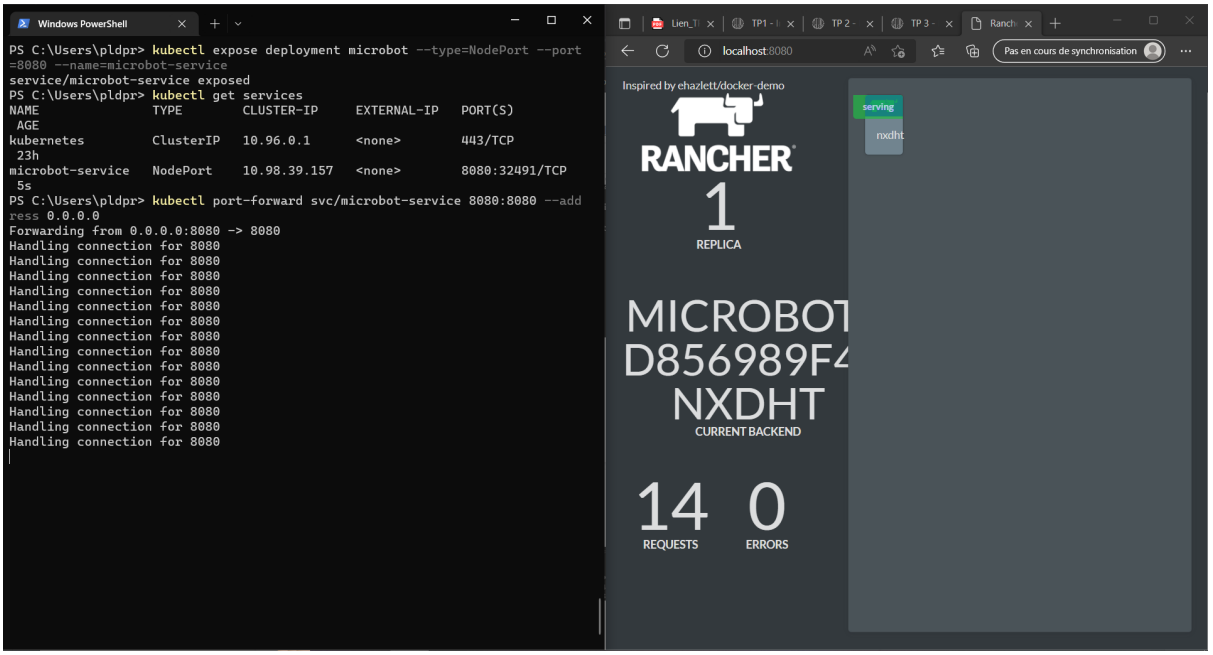
Pour créer un déploiement en ligne de commande et on affiche les informations du déploiement avec ‘kubectl describe’ :

```
PS C:\Users\pldpr> kubectl create deployment microbot --image=monachus/rancher-demo
deployment.apps/microbot created
PS C:\Users\pldpr> kubectl describe deployement/microbot
error: the server doesn't have a resource type "deployement"
PS C:\Users\pldpr> kubectl describe deployment/microbot
Name:                   microbot
Namespace:              default
CreationTimestamp:      Thu, 27 Oct 2022 09:27:35 +0200
Labels:                 app=microbot
Annotations:            deployment.kubernetes.io/revision: 1
Selector:               app=microbot
Replicas:               1 desired | 1 updated | 1 total | 1 available | 0 unavailable
StrategyType:           RollingUpdate
MinReadySeconds:        0
RollingUpdateStrategy:  25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=microbot
  Containers:
   rancher-demo:
    Image:        monachus/rancher-demo
    Port:         <none>
    Host Port:    <none>
```

Pour accéder au cluster depuis l'extérieur il faut l'exposer avec la commande **expose**

```
PS C:\Users\pldpr> kubectl expose deployment microbot --type=NodePort --port=8080 --name=microbot-service
service/microbot-service exposed
PS C:\Users\pldpr> kubectl get services
NAME                TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
kubernetes          ClusterIP   10.96.0.1       <none>        443/TCP          23h
microbot-service    NodePort    10.98.39.157    <none>        8080:32491/TCP   5s
```

On assigne le port 8080 au cluster pour pouvoir y accéder



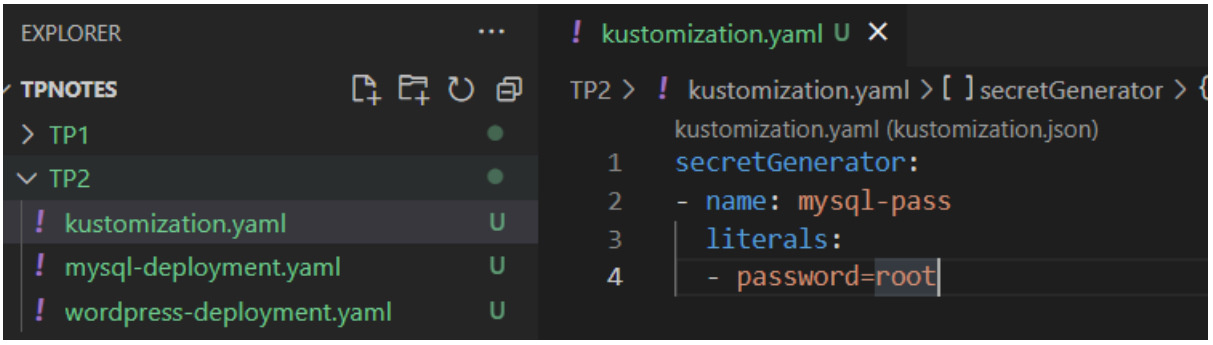
L'application compte le nombre de requêtes (on observe 14 requêtes sur le site à droite et 14 lignes de connection sur le port 80 à gauche dans le terminal)

TP 2 - Déployer Wordpress rapidement

https://cours.hadrienpelissier.fr/03-kubernetes/tp2_k8s_pvc+secrets/

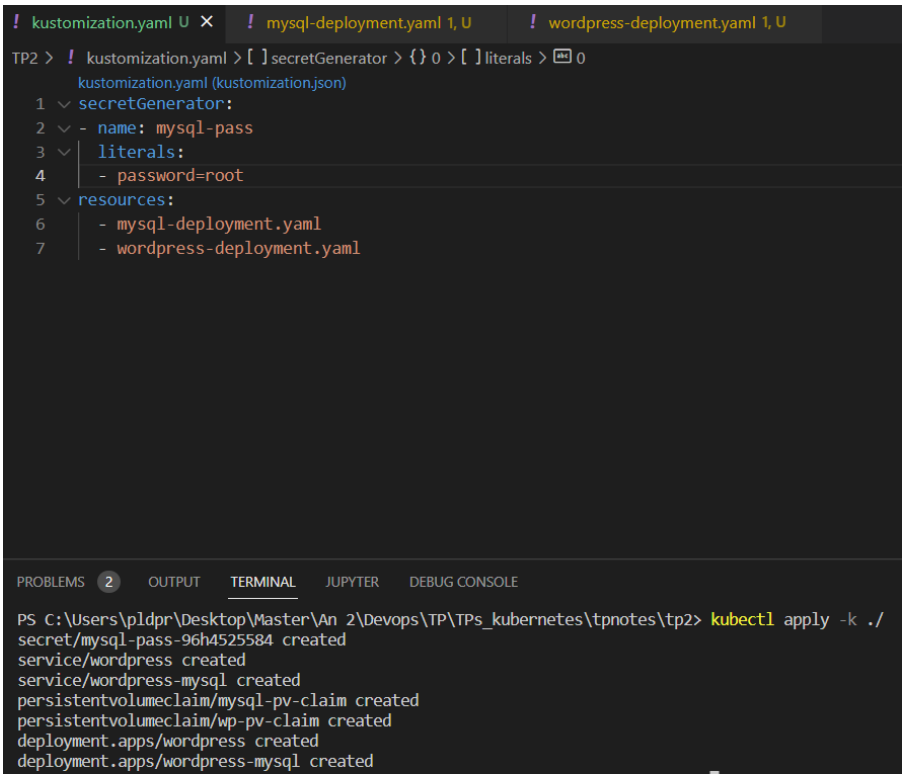
Déployer Wordpress et MySQL avec du stockage et des Secrets

Nous avons téléchargé les fichiers de configuration de wordpress et mysql en amont.
Création du fichier kustomization.yaml avec la configuration donnée dans la documentation.



Add resource configs for MySQL and WordPress

On modifie les fichiers de configuration de wordpress ainsi que celui de mysql pour définir les **Secrets**
On définit les fichiers de configuration de mysql et wordpress et on applique



On vérifie

```
PS C:\Program Files\kuberaddons> kubectl get secrets
NAME                     TYPE      DATA   AGE
mysql-pass-96h4525584    Opaque    1      16s
```

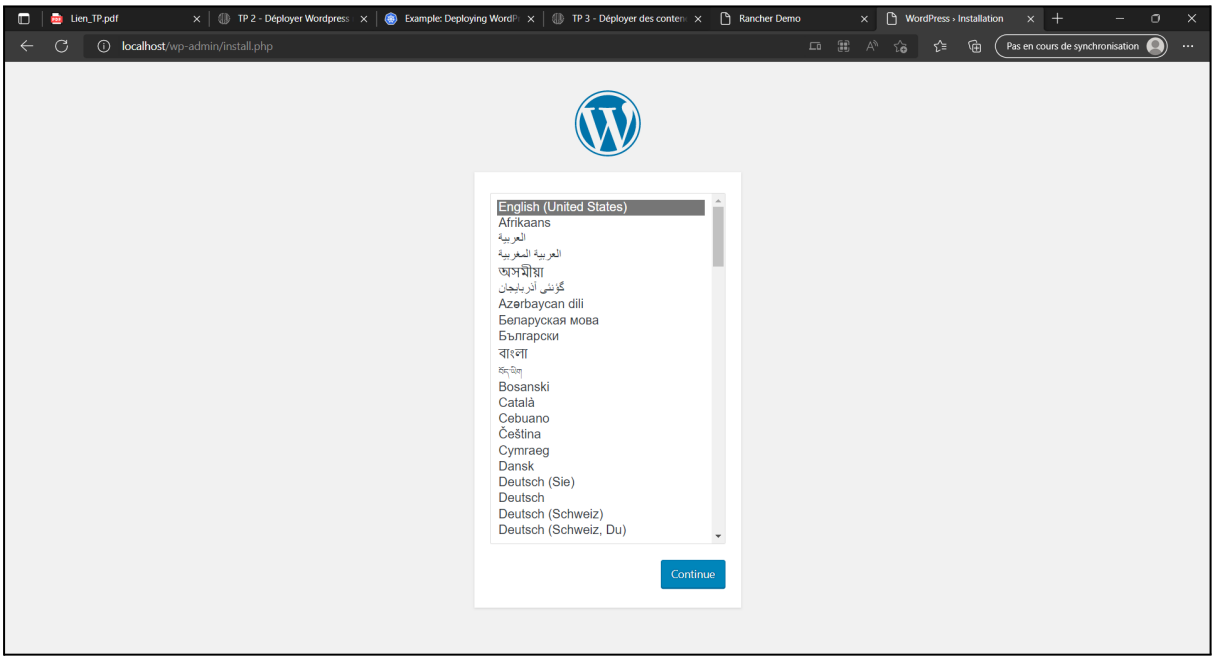
On vérifie le PersistentVolume

```
PS C:\Program Files\kuberaddons> kubectl get pvc
NAME             STATUS   VOLUME                                     CAPACITY   ACCESS MODES   STORAGECLASS   AGE
mysql-pv-claim   Bound    pvc-d3e9115a-f42d-4f56-bfce-4e70dca7af73   20Gi       RWO            hostpath       3m17s
wp-pv-claim      Bound    pvc-34211ff8-3cd7-40f2-a372-b08bffce090d   20Gi       RWO            hostpath       3m17s
```

On vérifie que le Secret existe en exécutant la commande suivante :

```
PS C:\Program Files\kuberaddons> kubectl get secrets
NAME                     TYPE      DATA   AGE
mysql-pass-96h4525584    Opaque    1      8m1s
PS C:\Program Files\kuberaddons>  kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
microbot-d856989f4-nxdht            1/1     Running   0          44m
wordpress-b8cb9d55c-rzpw4           1/1     Running   0          14s
wordpress-mysql-7dc6b8fd5-cbj5r     1/1     Running   0          14s
```

Voilà l'appli WordPress présente sur le localhost :



Puis on le delete

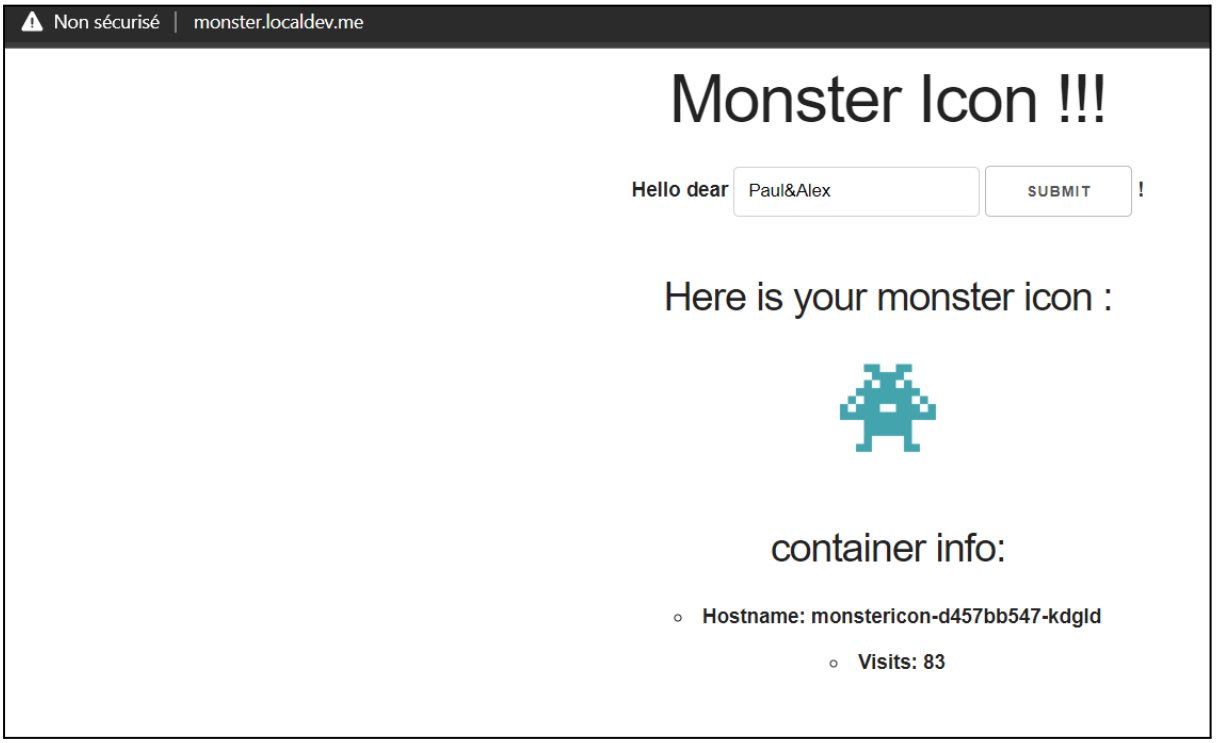
```
PS C:\Users\pldpr\Desktop\Master\An 2\Devops\TP\TPs_kubernetes\tpnotes\tp2> kubectl delete -k ./
secret "mysql-pass-96h4525584" deleted
service "wordpress" deleted
service "wordpress-mysql" deleted
persistentvolumeclaim "mysql-pv-claim" deleted
persistentvolumeclaim "wp-pv-claim" deleted
deployment.apps "wordpress" deleted
deployment.apps "wordpress-mysql" deleted
```

TP 3 - Déployer des conteneurs de A à Z

https://cours.hadrienpelissier.fr/03-kubernetes/tp3_k8s_monsterstack/

Déploiement de la stack monsterstack

Les fichiers de configuration sont disponibles dans ce dépôt github : https://github.com/ElManchacho/tpnotes/tree/main/Kubernetes/TP3/monster_app_k8s

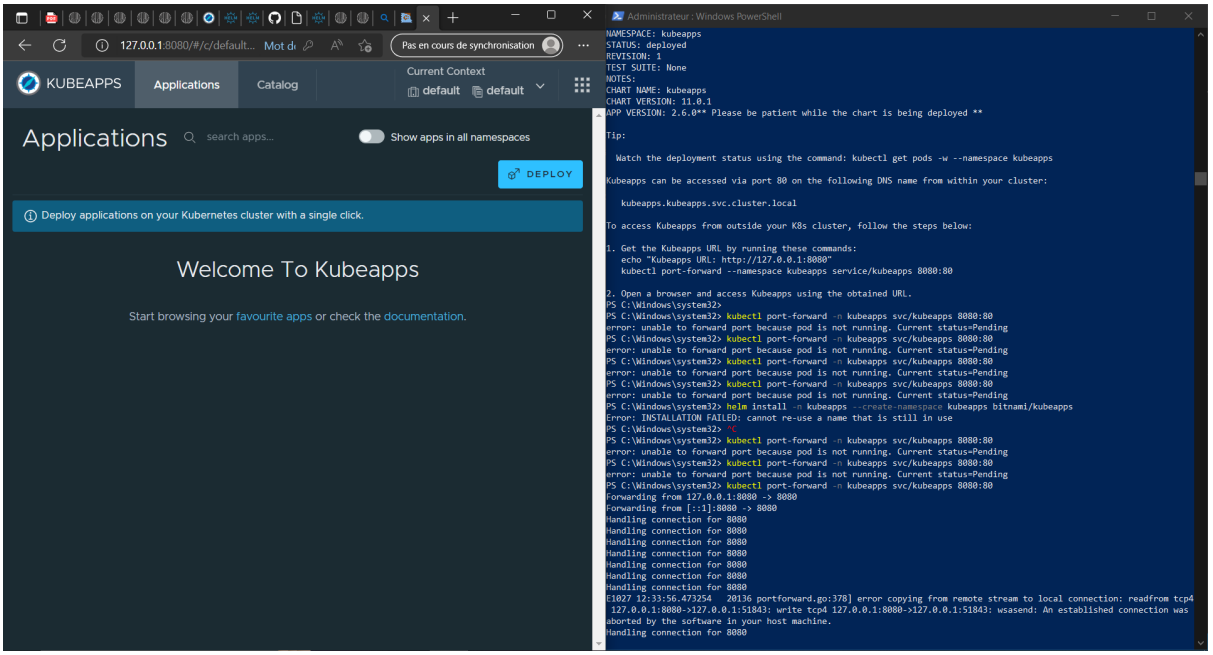


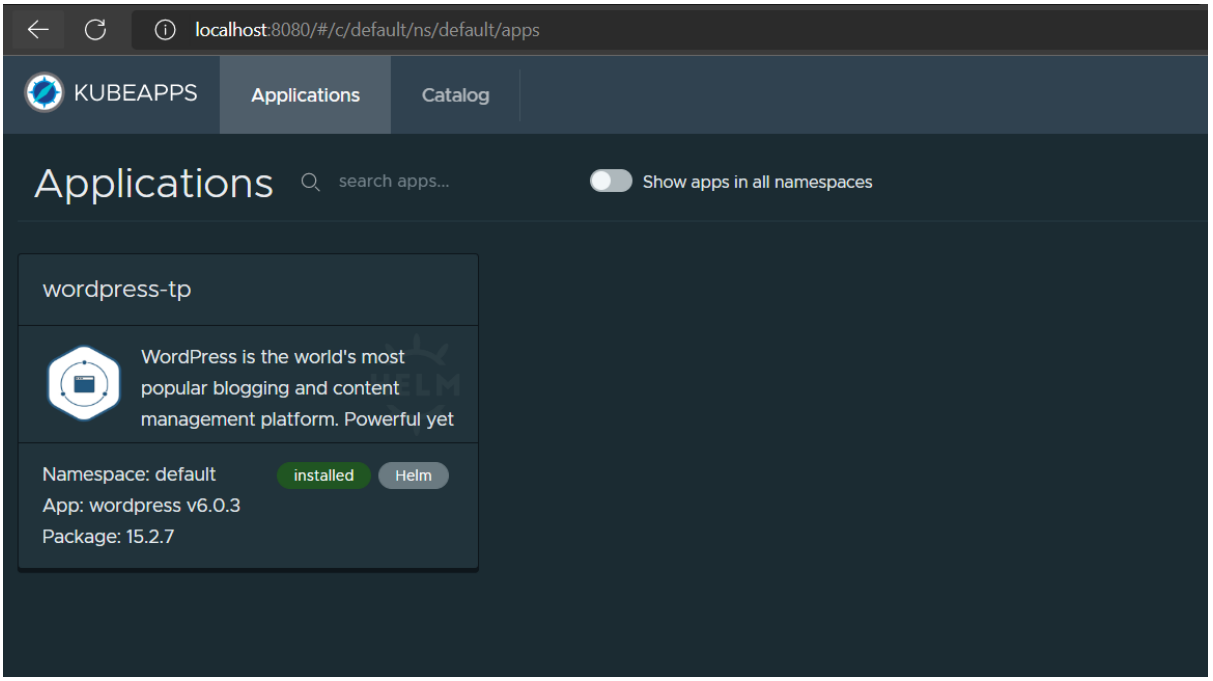
TP 4 - Déployer Wordpress avec Helm

https://cours.hadrienpelissier.fr/03-kubernetes/tp4_helm/

```
PS C:\Windows\system32> helm repo update
Hang tight while we grab the latest from your chart repositories...
...Successfully got an update from the "bitnami" chart repository
Update Complete. ⎈Happy Helming!⎈
PS C:\Windows\system32> helm install bitnami/mysql --generate-name
NAME: mysql-1666865980
LAST DEPLOYED: Thu Oct 27 12:19:41 2022
NAMESPACE: default
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
CHART NAME: mysql
CHART VERSION: 9.4.1
APP VERSION: 8.0.31

** Please be patient while the chart is being deployed **

Tip:

  Watch the deployment status using the command: kubectl get pods -w --namespace default

Services:

  echo Primary: mysql-1666865980.default.svc.cluster.local:3306

Execute the following to get the administrator credentials:

  echo Username: root
  MYSQL_ROOT_PASSWORD=$(kubectl get secret --namespace default mysql-1666865980 -o jsonpath="{.data.mysql-root-passwo
rd}" | base64 -d)

To connect to your database:

  1. Run a pod that you can use as a client:

      kubectl run mysql-1666865980-client --rm --tty -i --restart='Never' --image  docker.io/bitnami/mysql:8.0.31-deb
ian-11-r0 --namespace default --env MYSQL_ROOT_PASSWORD=$MYSQL_ROOT_PASSWORD --command -- bash

  2. To connect to primary service (read/write):

      mysql -h mysql-1666865980.default.svc.cluster.local -uroot -p"$MYSQL_ROOT_PASSWORD"
PS C:\Windows\system32> helm list
NAME                    NAMESPACE       REVISION        UPDATED                                 STATUS          CHART
        APP VERSION
mysql-1666865980        default         1               2022-10-27 12:19:41.5189196 +0200 CEST  deployed        mysql
-9.4.1  8.0.31
```

```
PS C:\Windows\system32> helm uninstall mysql-1666865980
release "mysql-1666865980" uninstalled
```

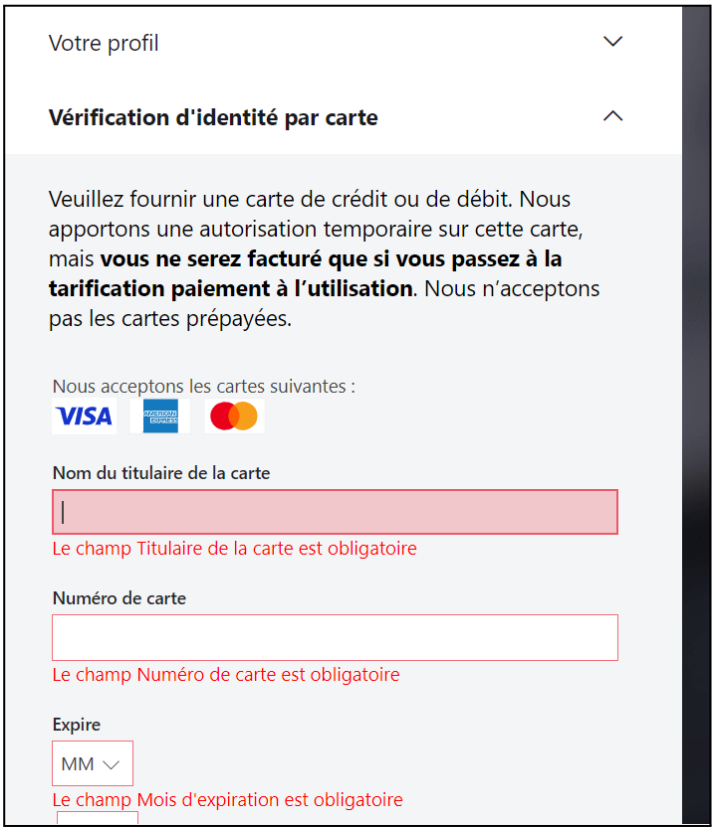

KUBEAPPS
Applications
Catalog
Current Context
default
default
Applications
search apps...
Show apps in all namespaces
DEPLOY
Deploy applications on your Kubernetes cluster with a single click.
Welcome To Kubeapps
Start browsing your favourite apps or check the documentation.
Administrateur : Windows PowerShell
NAMESPACE: kubeapps
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
CHART NAME: kubeapps
CHART VERSION: 11.0.1
APP VERSION: 2.6.0** Please be patient while the chart is being deployed **
Tip:
Watch the deployment status using the command: kubectl get pods -w --namespace kubeapps
Kubeapps can be accessed via port 80 on the following DNS name from within your cluster:
kubeapps.kubeapps.svc.cluster.local
To access Kubeapps from outside your K8s cluster, follow the steps below:
1. Get the Kubeapps URL by running these commands:
echo "Kubeapps URL: http://127.0.0.1:8080"
kubectl port-forward --namespace kubeapps service/kubeapps 8080:80
2. Open a browser and access Kubeapps using the obtained URL.
PS C:\Windows\system32>
PS C:\Windows\system32> kubectl port-forward -n kubeapps svc/kubeapps 8080:80
error: unable to forward port because pod is not running. Current status=Pending
PS C:\Windows\system32> kubectl port-forward -n kubeapps svc/kubeapps 8080:80
error: unable to forward port because pod is not running. Current status=Pending
PS C:\Windows\system32> kubectl port-forward -n kubeapps svc/kubeapps 8080:80
error: unable to forward port because pod is not running. Current status=Pending
PS C:\Windows\system32> kubectl port-forward -n kubeapps svc/kubeapps 8080:80
error: unable to forward port because pod is not running. Current status=Pending
PS C:\Windows\system32> helm install -n kubeapps --create-namespace kubeapps bitnami/kubeapps
Error: INSTALLATION FAILED: cannot re-use a name that is still in use
PS C:\Windows\system32> ^C
PS C:\Windows\system32> kubectl port-forward -n kubeapps svc/kubeapps 8080:80
error: unable to forward port because pod is not running. Current status=Pending
PS C:\Windows\system32> kubectl port-forward -n kubeapps svc/kubeapps 8080:80
error: unable to forward port because pod is not running. Current status=Pending
PS C:\Windows\system32> kubectl port-forward -n kubeapps svc/kubeapps 8080:80
Forwarding from 127.0.0.1:8080 -> 8080
Forwarding from [::1]:8080 -> 8080
Handling connection for 8080
Handling connection for 8080
Handling connection for 8080
Handling connection for 8080
Handling connection for 8080
Handling connection for 8080
Handling connection for 8080
E1027 12:33:56.473254 20136 portforward.go:378] error copying from remote stream to local connection: readfrom tcp4 127.0.0.1:8080->127.0.0.1:51843: write tcp4 127.0.0.1:8080->127.0.0.1:51843: wsasend: An established connection was aborted by the software in your host machine.
Handling connection for 8080


localhost:8080/#/c/default/ns/default/apps
KUBEAPPS
Applications
Catalog
Applications
search apps...
Show apps in all namespaces
wordpress-tp
WordPress is the world's most popular blogging and content management platform. Powerful yet
Namespace: default
installed
Helm
App: wordpress v6.0.3
Package: 15.2.7

TP 5 - Cloud Azure

https://cours.hadrienpelissier.fr/03-kubernetes/tp_5_aks/

Il y a un point de blocage avec la création d'un compte Microsoft Azure : il faut entrer des informations de paiement :



TP7 - Stratégies de déploiement et monitoring

https://cours.hadrienpelissier.fr/03-kubernetes/tp7_k8s_deploy_strategies/

Prometheus installation is functioning

```
PS C:\Users\pldpr\Desktop\Master\An 2\Devops\tpnotes\Kubernetes\TP7> helm install --namespace monitoring --version 13.2.1 --set service.type=NodePort promet
heus prometheus-community/prometheus
NAME: prometheus
LAST DEPLOYED: Thu Oct 27 16:17:26 2022
NAMESPACE: monitoring
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
The Prometheus server can be accessed via port 80 on the following DNS name from within your cluster:
prometheus-server.monitoring.svc.cluster.local


Get the Prometheus server URL by running these commands in the same shell:
  export POD_NAME=$(kubectl get pods --namespace monitoring -l "app=prometheus,component=server" -o jsonpath="{.items[0].metadata.name}")
  kubectl --namespace monitoring port-forward $POD_NAME 9090


The Prometheus alertmanager can be accessed via port 80 on the following DNS name from within your cluster:
prometheus-alertmanager.monitoring.svc.cluster.local


Get the Alertmanager URL by running these commands in the same shell:
PS C:\Users\pldpr\Desktop\Master\An 2\Devops\tpnotes\Kubernetes\TP7> kubectl get pods --namespace monitoring
NAME                                             READY   STATUS             RESTARTS      AGE
prometheus-alertmanager-5cd5445b6d-pm6mt         1/2     Running            0             36s
prometheus-kube-state-metrics-678d557c7-hkq86    1/1     Running            0             36s
prometheus-node-exporter-9bg4q                   0/1     RunContainerError  2 (16s ago)   37s
prometheus-pushgateway-79b5d7d967-dd4kr          1/1     Running            0             36s
prometheus-server-9b46c76b7-g44z8                2/2     Running            0             36s
```

But pod ‘node exporter’ is displaying an error :

```
QoS Class:                   BestEffort
Node-Selectors:              <none>
Tolerations:                 node.kubernetes.io/disk-pressure:NoSchedule op=Exists
                             node.kubernetes.io/memory-pressure:NoSchedule op=Exists
                             node.kubernetes.io/network-unavailable:NoSchedule op=Exists
                             node.kubernetes.io/not-ready:NoExecute op=Exists
                             node.kubernetes.io/pid-pressure:NoSchedule op=Exists
                             node.kubernetes.io/unreachable:NoExecute op=Exists
                             node.kubernetes.io/unschedulable:NoSchedule op=Exists
Events:
  Type     Reason     Age                From               Message
  ----     ------     ----               ----               -------
  Normal   Scheduled  60s                default-scheduler  Successfully assigned monitoring/prometheus-node-exporter-9bg4q to docker-desktop
  Normal   Pulled     13s (x4 over 59s)  kubelet            Container image "quay.io/prometheus/node-exporter:v1.0.1" already present on machine
  Normal   Created    13s (x4 over 58s)  kubelet            Created container prometheus-node-exporter
  Warning  Failed     13s (x4 over 58s)  kubelet            Error: failed to start container "prometheus-node-exporter": Error response from daemon: path /
is mounted on / but it is not a shared or slave mount
  Warning  BackOff    11s (x4 over 54s)  kubelet            Back-off restarting failed container
```

So we can’t go further in the TP.