An aerial photograph of a large container port. The image shows a dense arrangement of multi-colored shipping containers (red, blue, orange, white, green) stacked in rows. Yellow gantry cranes are visible, positioned over the container stacks. The ground is marked with yellow lines and labels such as 'P4', 'P5', 'P6', 'P7', 'Q4', 'Q5', 'Q6', 'Q7', and 'Q8'. The word 'Kubernetes' is overlaid in the center in a large, black, sans-serif font.

# Kubernetes



# Objectifs

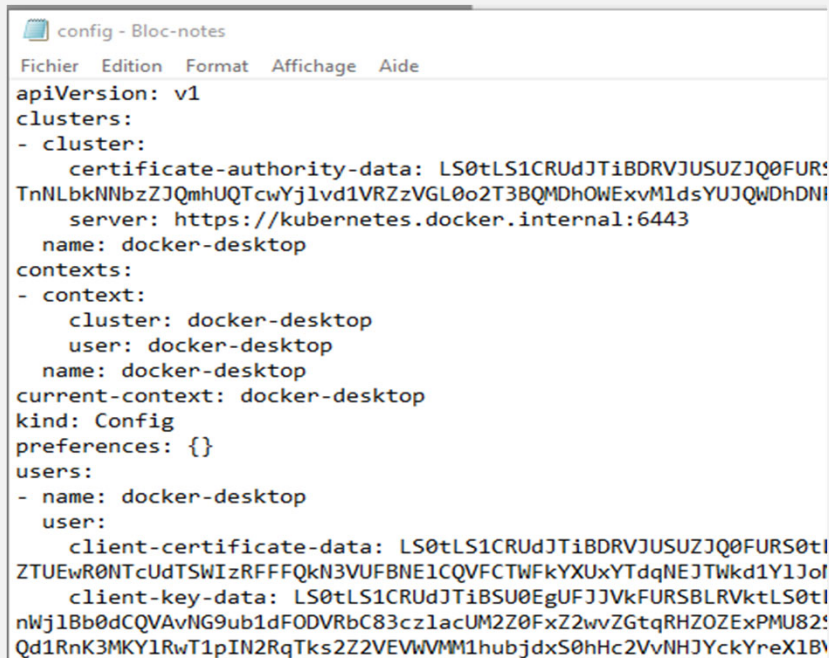
- Notre environnement de travail
- Déployer votre première application avec kubectl
- Création des pods

# Notre environnement de travail

## Retour sur Docker Desktop

- Un cluster avec un seul noeud (node) pour tout faire.
- Peu importe le cluster, kubectl à besoin d'un fichier config :

C:\Users\[usager]\.kube

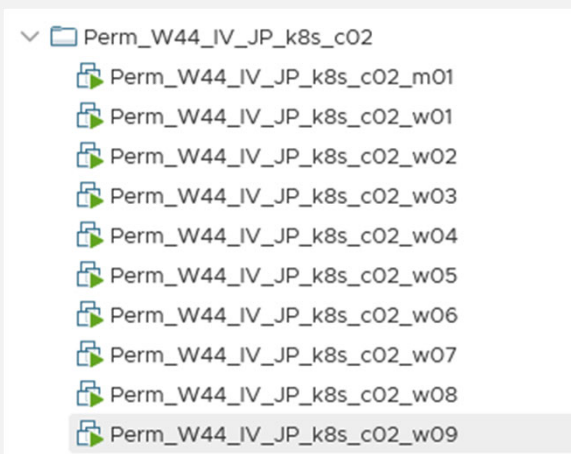


```
config - Bloc-notes
Fichier  Edition  Format  Affichage  Aide
apiVersion: v1
clusters:
- cluster:
    certificate-authority-data: LS0tLS1CRUdJTiBDRVJUSUZJQ0FUR...
    server: https://kubernetes.docker.internal:6443
    name: docker-desktop
contexts:
- context:
    cluster: docker-desktop
    user: docker-desktop
    name: docker-desktop
current-context: docker-desktop
kind: Config
preferences: {}
users:
- name: docker-desktop
  user:
    client-certificate-data: LS0tLS1CRUdJTiBDRVJUSUZJQ0FUR...
    client-key-data: LS0tLS1CRUdJTiBDRVJUSUZJQ0FUR...
```

# Notre environnement de travail

## Notre cluster

10 vms :



10 nœuds : 1 master et 9 worker

```
jpduches@VM-DevOpsJPD:~/k8s$ kubectl get nodes
NAME                 STATUS    ROLES                  AGE      VERSION
ivk8sc02m01         Ready     control-plane,master   25h      v1.20.10
ivk8sc02w01         Ready     <none>                 25h      v1.20.10
ivk8sc02w02         Ready     <none>                 25h      v1.20.10
ivk8sc02w03         Ready     <none>                 25h      v1.20.10
ivk8sc02w04         Ready     <none>                 25h      v1.20.10
ivk8sc02w05         Ready     <none>                 25h      v1.20.10
ivk8sc02w06         Ready     <none>                 25h      v1.20.10
ivk8sc02w07         Ready     <none>                 25h      v1.20.10
ivk8sc02w08         Ready     <none>                 25h      v1.20.10
ivk8sc02w09         Ready     <none>                 25h      v1.20.10
```

Un fichier config dans maVm /home/[user]/.kube/config

```
1 apiVersion: v1
2 clusters:
3 - cluster:
4   certificate-authority-data:
5     LS0tLS1CRUdJTiBDRVJUSUZJQ0FUR50tLS0tck1J3SUM1ekNDQWMrZ0F3SUJBZ0lCQURBTkZna
6     server: https://10.100.2.90:6443
7   name: kubernetes-distant
8 contexts:
9 - context:
10   cluster: kubernetes-distant
11   namespace: jpd
12   user: kubernetes-admin-distant
13   name: kubernetes-admin@kubernetes
14 current-context: kubernetes-admin@kubernetes
15 kind: Config
16 preferences: {}
17 users:
18 - name: kubernetes-admin-distant
19   user:
20     client-certificate-data:
21     LS0tLS1CRUdJTiBDRVJUSUZJQ0FUR50tLS0tck1J3SURFekNDQWZ1Z0F3SUJBZ0lCSXda1RPNV
22     client-key-data:
23     LS0tLS1CRUdJTiBDRVJUSUZJQ0FUR50tLS0tck1J3SURFekNDQWZ1Z0F3SUJBZ0lCSXda1RPNV
```

Peut-être visualisé avec :  
\$ kubectl config view  
Ou édité avec nano, vi, code, etc.

# Notre environnement de travail

## Namespace

- Isole un ensemble de ressources (Pods, Services, Deployments,...)
- Partage d'un cluster
  - Équipe / projet / clients
- Namespace par défaut si pas spécifié : default

```
jpduches@VM-DevOpsJPD:~/k8s$ kubectl get namespaces
NAME                STATUS    AGE
calico-apiserver     Active    4h58m
calico-system        Active    4h59m
default              Active    5h1m
development          Active    30s
jpd                  Active    13m
kube-node-lease      Active    5h1m
kube-public          Active    5h1m
kube-system          Active    5h1m
pfl                  Active    3h4m
production           Active    6s
test                  Active    14s
tigera-operator      Active    4h59m
jpduches@VM-DevOpsJPD:~/k8s$
```

# Notre environnement de travail

## Liste des ``pods``

```
jpduches@VM-DevOpsJPD:~/k8s$ kubectl get pod --all-namespaces
```

| NAMESPACE     | NAME                                     | READY | STATUS  | RESTARTS | AGE |
|---------------|--|-------|---------|----------|-----|
| calico-system | calico-apiserver-5b5cddc4db-6hzbr        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-kube-controllers-6b68fbbc84-skfnn | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-2ddpj                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-7wtx4                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-98t9g                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-b2lx5                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-fq956                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-mk54s                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-sqld2                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-vg48x                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-wxttm                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-node-xhbhp                        | 1/1   | Running | 0        | 2d  |
| calico-system | calico-typha-747bf9cf65-bzlk7            | 1/1   | Running | 0        | 2d  |
| calico-system | calico-typha-747bf9cf65-fbjjl            | 1/1   | Running | 0        | 2d  |
| calico-system | calico-typha-747bf9cf65-mwn5r            | 1/1   | Running | 0        | 2d  |
| default       | www                                      | 1/1   | Running | 0        | 22h |
| development   | www                                      | 1/1   | Running | 0        | 65m |
| kube-system   | coredns-74ff55c5b-jlrm7                  | 1/1   | Running | 0        | 2d  |
| kube-system   | coredns-74ff55c5b-mcp77                  | 1/1   | Running | 0        | 2d  |
| kube-system   | etcd-ivk8sc02m01                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-apiserver-ivk8sc02m01               | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-controller-manager-ivk8sc02m01      | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-4gks9                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-4r8kg                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-6mwcw                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-fmgb8                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-g486v                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-gmhmf                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-jn6vj                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-lqt2n                         | 1/1   | Running | 0        | 2d  |
| kube-system   | kube-proxy-ph6th                         | 1/1   | Running | 0        | 2d  |

```
jpduches@VM-DevOpsJPD:~/k8s$ kubectl get pod --namespace=development
```

| NAME | READY | STATUS  | RESTARTS | AGE |
|------|-------|---------|----------|-----|
| www  | 1/1   | Running | 0        | 66m |

```
jpduches@VM-DevOpsJPD:~/k8s$
```

- Supprimer un pod dans un namespace qui n'est pas celui par défaut (présent dans le fichier .kube/config :

```
jpduches@VM-DevOpsJPD:~/k8s$ kubectl delete pod/www --namespace=default
```

pod "www" deleted

```
jpduches@VM-DevOpsJPD:~/k8s$
```

# Création namespace

```
# Création du namespaces development (option 1)
```

```
$ kubectl create namespace development
```

```
namespace "development" created
```

← En ligne de commande

```
# Suppression du namespace
```

```
$ kubectl delete namespace/development
```

```
namespace "development" deleted
```

```
# Création du namespace development (option 2)
```

```
$ cat development.yaml
```

```
{  
  "kind": "Namespace",  
  "apiVersion": "v1",  
  "metadata": {  
    "name": "development",  
    "labels": {  
      "name": "development"  
    }  
  }  
}
```

← Dans un fichier de spécification

```
$ kubectl create -f development.yaml
```

```
namespace "development" created
```

# Notre environnement de travail

## Fichier config

Un fichier config dans maVm /home/[user]/.kube/config

Indiquer votre namespace :[matricule]

```
1 apiVersion: v1
2 clusters:
3 - cluster:
4   certificate-authority-data:
5     LS0tLS1CRUdJTiBDRVJUSUZJJQ0FURS0tLS0tck1JSUM1ekNDQWMrZ0F3SUJBZ0lCQURBTkNa
6   server: https://10.100.2.90:6443
7   name: kubernetes-distant
8 contexts:
9 - context:
10   cluster: kubernetes-distant
11   namespace : jpd
12   user: kubernetes-admin-distant
13   name: kubernetes-admin@kubernetes
14 current-context: kubernetes-admin@kubernetes
15 kind: Config
16 preferences: {}
17 users:
18 - name: kubernetes-admin-distant
19   user:
20     client-certificate-data:
21       LS0tLS1CRUdJTiBDRVJUSUZJJQ0FURS0tLS0tck1JSURFekNDQWZ1Z0F3SUJBZ0lJSXdGa1RPV
22     client-key-data:
23       LS0tLS1CRUdJTiB0EgUUFJJVktFURSBLRVktLS0tLQpNSU1Fb2dJQkFBS0NBUEVBBmhWdC9ld
```



# Création d'un pod

- Démo sur vm :

```
$kubectl get nodes
$nano www.yml
$kubectl create -f www.yml
$kubectl get pods
$kubectl describe pod/www
$kubectl port-forward www 8080:80
$kubectl delete po/www
```

Fichier `www.yml`

```
apiVersion: v1
kind: Pod
metadata:
  name: www
spec:
  containers:
  - name: nginx
    image: nginx:1.12.2
```

# Cycle de vie d'un pod

- Lancement d'un pod  
`$kubectl create -f POD_SPECIFICATION.yml`
- Liste des Pods  
`$kubectl get pod`  
Namespaces « default »
- Description d'un pod  
`$kubectl describe pod POD_NAME`  
`$kubectl describe po/POD_NAME`
- Log d'un container d'un pod  
`$kubectl logs pod POD_NAME[-c CONTAINER_NAME]`
- Lancement d'une commande dans un Pod existant  
`$kubectl exec pod POD_NAME[-c CONTAINER_NAME]- Command`
- Suppression d'un Pod  
`$kubectl delete pod POD_NAME`

# Commandes d'un pod

- Démo sur vm :

```
$kubectl create -f www.yml  
$kubectl get pods  
$kubectl exec www -- nginx -v  
$kubectl exec -t -i www -- /bin/bash  
root@nginx: /#pwd  
root@nginx: /#exit  
$kubectl delete po/www
```

Fichier www.yml

```
apiVersion: v1  
kind: Pod  
metadata:  
  name: www  
spec:  
  containers:  
  - name: nginx  
    image: nginx:1.12.2
```

# Debug de container

```
jpduches@VM-DevOpsJPD:~/k8s/exer14$ kubectl get pod
NAME      READY   STATUS    RESTARTS   AGE
wp        1/2     CrashLoopBackOff   6          10m
jpduches@VM-DevOpsJPD:~/k8s/exer14$ kubectl logs pod/wp
error: a container name must be specified for pod wp, choose one of: [wordpress mysql]
jpduches@VM-DevOpsJPD:~/k8s/exer14$ kubectl logs pod/wp mysql
2021-08-23 18:30:17+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 8.0.26-1debian10 started.
2021-08-23 18:30:17+00:00 [Note] [Entrypoint]: Switching to dedicated user 'mysql'
2021-08-23 18:30:17+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 8.0.26-1debian10 started.
2021-08-23 18:30:18+00:00 [ERROR] [Entrypoint]: Database is uninitialized and password option is not specified
  You need to specify one of the following:
  - MYSQL_ROOT_PASSWORD
  - MYSQL_ALLOW_EMPTY_PASSWORD
  - MYSQL_RANDOM_ROOT_PASSWORD
jpduches@VM-DevOpsJPD:~/k8s/exer14$ kubectl logs pod/wp wordpress
error: container wordpress is not valid for pod wp
jpduches@VM-DevOpsJPD:~/k8s/exer14$ kubectl logs pod/wp wordpress
WordPress not found in /var/www/html - copying now...
Complete! WordPress has been successfully copied to /var/www/html
No 'wp-config.php' found in /var/www/html, but 'WORDPRESS_...' variables supplied; copying 'wp-config-docker.php' (WORDPRESS_DB_HOST WORDPRESS_DB_NAME WORDPRESS_DB_PASSWORD WORDPRESS_USER)
AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 192.168.119.197. Set the 'ServerName' directive globally to suppress this message
AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 192.168.119.197. Set the 'ServerName' directive globally to suppress this message
[Mon Aug 23 18:19:20.158553 2021] [mpm_prefork:notice] [pid 1] AH00163: Apache/2.4.48 (Debian) PHP/7.4.22 configured -- resuming normal operations
[Mon Aug 23 18:19:20.158599 2021] [core:notice] [pid 1] AH00094: Command line: 'apache2 -D FOREGROUND'
jpduches@VM-DevOpsJPD:~/k8s/exer14$
```

Utiliser l'aide mémoire de kubectl: <https://kubernetes.io/fr/docs/reference/kubectl/cheatsheet/>



- Pour le prochain cours

- Avoir écouté la vidéo de Pierre François Léon :
- <https://www.youtube.com/watch?v=71164-zrjac&list=PL1Cc1A0PTWee3ok4KQz0umqsVngtlnSur&index=3&t=1123s>  
24 minutes 22
- Le PDF des manifestes est sur LÉA
- Début du laboratoire 3