5SRC1
Groupe 8
ADOUSSI Eugène
FIKARA Imad
CADIRY William

TP KUBERNETES PARTIE 2

I - Installation ArgoCD

```
kubectl create namespace argocd
```

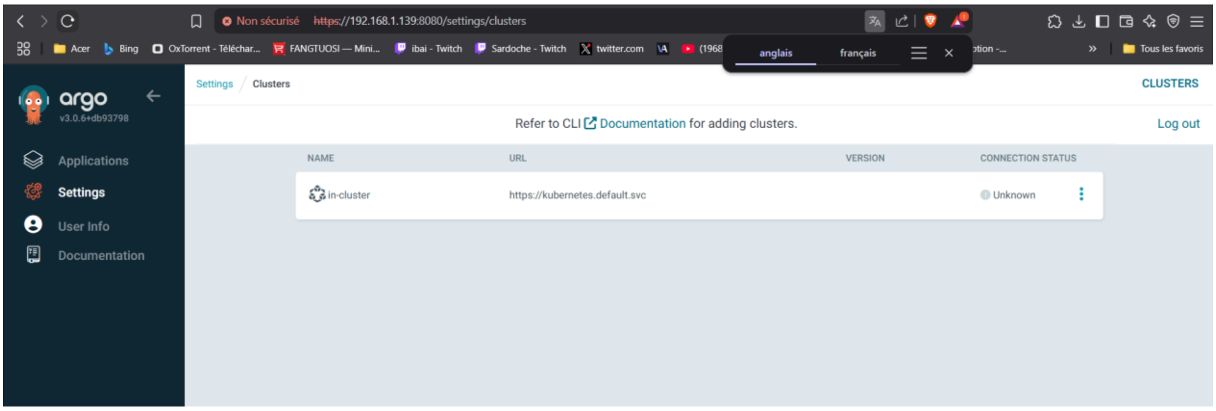
```
kubectl apply -n argocd -f https://raw.githubusercontent.com/argoproj/argo-cd/stable/manifests/install.yaml
```

```
argocd admin initial-password -n argocd
```

```
kubectl port-forward --address 0.0.0.0 svc/argocd-server -n argocd 8080:443
```

```
kubectl patch svc argocd-server -n argocd -p '{"spec": {"type": "LoadBalancer"}}'
```

https://192.168.1.139:8080/settings/clusters



Non sécurisé ~~https~~://192.168.1.139:8080/settings/clusters

Refer to CLI Documentation for adding clusters.

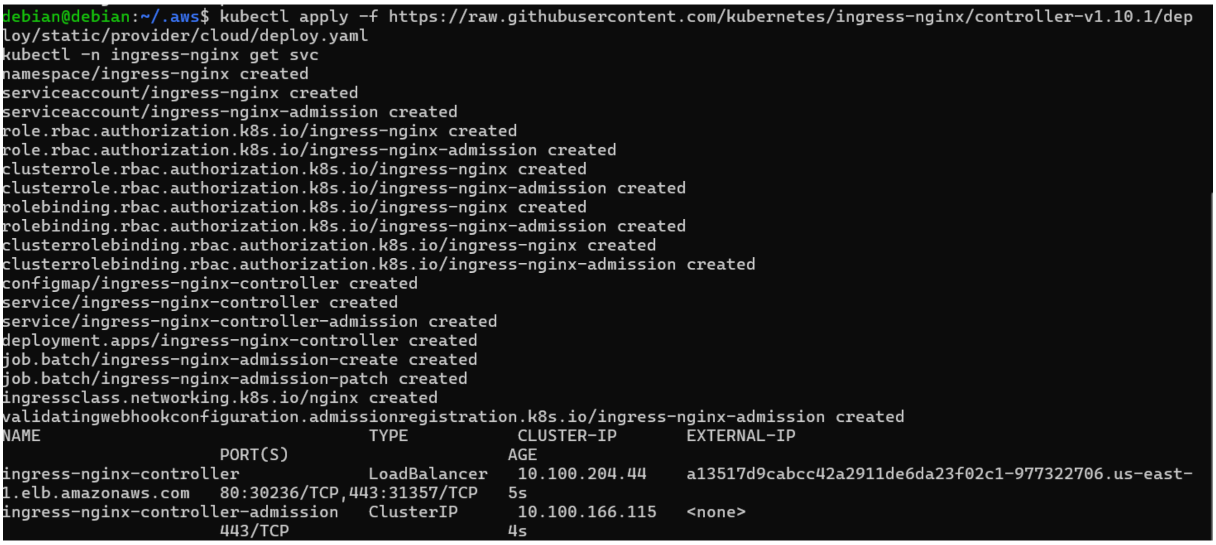
NAME	URL	VERSION	CONNECTION STATUS
in-cluster	https://kubernetes.default.svc		Unknown

II – Déploiement de l’application ArgoCD

Installation d’un Ingress Controller via ces commandes suivantes :

```
kubectl apply -f https://raw.githubusercontent.com/kubernetes/ingress-nginx/controller-v1.10.1/deploy/static/provider/cloud/deploy.yaml
```

```
kubectl -n ingress-nginx get svc
```



```
debian@debian:~/.aws$ kubectl apply -f https://raw.githubusercontent.com/kubernetes/ingress-nginx/controller-v1.10.1/dep
loy/static/provider/cloud/deploy.yaml
kubectl -n ingress-nginx get svc
namespace/ingress-nginx created
serviceaccount/ingress-nginx created
serviceaccount/ingress-nginx-admission created
role.rbac.authorization.k8s.io/ingress-nginx created
role.rbac.authorization.k8s.io/ingress-nginx-admission created
clusterrole.rbac.authorization.k8s.io/ingress-nginx created
clusterrole.rbac.authorization.k8s.io/ingress-nginx-admission created
rolebinding.rbac.authorization.k8s.io/ingress-nginx created
rolebinding.rbac.authorization.k8s.io/ingress-nginx-admission created
clusterrolebinding.rbac.authorization.k8s.io/ingress-nginx created
clusterrolebinding.rbac.authorization.k8s.io/ingress-nginx-admission created
configmap/ingress-nginx-controller created
service/ingress-nginx-controller created
service/ingress-nginx-controller-admission created
deployment.apps/ingress-nginx-controller created
job.batch/ingress-nginx-admission-create created
job.batch/ingress-nginx-admission-patch created
ingressclass.networking.k8s.io/nginx created
validatingwebhookconfiguration.admissionregistration.k8s.io/ingress-nginx-admission created
NAME                                 TYPE           CLUSTER-IP       EXTERNAL-IP
                      PORT(S)                      AGE
ingress-nginx-controller             LoadBalancer   10.100.204.44    a13517d9cabcc42a2911de6da23f02c1-977322706.us-east-
1.elb.amazonaws.com   80:30236/TCP,443:31357/TCP   5s
ingress-nginx-controller-admission   ClusterIP      10.100.166.115   <none>
                      443/TCP                      4s
```

III - Création d’une application ArgoCD

Création du fichier **ingress.yaml :**

```
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: hello-ingress
  annotations:
    nginx.ingress.kubernetes.io/rewrite-target: /
spec:
  rules:
    - host: hello.local
      http:
        paths:
          - path: /
            pathType: Prefix
            backend:
              service:
                name: hello-kubernetes
                port:
                  number: 80
deployment :
```

Ajout d’une entrée dans le fichier **/etc/hosts** :

<IP-ingress> hello.local -> 10.100.204.44 hello.local

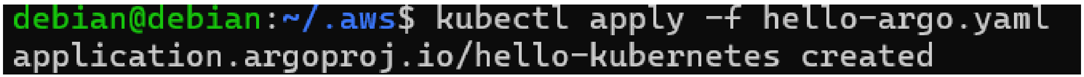
5SRC1
Groupe 8
ADOUSSI Eugène
FIKARA Imad
CADIRY William

Création du fichier **hello-argo.yaml :**

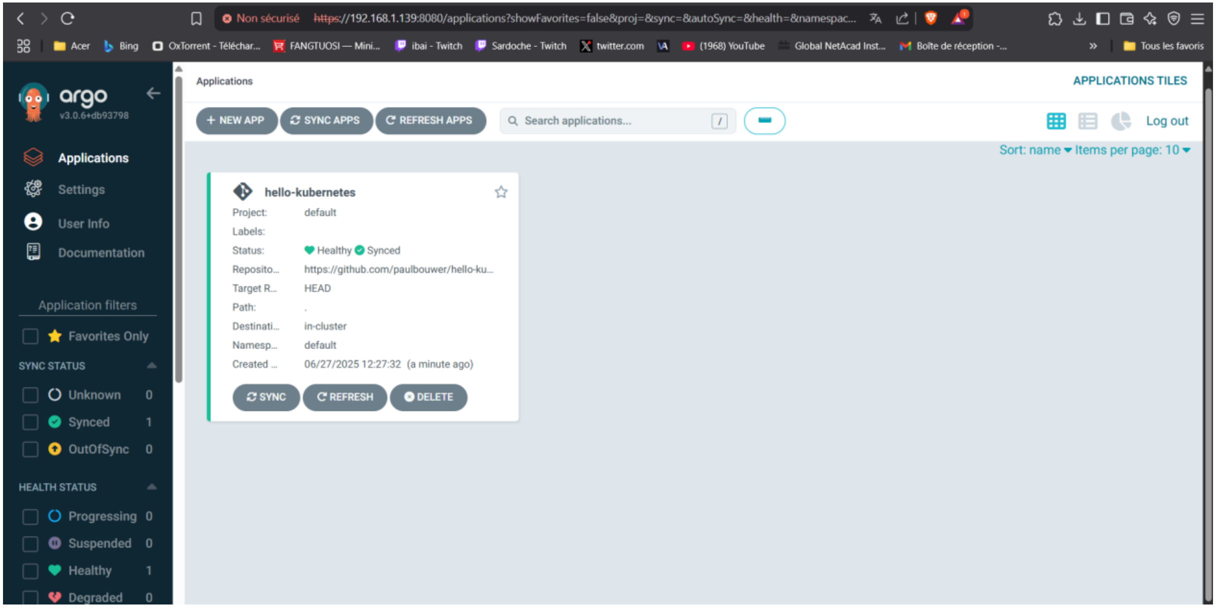
```
apiVersion: argoproj.io/v1alpha1
kind: Application
metadata:
  name: hello-kubernetes
  namespace: argocd
spec:
  project: default
  source:
    repoURL: https://github.com/paulbouwer/hello-kubernetes
    path: .
    targetRevision: HEAD
  destination:
    server: https://kubernetes.default.svc
    namespace: default
  syncPolicy:
    automated: {}   # Pour sync auto (à désactiver pour test manuel)
  ingress:
    enabled: true
```

IV - Déploiement de l'application ArgoCD

Déploiement de l'application via cette commande : *kubectl apply -f hello-argo.yaml*



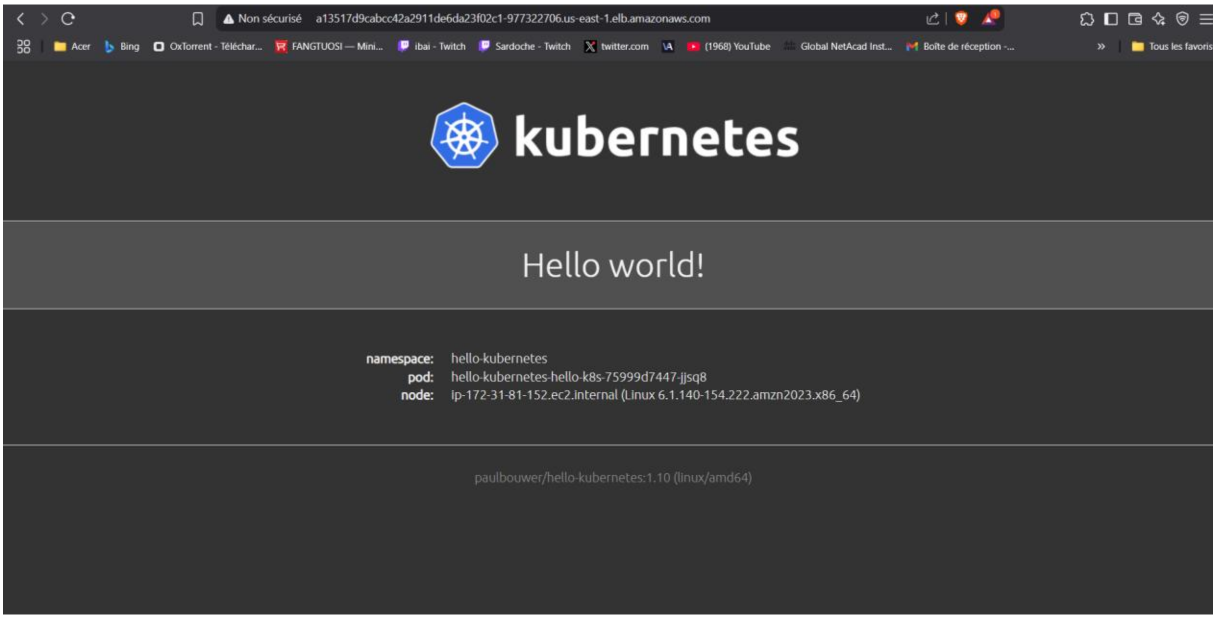
```
debian@debian:~/.aws$ kubectl apply -f hello-argo.yaml
application.argoproj.io/hello-kubernetes created
```



Non sécurisé https://192.168.1.139:8080/applications?showFavorites=false&proj=&sync=&autoSync=&health=&namespac...

hello-kubernetes
Project: default
Labels:
Status: Healthy Synced
Reposito... https://github.com/paulbouwer/hello-ku...
Target R... HEAD
Path: .
Destinati... in-cluster
Namesp... default
Created ... 06/27/2025 12:27:32 (a minute ago)

URL d’accès : http://a13517d9cabcc42a2911de6da23f02c1-977322706.us-east-1.elb.amazonaws.com/

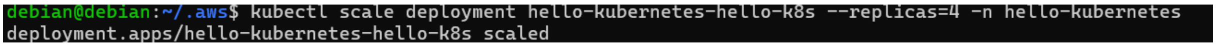


Hello world!

namespace: hello-kubernetes
pod: hello-kubernetes-hello-k8s-75999d7447-jjsq8
node: ip-172-31-81-152.ec2.internal (Linux 6.1.140-154.222.amzn2023.x86_64)

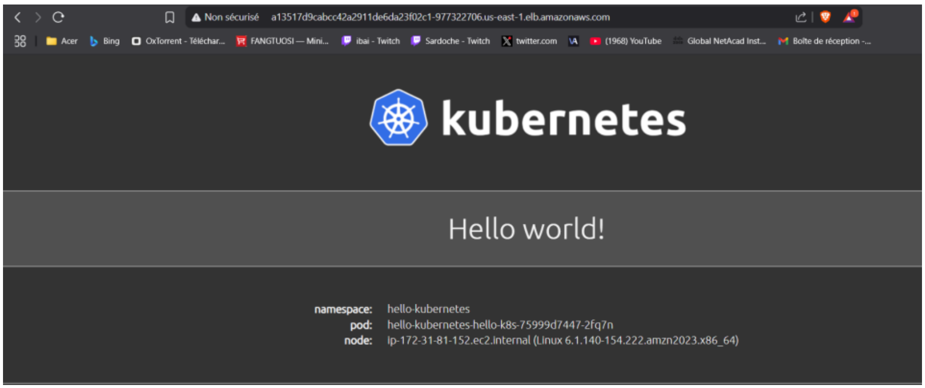
paulbouwer/hello-kubernetes:1.10 (linux/amd64)

Test de scalabilité de Kubernetes :



```
debian@debian:~/.aws$ kubectl scale deployment hello-kubernetes-hello-k8s --replicas=4 -n hello-kubernetes
deployment.apps/hello-kubernetes-hello-k8s scaled
```

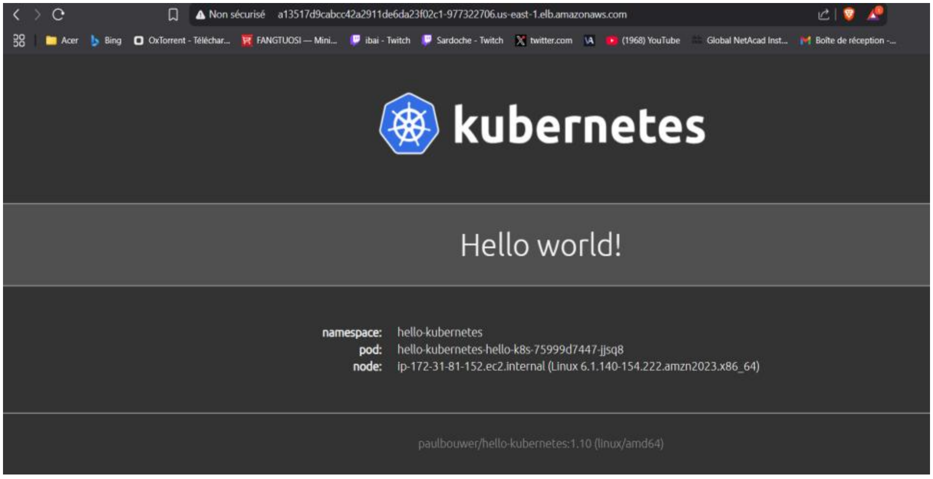
Pour vérifier si cela fonctionne, il faut porter une attention particulière au pod qui change après chaque rechargement de la page Web :



Non sécurisé a13517d9cabcc42a2911de6da23f02c1-977322706.us-east-1.elb.amazonaws.com

Hello world!

namespace: hello-kubernetes
pod: hello-kubernetes-hello-k8s-75999d7447-2fq7n
node: ip-172-31-81-152.ec2.internal (Linux 6.1.140-154.222.amzn2023.x86_64)



Non sécurisé a13517d9cabcc42a2911de6da23f02c1-977322706.us-east-1.elb.amazonaws.com

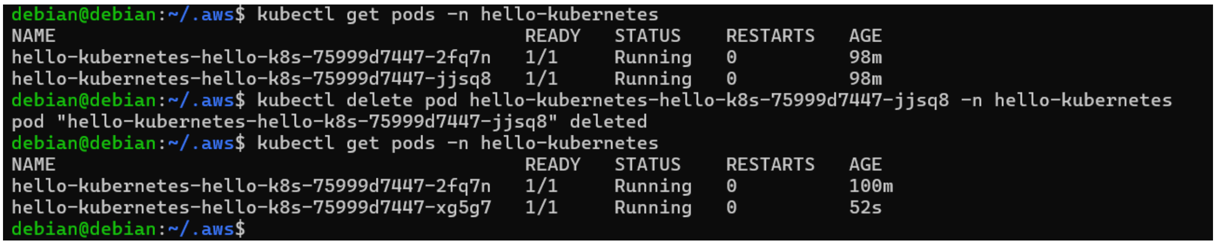
Hello world!

namespace: hello-kubernetes
pod: hello-kubernetes-hello-k8s-75999d7447-jjsq8
node: ip-172-31-81-152.ec2.internal (Linux 6.1.140-154.222.amzn2023.x86_64)

paulbouwer/hello-kubernetes:1.10 (linux/amd64)

V - Test de résilience Argo CD

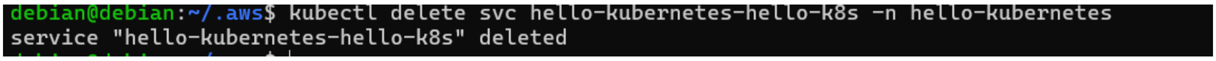
Test n°1 : Suppression manuelle d'un Pod (auto-heal)



```
debian@debian:~/.aws$ kubectl get pods -n hello-kubernetes
NAME                                           READY   STATUS    RESTARTS   AGE
hello-kubernetes-hello-k8s-75999d7447-2fq7n    1/1     Running   0          98m
hello-kubernetes-hello-k8s-75999d7447-jjsq8    1/1     Running   0          98m
debian@debian:~/.aws$ kubectl delete pod hello-kubernetes-hello-k8s-75999d7447-jjsq8 -n hello-kubernetes
pod "hello-kubernetes-hello-k8s-75999d7447-jjsq8" deleted
debian@debian:~/.aws$ kubectl get pods -n hello-kubernetes
NAME                                           READY   STATUS    RESTARTS   AGE
hello-kubernetes-hello-k8s-75999d7447-2fq7n    1/1     Running   0          100m
hello-kubernetes-hello-k8s-75999d7447-xg5g7    1/1     Running   0          52s
debian@debian:~/.aws$
```

Argo CD détecte le pod manquant et Kubernetes recrée automatiquement le pod

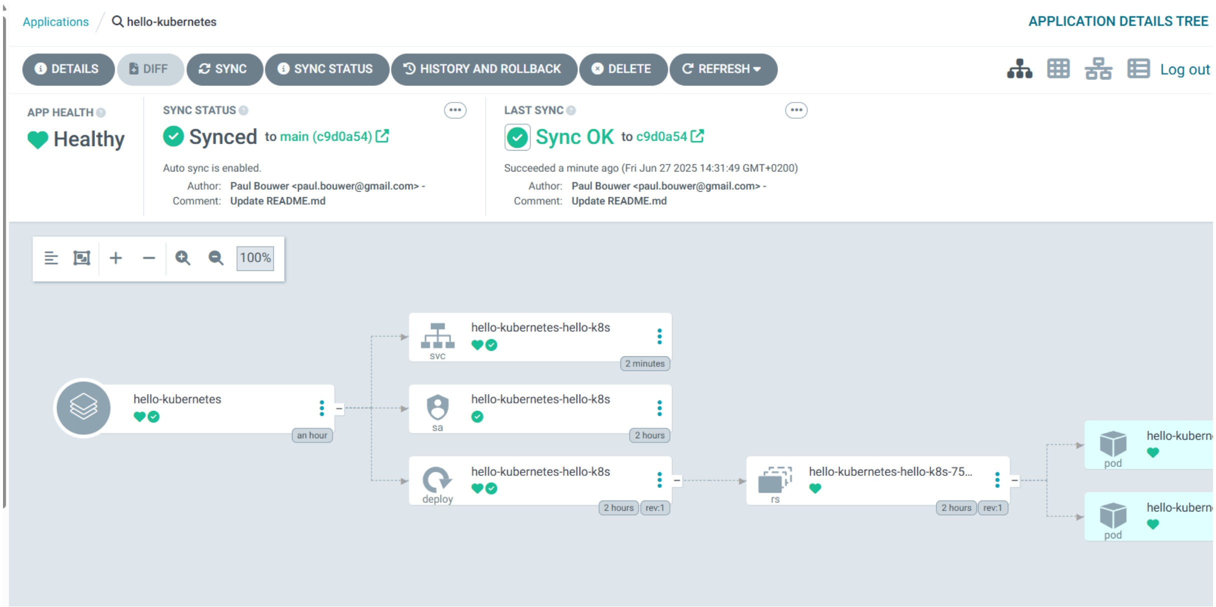
Test n°2 : Suppression manuelle d'un Service (sync automatique)



```
debian@debian:~/.aws$ kubectl delete svc hello-kubernetes-hello-k8s -n hello-kubernetes
service "hello-kubernetes-hello-k8s" deleted
```

Nous voyons que le service SVC est recréé automatiquement

5SRC1
Groupe 8
ADOUSSI Eugène
FIKARA Imad
CADIRY William

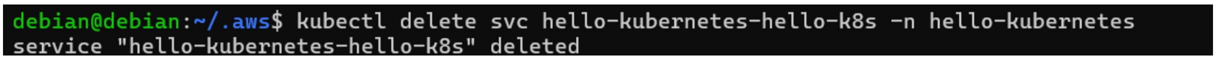


APP HEALTH
Healthy

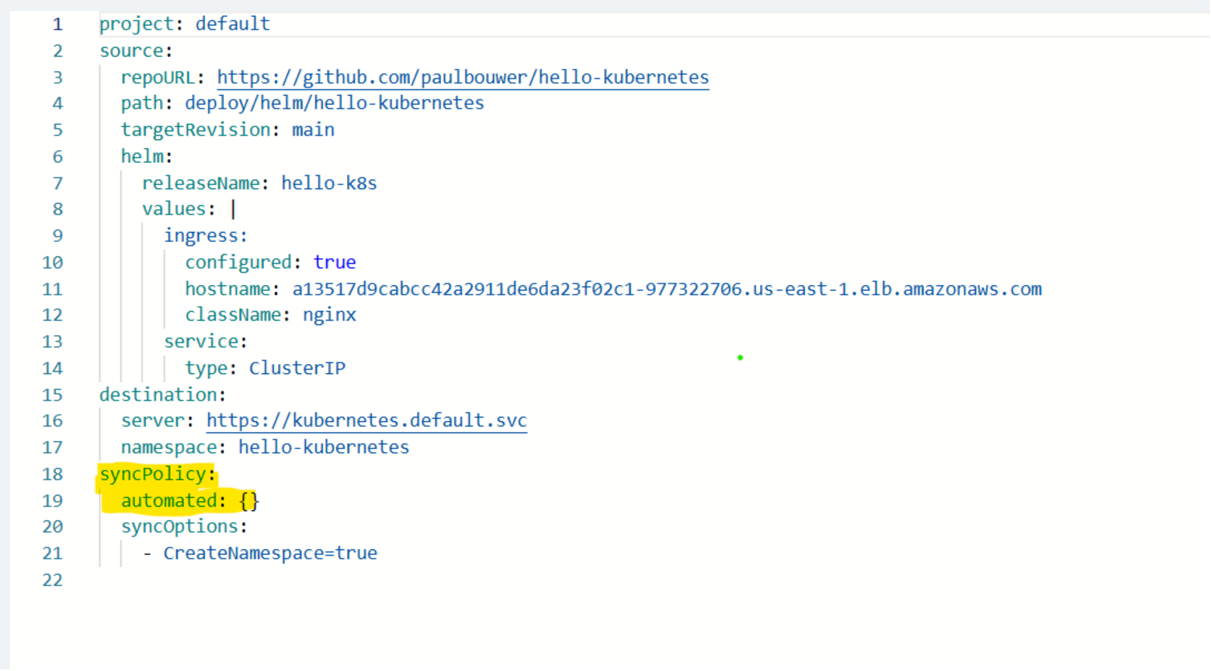
SYNC STATUS
Synced to main (c9d0a54)
Auto sync is enabled.
Author: Paul Bouwer <paul.bouwer@gmail.com> -
Comment: Update README.md

LAST SYNC
Sync OK to c9d0a54
Succeeded a minute ago (Fri Jun 27 2025 14:31:49 GMT+0200)
Author: Paul Bouwer <paul.bouwer@gmail.com> -
Comment: Update README.md

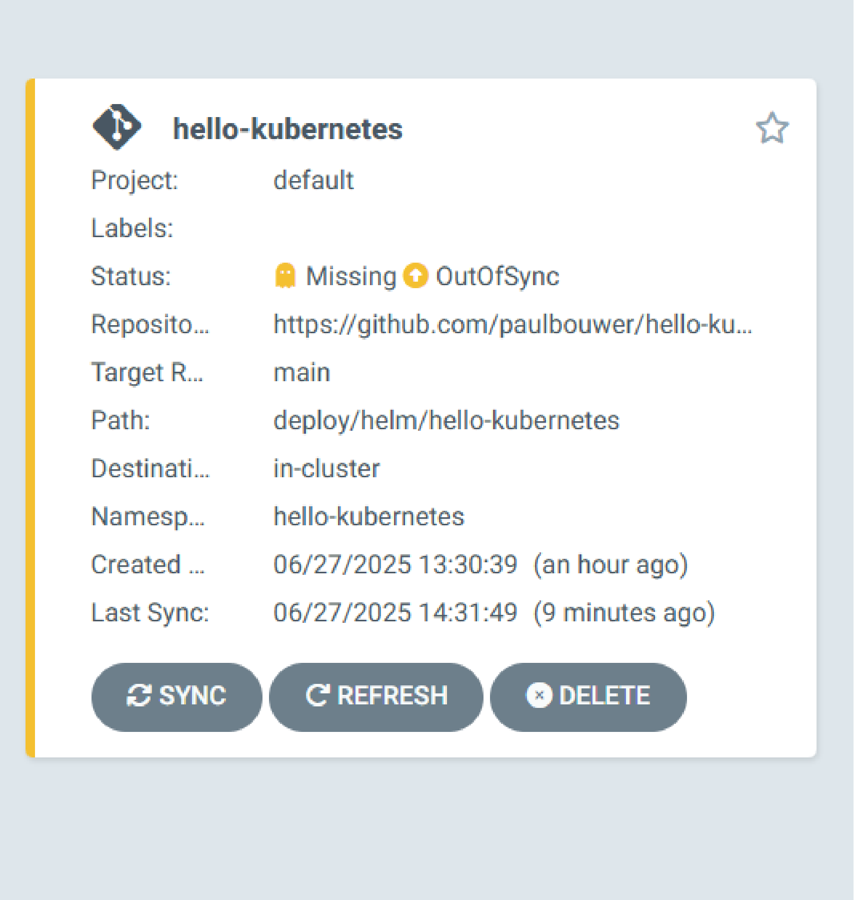
Test n°3 : Suppression manuelle d’un Service (sync manuel)



```
debian@debian:~/.aws$ kubectl delete svc hello-kubernetes-hello-k8s -n hello-kubernetes
service "hello-kubernetes-hello-k8s" deleted
```



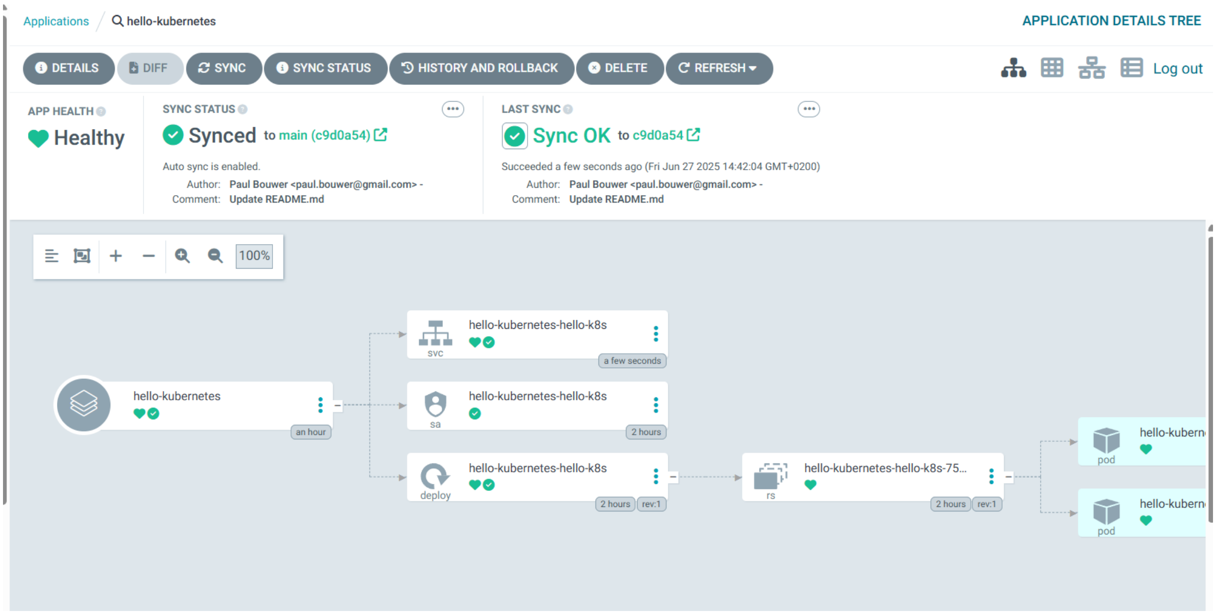
```
project: default
source:
  repoURL: https://github.com/paulbouwer/hello-kubernetes
  path: deploy/helm/hello-kubernetes
  targetRevision: main
  helm:
    releaseName: hello-k8s
    values: |
      ingress:
        configured: true
        hostname: a13517d9cabcc42a2911de6da23f02c1-977322706.us-east-1.elb.amazonaws.com
        className: nginx
      service:
        type: ClusterIP
destination:
  server: https://kubernetes.default.svc
  namespace: hello-kubernetes
syncPolicy:
  automated: {}
  syncOptions:
    - CreateNamespace=true

```



hello-kubernetes

Project:	default
Labels:	
Status:	Missing OutOfSync
Reposito...	https://github.com/paulbouwer/hello-ku...
Target R...	main
Path:	deploy/helm/hello-kubernetes
Destinati...	in-cluster
Namesp...	hello-kubernetes
Created ...	06/27/2025 13:30:39 (an hour ago)
Last Sync:	06/27/2025 14:31:49 (9 minutes ago)

Affichage d’ArgoCD après synchronisation manuelle :



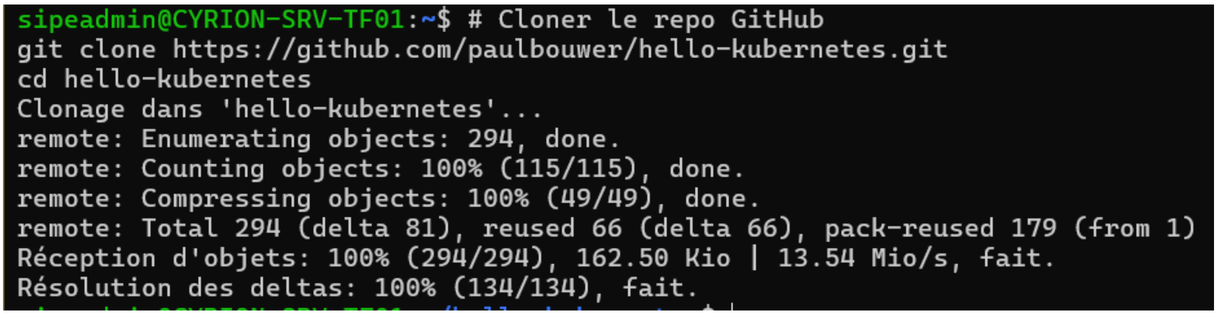
APP HEALTH
Healthy

SYNC STATUS
Synced to main (c9d0a54)
Auto sync is enabled.
Author: Paul Bouwer <paul.bouwer@gmail.com> -
Comment: Update README.md

LAST SYNC
Sync OK to c9d0a54
Succeeded a few seconds ago (Fri Jun 27 2025 14:42:04 GMT+0200)
Author: Paul Bouwer <paul.bouwer@gmail.com> -
Comment: Update README.md

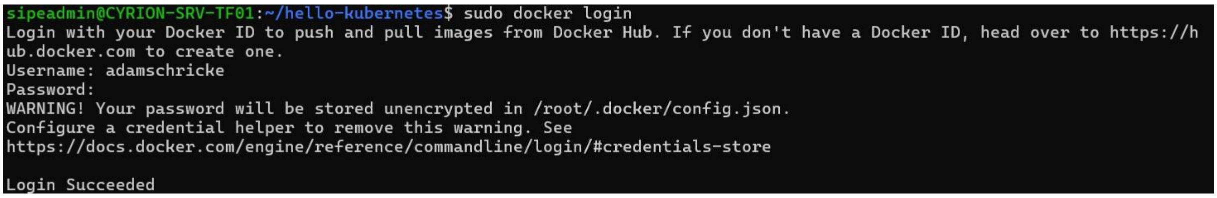
VI - Déploiement d'une image depuis un Repo Privé

On commence par cloner le repository



```
sipeadmin@CYRION-SRV-TF01:~$ # Cloner le repo GitHub
git clone https://github.com/paulbouwer/hello-kubernetes.git
cd hello-kubernetes
Clonage dans 'hello-kubernetes'...
remote: Enumerating objects: 294, done.
remote: Counting objects: 100% (115/115), done.
remote: Compressing objects: 100% (49/49), done.
remote: Total 294 (delta 81), reused 66 (delta 66), pack-reused 179 (from 1)
Réception d'objets: 100% (294/294), 162.50 Kio | 13.54 Mio/s, fait.
Résolution des deltas: 100% (134/134), fait.
```

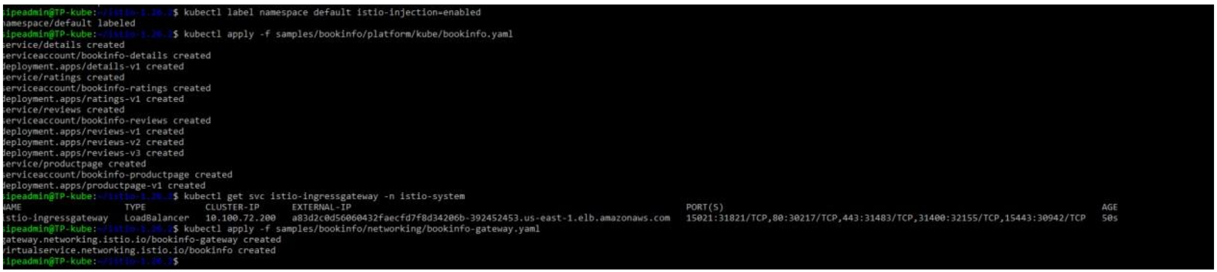
On se connecte ensuite à notre compte
Docker Hub



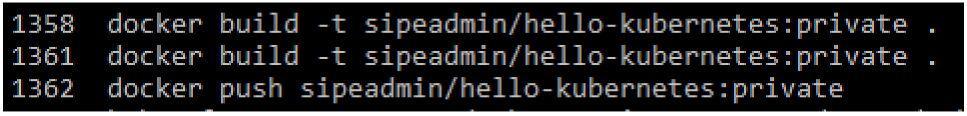
```
sipeadmin@CYRION-SRV-TF01:~/hello-kubernetes$ sudo docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://h
ub.docker.com to create one.
Username: adamschricke
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
```

On va ensuite créer l'image privée C poussée sur Docker Hub :

5SRC1
Groupe 8
ADOUSSI Eugène
FIKARA Imad
CADIRY William

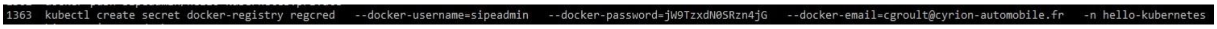


```
ipeadmin@TP-kube:~/istio-1.26.2$ kubectl label namespace default istio-injection=enabled
amespace/default labeled
ipeadmin@TP-kube:~/istio-1.26.2$ kubectl apply -f samples/bookinfo/platform/kube/bookinfo.yaml
ervice/details created
erviceaccount/bookinfo-details created
eployment.apps/details-v1 created
ervice/ratings created
erviceaccount/bookinfo-ratings created
eployment.apps/ratings-v1 created
ervice/reviews created
erviceaccount/bookinfo-reviews created
eployment.apps/reviews-v1 created
eployment.apps/reviews-v2 created
eployment.apps/reviews-v3 created
ervice/productpage created
erviceaccount/bookinfo-productpage created
eployment.apps/productpage-v1 created
ipeadmin@TP-kube:~/istio-1.26.2$ kubectl get svc istio-ingressgateway -n istio-system
AME                   TYPE           CLUSTER-IP      EXTERNAL-IP                                                               PORT(S)                                                                      AGE
stio-ingressgateway   LoadBalancer   10.100.72.200   a83d2c0d56060432faecfd7f8d34206b-392452453.us-east-1.elb.amazonaws.com   15021:31821/TCP,80:30217/TCP,443:31483/TCP,31400:32155/TCP,15443:30942/TCP   50s
ipeadmin@TP-kube:~/istio-1.26.2$ kubectl apply -f samples/bookinfo/networking/bookinfo-gateway.yaml
ateway.networking.istio.io/bookinfo-gateway created
irtualservice.networking.istio.io/bookinfo created
ipeadmin@TP-kube:~/istio-1.26.2$
```



```
1358  docker build -t sipeadmin/hello-kubernetes:private .
1361  docker build -t sipeadmin/hello-kubernetes:private .
1362  docker push sipeadmin/hello-kubernetes:private
```

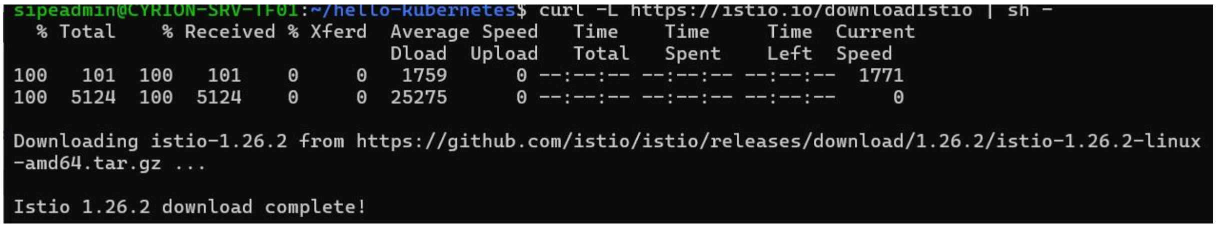
On fait la création du secret Kubernetes regcred pour autoriser le cluster à tirer l’image privée



```
1363  kubectl create secret docker-registry regcred   --docker-username=sipeadmin   --docker-password=jW9TzxdN0SRzn4jG   --docker-email=cgroult@cyrion-automobile.fr   -n hello-kubernetes
```

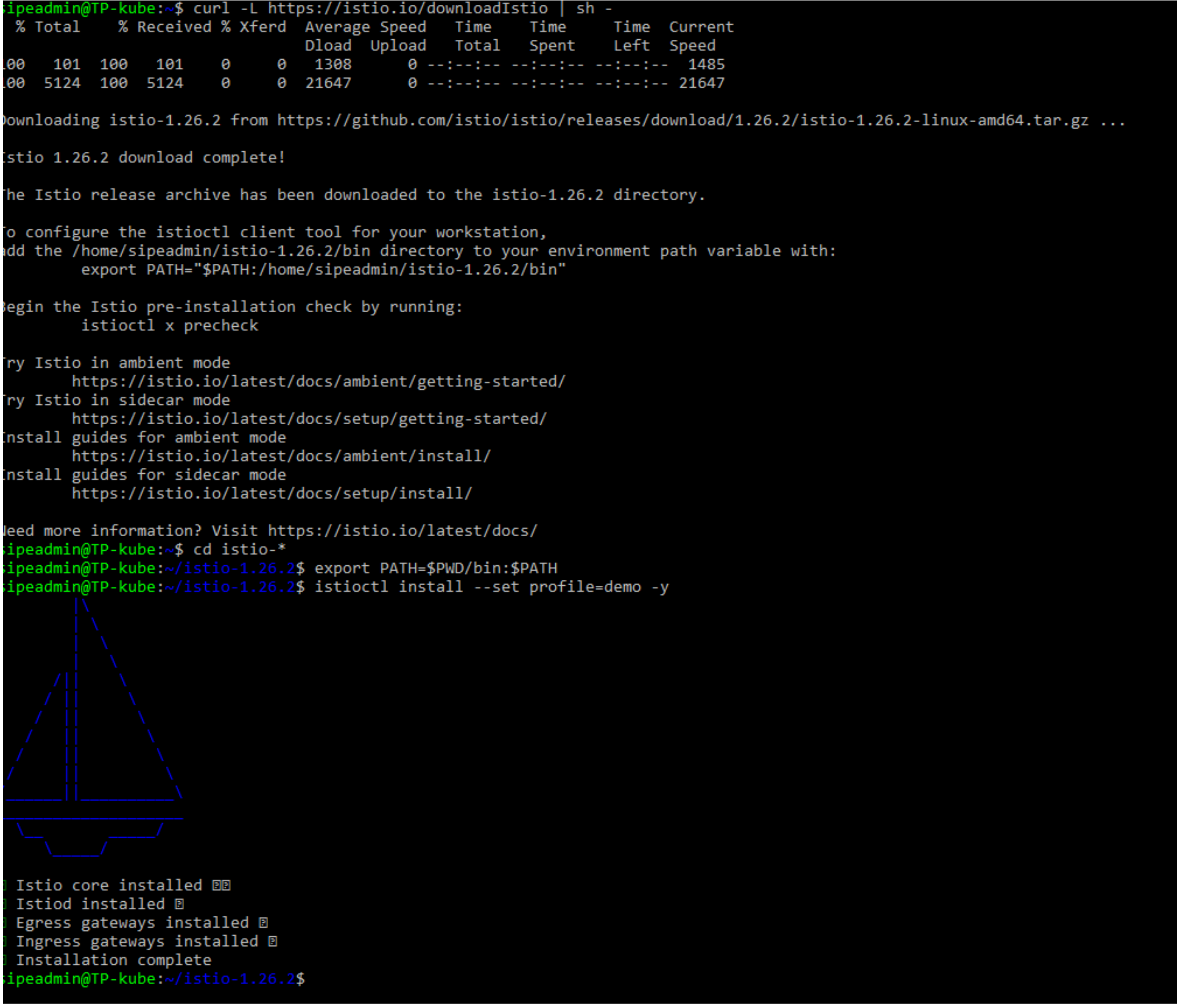
VII - Service MESH avec ISTIO

On télécharge
l'application



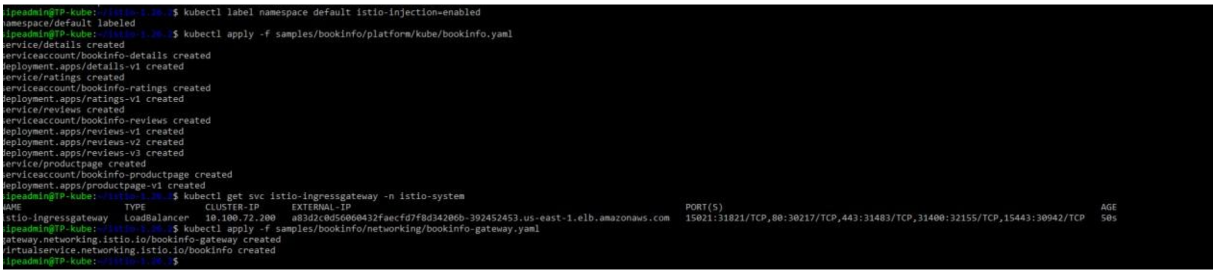
```
sipeadmin@CYRION-SRV-TF01:~/hello-kubernetes$ curl -L https://istio.io/downloadIstio | sh -
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   101  100   101    0     0   1759      0 --:--:-- --:--:-- --:--:--  1771
100  5124  100  5124    0     0  25275      0 --:--:-- --:--:-- --:--:--     0

Downloading istio-1.26.2 from https://github.com/istio/istio/releases/download/1.26.2/istio-1.26.2-linux
-amd64.tar.gz ...

Istio 1.26.2 download complete!
```

Déploiment de l'application



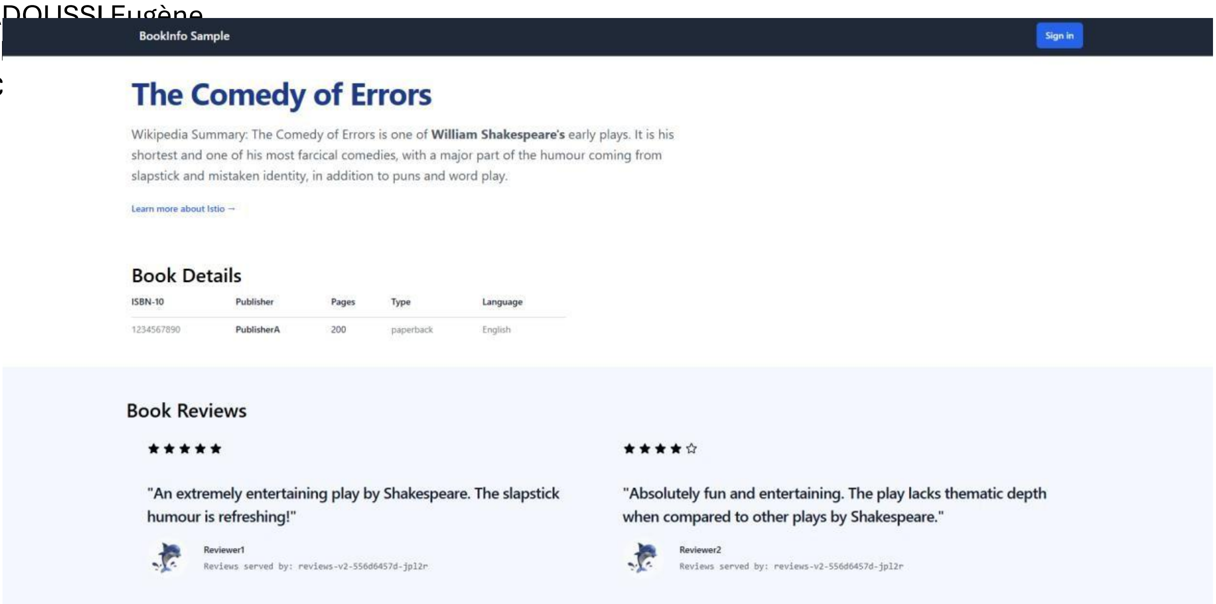
```
ipeadmin@TP-kube:~$ curl -L https://istio.io/downloadIstio | sh -
 % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                Dload  Upload   Total   Spent    Left  Speed
00   101  100   101    0     0   1308      0 --:--:-- --:--:-- --:--:--  1485
00  5124  100  5124    0     0  21647      0 --:--:-- --:--:-- --:--:-- 21647

ownloading istio-1.26.2 from https://github.com/istio/istio/releases/download/1.26.2/istio-1.26.2-linux-amd64.tar.gz ...

stio 1.26.2 download complete!

he Istio release archive has been downloaded to the istio-1.26.2 directory.

o configure the istioctl client tool for your workstation,
dd the /home/sipeadmin/istio-1.26.2/bin directory to your environment path variable with:
        export PATH="$PATH:/home/sipeadmin/istio-1.26.2/bin"

egin the Istio pre-installation check by running:
        istioctl x precheck

ry Istio in ambient mode
       https://istio.io/latest/docs/ambient/getting-started/
ry Istio in sidecar mode
       https://istio.io/latest/docs/setup/getting-started/
nstall guides for ambient mode
       https://istio.io/latest/docs/ambient/install/
nstall guides for sidecar mode
       https://istio.io/latest/docs/setup/install/

eed more information? Visit https://istio.io/latest/docs/
ipeadmin@TP-kube:~$ cd istio-*
ipeadmin@TP-kube:~/istio-1.26.2$ export PATH=$PWD/bin:$PATH
ipeadmin@TP-kube:~/istio-1.26.2$ istioctl install --set profile=demo -y
        |\
        | \
        |  \
        |   \
      /||    \
     / ||     \
    /  ||      \
   /   ||       \
  /    ||        \
 /     ||         \
/______||__________\
____________________
  \__       _____/
     \_____/

 Istio core installed □□
 Istiod installed □
 Egress gateways installed □
 Ingress gateways installed □
 Installation complete
ipeadmin@TP-kube:~/istio-1.26.2$
```

On applique le manifeste Bookinfo et configure Gateway + VirtualService



```
ipeadmin@TP-kube:~/istio-1.26.2$ kubectl label namespace default istio-injection=enabled
amespace/default labeled
ipeadmin@TP-kube:~/istio-1.26.2$ kubectl apply -f samples/bookinfo/platform/kube/bookinfo.yaml
ervice/details created
erviceaccount/bookinfo-details created
eployment.apps/details-v1 created
ervice/ratings created
erviceaccount/bookinfo-ratings created
eployment.apps/ratings-v1 created
ervice/reviews created
erviceaccount/bookinfo-reviews created
eployment.apps/reviews-v1 created
eployment.apps/reviews-v2 created
eployment.apps/reviews-v3 created
ervice/productpage created
erviceaccount/bookinfo-productpage created
eployment.apps/productpage-v1 created
ipeadmin@TP-kube:~/istio-1.26.2$ kubectl get svc istio-ingressgateway -n istio-system
AME                   TYPE           CLUSTER-IP      EXTERNAL-IP                                                                PORT(S)                                                                      AGE
stio-ingressgateway   LoadBalancer   10.100.72.200   a83d2c0d56060432faecfd7f8d34206b-392452453.us-east-1.elb.amazonaws.com   15021:31821/TCP,80:30217/TCP,443:31483/TCP,31400:32155/TCP,15443:30942/TCP   50s
ipeadmin@TP-kube:~/istio-1.26.2$ kubectl apply -f samples/bookinfo/networking/bookinfo-gateway.yaml
ateway.networking.istio.io/bookinfo-gateway created
irtualservice.networking.istio.io/bookinfo created
ipeadmin@TP-kube:~/istio-1.26.2$
```

On a ici la preuve que l’application Bookinfo fonctionne via l’URL du LoadBalancer avec ces différentes versions et varations.



The Comedy of Errors

Wikipedia Summary: The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

Learn more about Istio →

Book Details

ISBN-10	Publisher	Pages	Type	Language
1234567890	PublisherA	200	paperback	English

Book Reviews

★★★★★

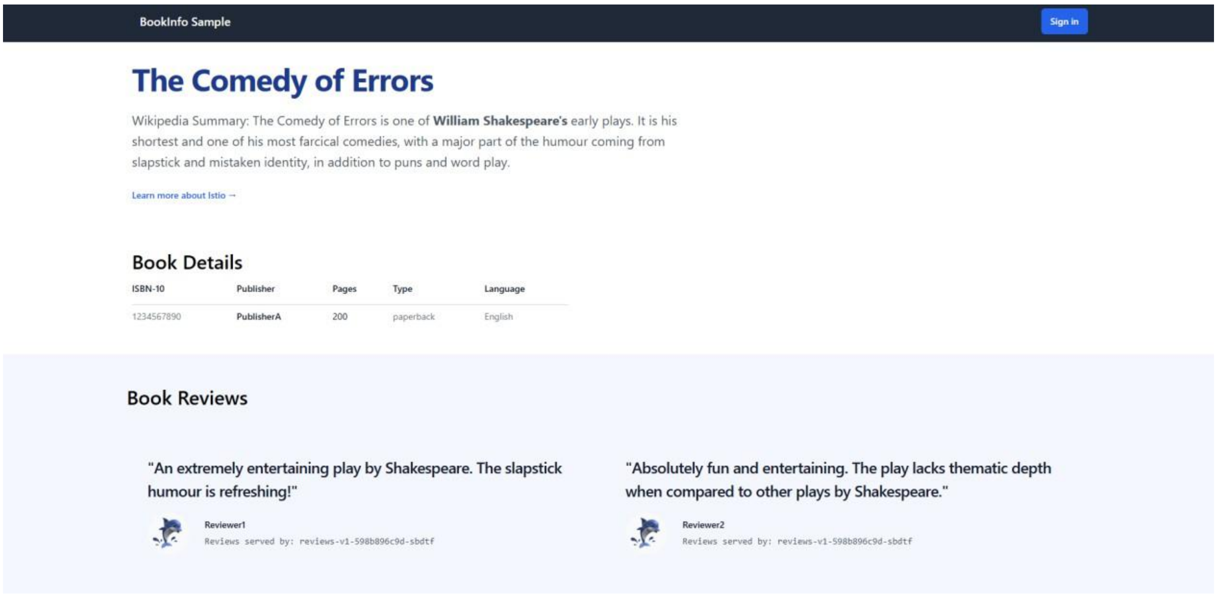
"An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!"

Reviewer1
Reviews served by: reviews-v2-556d6457d-jpl2r

★★★★☆

"Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare."

Reviewer2
Reviews served by: reviews-v2-556d6457d-jpl2r



The Comedy of Errors

Wikipedia Summary: The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

Learn more about Istio →

Book Details

ISBN-10	Publisher	Pages	Type	Language
1234567890	PublisherA	200	paperback	English

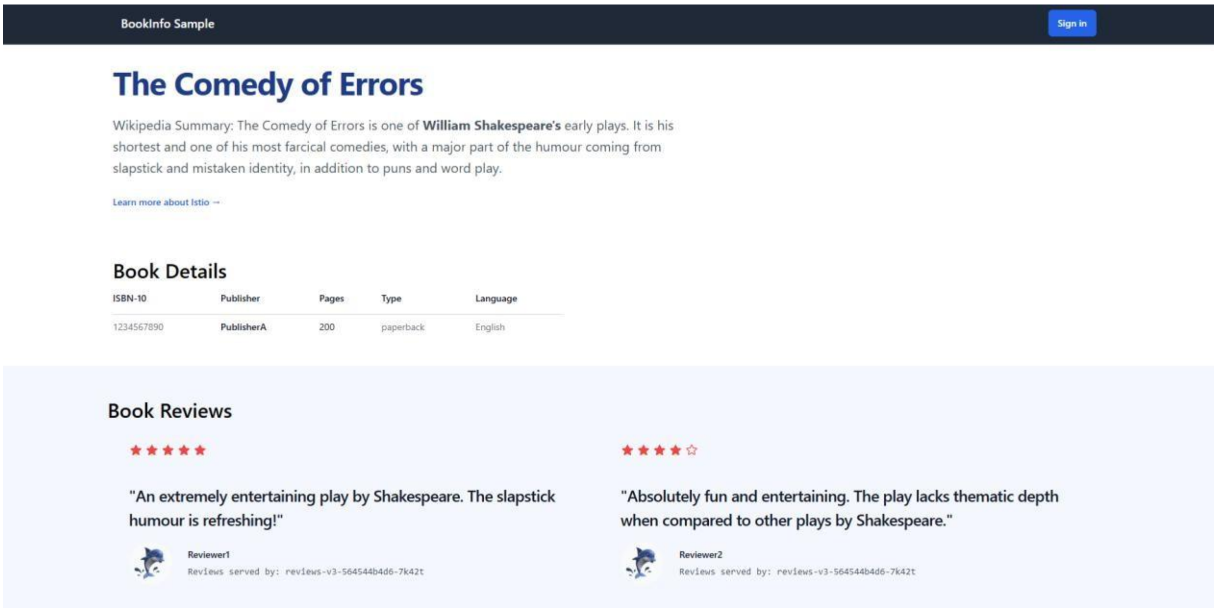
Book Reviews

"An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!"

Reviewer1
Reviews served by: reviews-v1-598b896c9d-sbdtf

"Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare."

Reviewer2
Reviews served by: reviews-v1-598b896c9d-sbdtf



The Comedy of Errors

Wikipedia Summary: The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

Learn more about Istio →

Book Details

ISBN-10	Publisher	Pages	Type	Language
1234567890	PublisherA	200	paperback	English

Book Reviews

★★★★★

"An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!"

Reviewer1
Reviews served by: reviews-v3-564544b4d6-7k42t

★★★★☆

"Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare."

Reviewer2
Reviews served by: reviews-v3-564544b4d6-7k42t

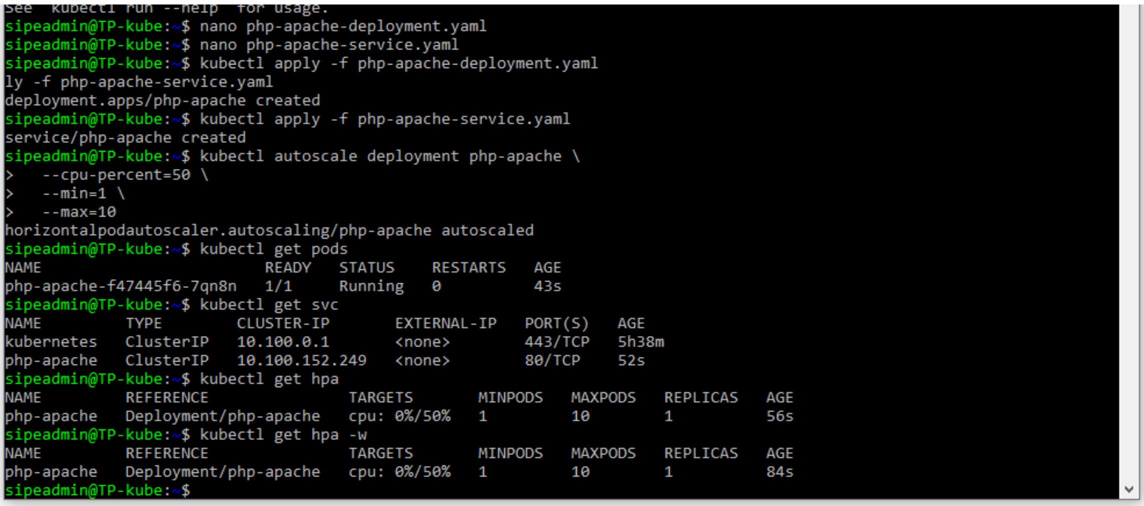
5SRC1
Groupe 8
ADOUSSI Eugène
FIKARA Imad
CADIRY William

ISTIO permet de contrôler les requêtes circulant entre les micro-services et peut aussi chiffrer les requêtes.

VIII - Illustration HPA

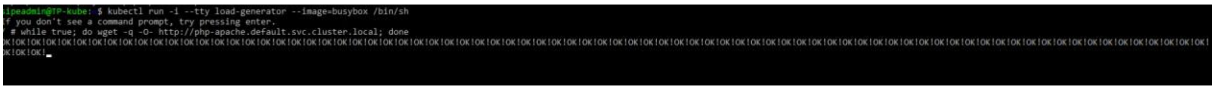
On a déployé un HPA pour php-apache, qui scale automatiquement nos pods en réponse à la charge CPU. Puis on a atteint jusqu'à 9 réplicas, ce qui prouve que l'autoscaling fonctionne parfaitement.

Déploiement initial :



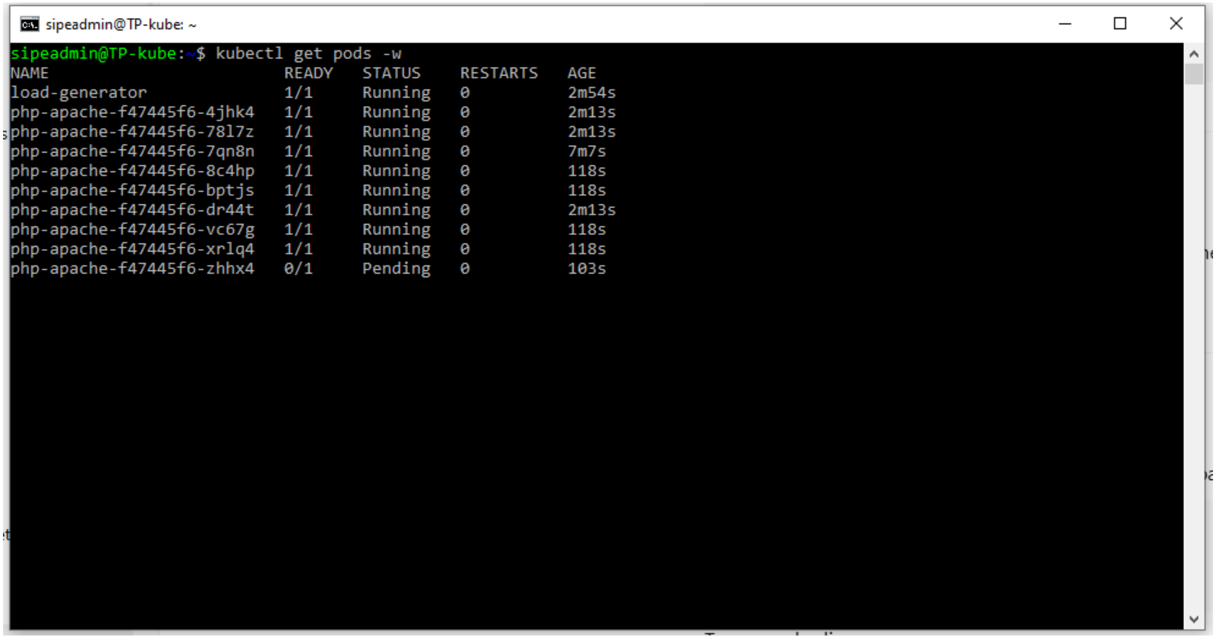
```
See  kubectl run --help  for usage.
sipeadmin@TP-kube:~$ nano php-apache-deployment.yaml
sipeadmin@TP-kube:~$ nano php-apache-service.yaml
sipeadmin@TP-kube:~$ kubectl apply -f php-apache-deployment.yaml
ly -f php-apache-service.yaml
deployment.apps/php-apache created
sipeadmin@TP-kube:~$ kubectl apply -f php-apache-service.yaml
service/php-apache created
sipeadmin@TP-kube:~$ kubectl autoscale deployment php-apache \
>   --cpu-percent=50 \
>   --min=1 \
>   --max=10
horizontalpodautoscaler.autoscaling/php-apache autoscaled
sipeadmin@TP-kube:~$ kubectl get pods
NAME                         READY   STATUS    RESTARTS   AGE
php-apache-f47445f6-7qn8n    1/1     Running   0          43s
sipeadmin@TP-kube:~$ kubectl get svc
NAME         TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)   AGE
kubernetes   ClusterIP   10.100.0.1       <none>        443/TCP   5h38m
php-apache   ClusterIP   10.100.152.249   <none>        80/TCP    52s
sipeadmin@TP-kube:~$ kubectl get hpa
NAME         REFERENCE               TARGETS       MINPODS   MAXPODS   REPLICAS   AGE
php-apache   Deployment/php-apache   cpu: 0%/50%   1         10        1          56s
sipeadmin@TP-kube:~$ kubectl get hpa -w
NAME         REFERENCE               TARGETS       MINPODS   MAXPODS   REPLICAS   AGE
php-apache   Deployment/php-apache   cpu: 0%/50%   1         10        1          84s
sipeadmin@TP-kube:~$
```

Mise en place du HPA :



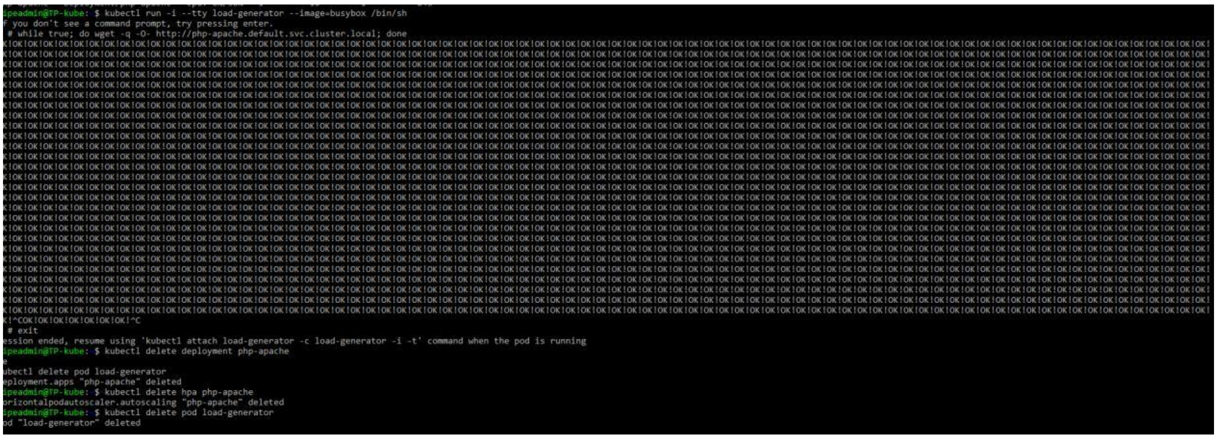
```
ipeadmin@TP-kube:~$ kubectl run -i --tty load-generator --image=busybox /bin/sh
f you don't see a command prompt, try pressing enter.
/ # while true; do wget -q -O- http://php-apache.default.svc.cluster.local; done
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!
```

Scaling des pods sous charge :



sipeadmin@TP-kube: ~

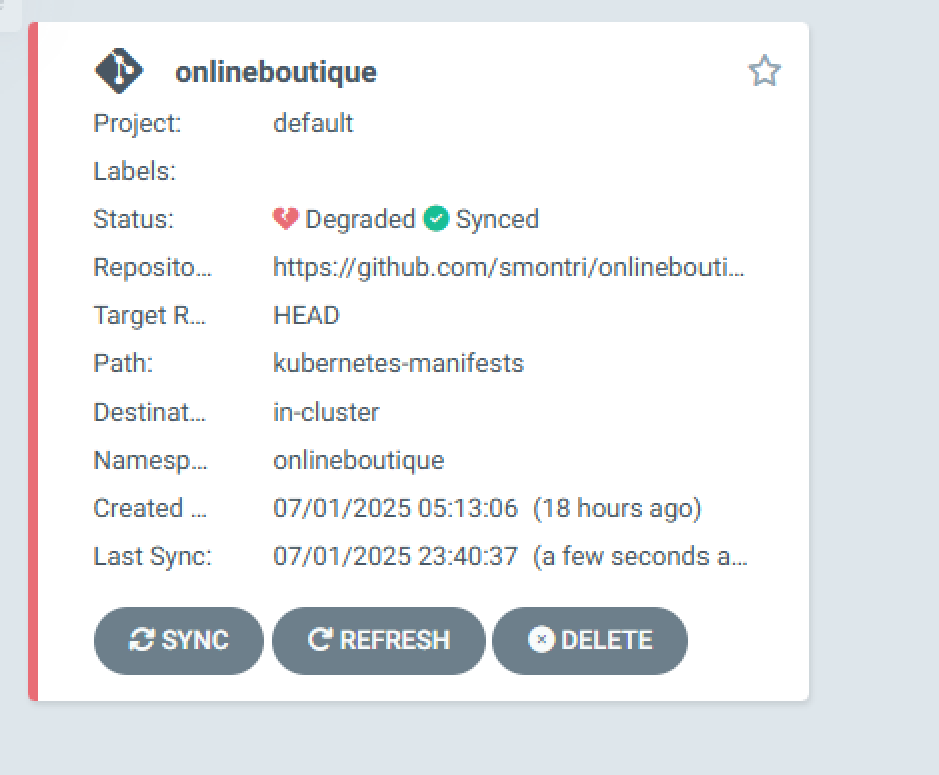
```
sipeadmin@TP-kube:~$ kubectl get pods -w
NAME                         READY   STATUS    RESTARTS   AGE
load-generator               1/1     Running   0          2m54s
php-apache-f47445f6-4jhk4    1/1     Running   0          2m13s
php-apache-f47445f6-78l7z    1/1     Running   0          2m13s
php-apache-f47445f6-7qn8n    1/1     Running   0          7m7s
php-apache-f47445f6-8c4hp    1/1     Running   0          118s
php-apache-f47445f6-bptjs    1/1     Running   0          118s
php-apache-f47445f6-dr44t    1/1     Running   0          2m13s
php-apache-f47445f6-vc67g    1/1     Running   0          118s
php-apache-f47445f6-xrlq4    1/1     Running   0          118s
php-apache-f47445f6-zhhx4    0/1     Pending   0          103s
```



```
ipeadmin@TP-kube: $ kubectl run -i --tty load-generator --image=busybox /bin/sh
f you don't see a command prompt, try pressing enter.
 # while true; do wget -q -O- http://php-apache.default.svc.cluster.local; done
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!OK!
K!^COK!OK!OK!OK!OK!OK!OK!^C
 # exit
ession ended, resume using 'kubectl attach load-generator -c load-generator -i -t' command when the pod is running
ipeadmin@TP-kube: $ kubectl delete deployment php-apache
e
ubectl delete pod load-generator
eployment.apps "php-apache" deleted
ipeadmin@TP-kube: $ kubectl delete hpa php-apache
orizontalpodautoscaler.autoscaling "php-apache" deleted
ipeadmin@TP-kube: $ kubectl delete pod load-generator
od "load-generator" deleted
```

IX - Application onlineboutique via ArgoCD

L'application ArgoCD est créée et synchronisée :



onlineboutique

Project: default

Labels:

Status: Degraded Synced

Reposito... https://github.com/smontri/onlinebouti...

Target R... HEAD

Path: kubernetes-manifests

Destinat... in-cluster

Namesp... onlineboutique

Created ... 07/01/2025 05:13:06 (18 hours ago)

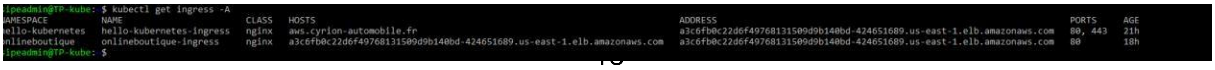
Last Sync: 07/01/2025 23:40:37 (a few seconds a...

Ingress configurés :

hello-kubernetes → aws.cyrion

automobile.fr onlineboutique → ELB AWS

Preuve des hôtes et ports configurés :



```
ipeadmin@TP-kube: $ kubectl get ingress -A
AMESPACE          NAME                       CLASS   HOSTS                                                                       ADDRESS                                                                     PORTS     AGE
ello-kubernetes   hello-kubernetes-ingress   nginx   aws.cyrion-automobile.fr                                                    a3c6fb0c22d6f49768131509d9b140bd-424651689.us-east-1.elb.amazonaws.com   80, 443   21h
nlineboutique     onlineboutique-ingress     nginx   a3c6fb0c22d6f49768131509d9b140bd-424651689.us-east-1.elb.amazonaws.com   a3c6fb0c22d6f49768131509d9b140bd-424651689.us-east-1.elb.amazonaws.com   80        18h
ipeadmin@TP-kube: $
```