1. Triển khai Kubernetes

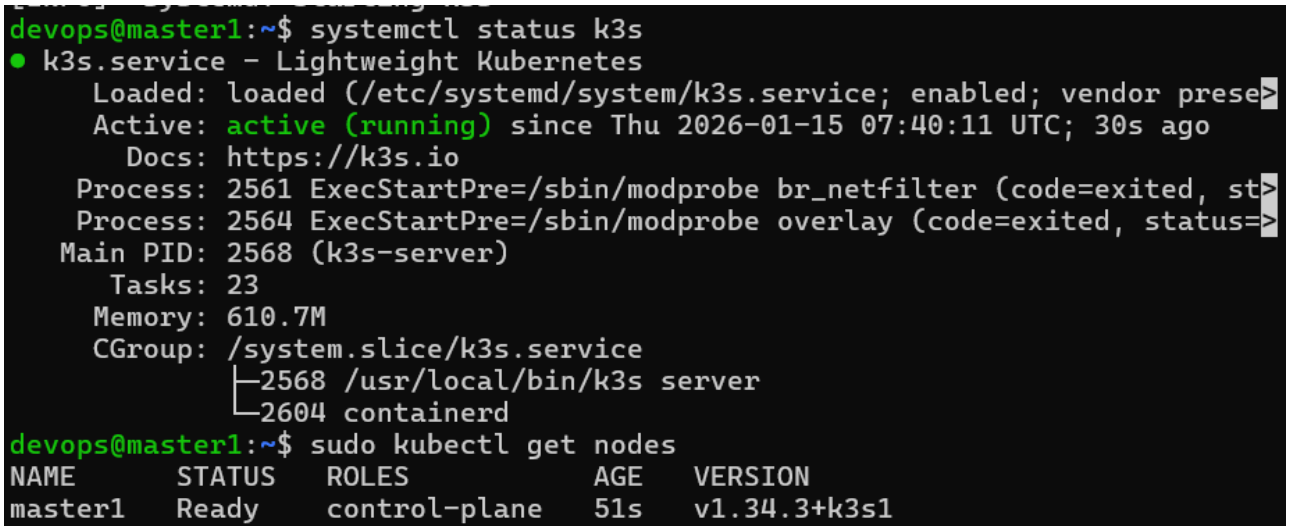
- Triển khai một Kubernetes Cluster gồm 1 Master node và 1 Worker node trên nền tảng Ubuntu 22.04.
- Lựa chọn triển khai **K3s – Lightweight Kubernetes**
- Mô hình hệ thống chuẩn bị:

Node	Vai trò	Hệ điều hành	IP
master1	K3s Server	Ubuntu 22.04	192.168.126.102
worker	K3S Worker	Ubuntu 22.04	192.168.126.100

- Cài đặt cơ bản:

```
sudo apt update -y
sudo apt install -y curl
```

- Cài đặt K3s (Master node):
  - SSH vào master node: `ssh devops@192.168.126.102`
  - Cài đặt K3s: `curl -sfL https://get.k3s.io | sh`
  - Kiểm tra trạng thái: `systemctl status k3s`
  - Kiểm tra node: `sudo kubectl get nodes`



  - Lấy token để join Worker `sudo cat /var/lib/rancher/k3s/server/node-token`

- Cài đặt K3s Agent (Worker node):
  - SSH vào worker node `ssh worker@192.168.126.100`
  - Join worker vào cluster

```
worker@worker:~$ curl -sfL https://get.k3s.io | \
> K3S_URL=https://192.168.126.102:6443 \
> K3S_TOKEN=f7e64011be0879d362fded79497fef43 \
> sh -
[INFO]  Finding release for channel stable
[INFO]  Using v1.34.3+k3s1 as release
[INFO]  Downloading hash https://github.com/k3s-io/k3s/releases/download/v1.
34.3+k3s1/sha256sum-amd64.txt
[INFO]  Downloading binary https://github.com/k3s-io/k3s/releases/download/v
1.34.3+k3s1/k3s
[INFO]  Verifying binary download
[INFO]  Installing k3s to /usr/local/bin/k3s
[INFO]  Skipping installation of SELinux RPM
[INFO]  Creating /usr/local/bin/kubectl symlink to k3s
[INFO]  Skipping /usr/local/bin/crictl symlink to k3s, already exists
[INFO]  Skipping /usr/local/bin/ctr symlink to k3s, already exists
[INFO]  Creating killall script /usr/local/bin/k3s-killall.sh
[INFO]  Creating uninstall script /usr/local/bin/k3s-agent-uninstall.sh
[INFO]  env: Creating environment file /etc/systemd/system/k3s-agent.service
.env
[INFO]  systemd: Creating service file /etc/systemd/system/k3s-agent.service
[INFO]  systemd: Enabling k3s-agent unit
Created symlink /etc/systemd/system/multi-user.target.wants/k3s-agent.servic
e → /etc/systemd/system/k3s-agent.service.
[INFO]  systemd: Starting k3s-agent
```

- Kiểm tra trạng thái: `sudo kubectl get nodes -o wide`

```
devops@master1:~$ sudo kubectl get nodes -o wide
NAME      STATUS   ROLES           AGE     VERSION        INTERNAL-IP       EXTERNAL-IP   OS-IMAGE             KERNEL-VERSION      CONTAINER-RUNTIME
master1   Ready    control-plane   7m44s   v1.34.3+k3s1   192.168.126.102   <none>        Ubuntu 20.04.6 LTS   5.4.0-216-generic   containerd://2.1.5-k3s1
worker    Ready    <none>          27s     v1.34.3+k3s1   192.168.126.100   <none>        Ubuntu 20.04.6 LTS   5.4.0-216-generic   containerd://2.1.5-k3s1
devops@master1:~$ sudo kubectl get pods -A -o wide
NAMESPACE     NAME                                      READY   STATUS      RESTARTS   AGE   IP           NODE      NOMINATED NODE   READINESS GATES
kube-system   coredns-7f496c8d7d-8cxnf                  1/1     Running     0          35m   10.42.0.4    master1   <none>           <none>
kube-system   helm-install-traefik-4gx94                0/1     Completed   2          35m   10.42.0.3    master1   <none>           <none>
kube-system   helm-install-traefik-crd-8p2m7            0/1     Completed   0          35m   10.42.0.2    master1   <none>           <none>
kube-system   local-path-provisioner-578895bd58-chpsd   1/1     Running     0          35m   10.42.0.6    master1   <none>           <none>
kube-system   metrics-server-7b9c9c4b9c-bcsfs           1/1     Running     0          35m   10.42.0.5    master1   <none>           <none>
kube-system   svclb-traefik-0a3c4d2d-6lggn              2/2     Running     0          33m   10.42.0.7    master1   <none>           <none>
kube-system   svclb-traefik-0a3c4d2d-sw9f8              2/2     Running     0          28m   10.42.1.2    worker    <none>           <none>
kube-system   traefik-6f5f87584-8hqg4                   1/1     Running     0          33m   10.42.0.8    master1   <none>           <none>
devops@master1:~$
```

2. Triển khai web application sử dụng các DevOps tools & practices

K8S Helm Chart (1.5đ)

2.1. Yêu cầu 1

- **Cài đặt ArgoCD** lên Kubernetes Cluster, expose được qua ArgoCD qua NodePort
  - Tạo namespace và triển khai bằng cách áp dụng các file từ chính kho lưu trưc của dự án Argi Project:

```
kubectl create namespace argocd

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

```
devops@master1:~/k8s-practice/lab6$ kubectl create namespace argocd
namespace/argocd created
devops@master1:~/k8s-practice/lab6$ kubectl apply -n argocd -f https://raw.githubusercontent.com/argop
roj/argo-cd/stable/manifests/install.yaml
customresourcedefinition.apiextensions.k8s.io/applications.argoproj.io created
customresourcedefinition.apiextensions.k8s.io/applicationsets.argoproj.io created
customresourcedefinition.apiextensions.k8s.io/appprojects.argoproj.io created
serviceaccount/argocd-application-controller created
serviceaccount/argocd-applicationset-controller created
serviceaccount/argocd-dex-server created
serviceaccount/argocd-notifications-controller created
serviceaccount/argocd-redis created
serviceaccount/argocd-repo-server created
serviceaccount/argocd-server created
role.rbac.authorization.k8s.io/argocd-application-controller created
role.rbac.authorization.k8s.io/argocd-applicationset-controller created
role.rbac.authorization.k8s.io/argocd-dex-server created
role.rbac.authorization.k8s.io/argocd-notifications-controller created
role.rbac.authorization.k8s.io/argocd-redis created
role.rbac.authorization.k8s.io/argocd-server created
clusterrole.rbac.authorization.k8s.io/argocd-application-controller created
clusterrole.rbac.authorization.k8s.io/argocd-applicationset-controller created
clusterrole.rbac.authorization.k8s.io/argocd-server created
rolebinding.rbac.authorization.k8s.io/argocd-application-controller created
rolebinding.rbac.authorization.k8s.io/argocd-applicationset-controller created
rolebinding.rbac.authorization.k8s.io/argocd-dex-server created
rolebinding.rbac.authorization.k8s.io/argocd-notifications-controller created
rolebinding.rbac.authorization.k8s.io/argocd-redis created
rolebinding.rbac.authorization.k8s.io/argocd-server created
clusterrolebinding.rbac.authorization.k8s.io/argocd-application-controller created
clusterrolebinding.rbac.authorization.k8s.io/argocd-applicationset-controller created
clusterrolebinding.rbac.authorization.k8s.io/argocd-server created
configmap/argocd-cm created
configmap/argocd-cmd-params-cm created
configmap/argocd-gpg-keys-cm created
configmap/argocd-notifications-cm created
configmap/argocd-rbac-cm created
configmap/argocd-ssh-known-hosts-cm created
configmap/argocd-tls-certs-cm created
secret/argocd-notifications-secret created
```

```
pod "argocd-server-57b47b59b6-ccmnm" deleted from argocd namespace
devops@master1:~$ kubectl get pods -n argocd
NAME                                                READY   STATUS    RESTARTS   AGE
argocd-application-controller-0                     1/1     Running   0          2m48s
argocd-applicationset-controller-7d97f7b47d-ph842   1/1     Running   0          3m31s
argocd-dex-server-657f5854c4-vhpsj                  1/1     Running   0          3m29s
argocd-notifications-controller-799d98bf9f-xntqb    1/1     Running   0          3m20s
argocd-redis-5b69b8d789-phg8p                       1/1     Running   0          3m14s
argocd-repo-server-569b656c5-mh4wc                  1/1     Running   0          3m2s
argocd-server-57b47b59b6-p4jnf                      1/1     Running   0          2m48s
```

- Expose qua NodePort

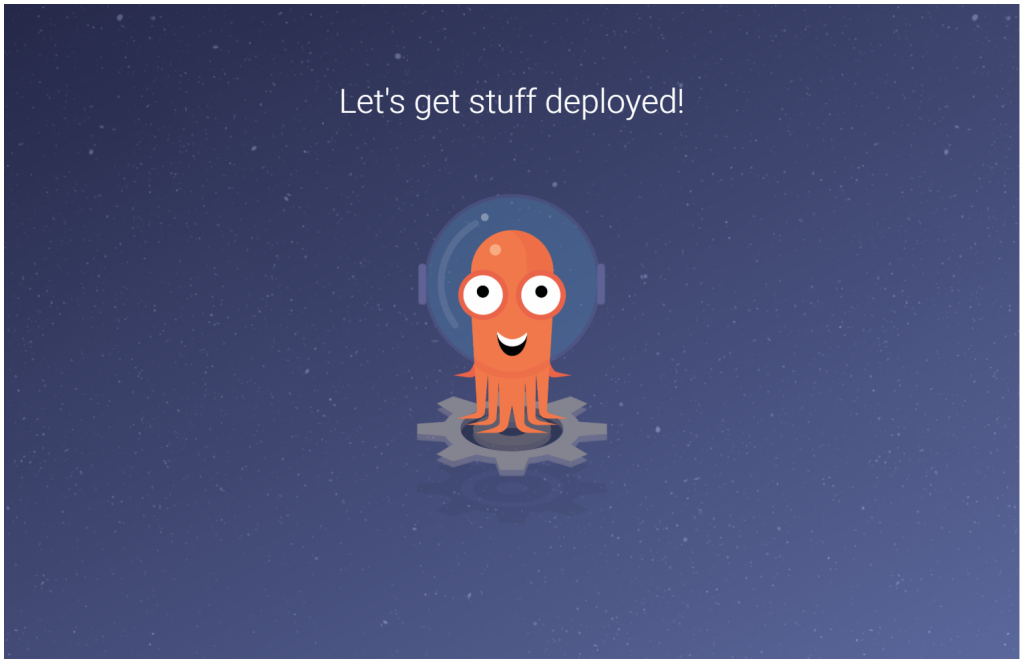
```
kubectl patch svc argocd-server -n argocd -p '{"spec":{"type":"NodePort"}}'
```

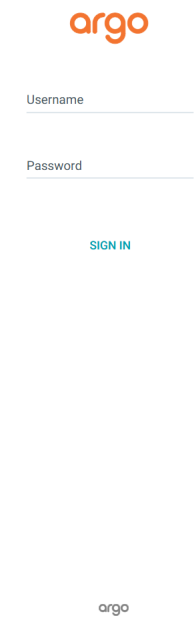
```
devops@master1:~$ kubectl patch svc argocd-server -n argocd -p '{"spec":{"type":"NodePort"}}'
service/argocd-server patched
devops@master1:~$ kubectl get svc argocd-server -n argocd
NAME            TYPE       CLUSTER-IP    EXTERNAL-IP   PORT(S)                      AGE
argocd-server   NodePort   10.43.95.34   <none>        80:32436/TCP,443:32607/TCP   18m
```

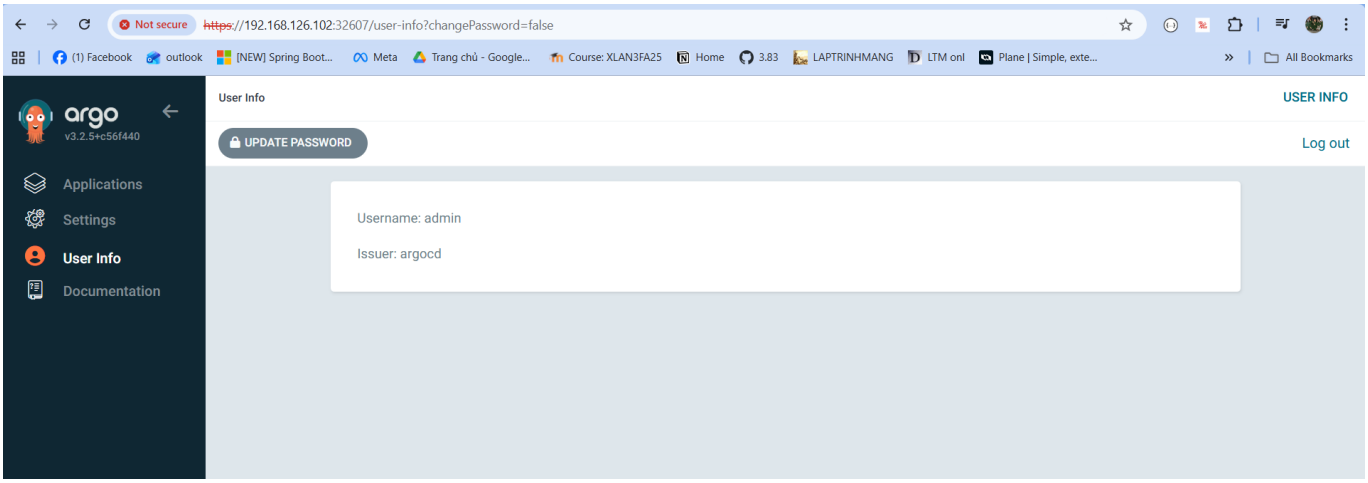
- Lấy mật khẩu:

```
kubectl -n argocd get secret argocd-initial-admin-secret -o jsonpath="
{.data.password}" | base64 -d
```

- Kết quả:







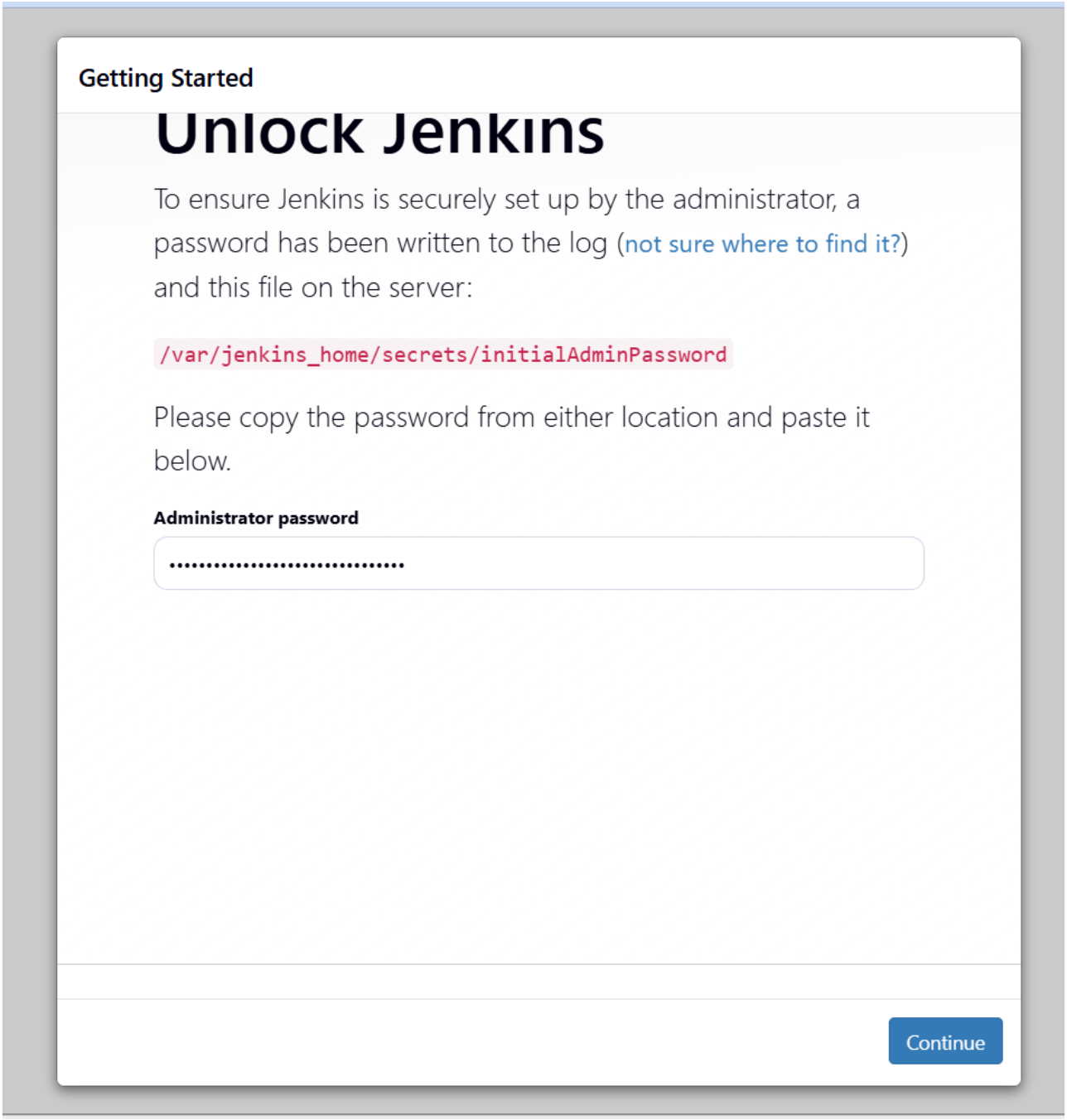
- **Cài đặt Jenkins** lên Kubernetes Cluster, expose được Jenkins qua NodePort
  - Cài đặt và triển khai:

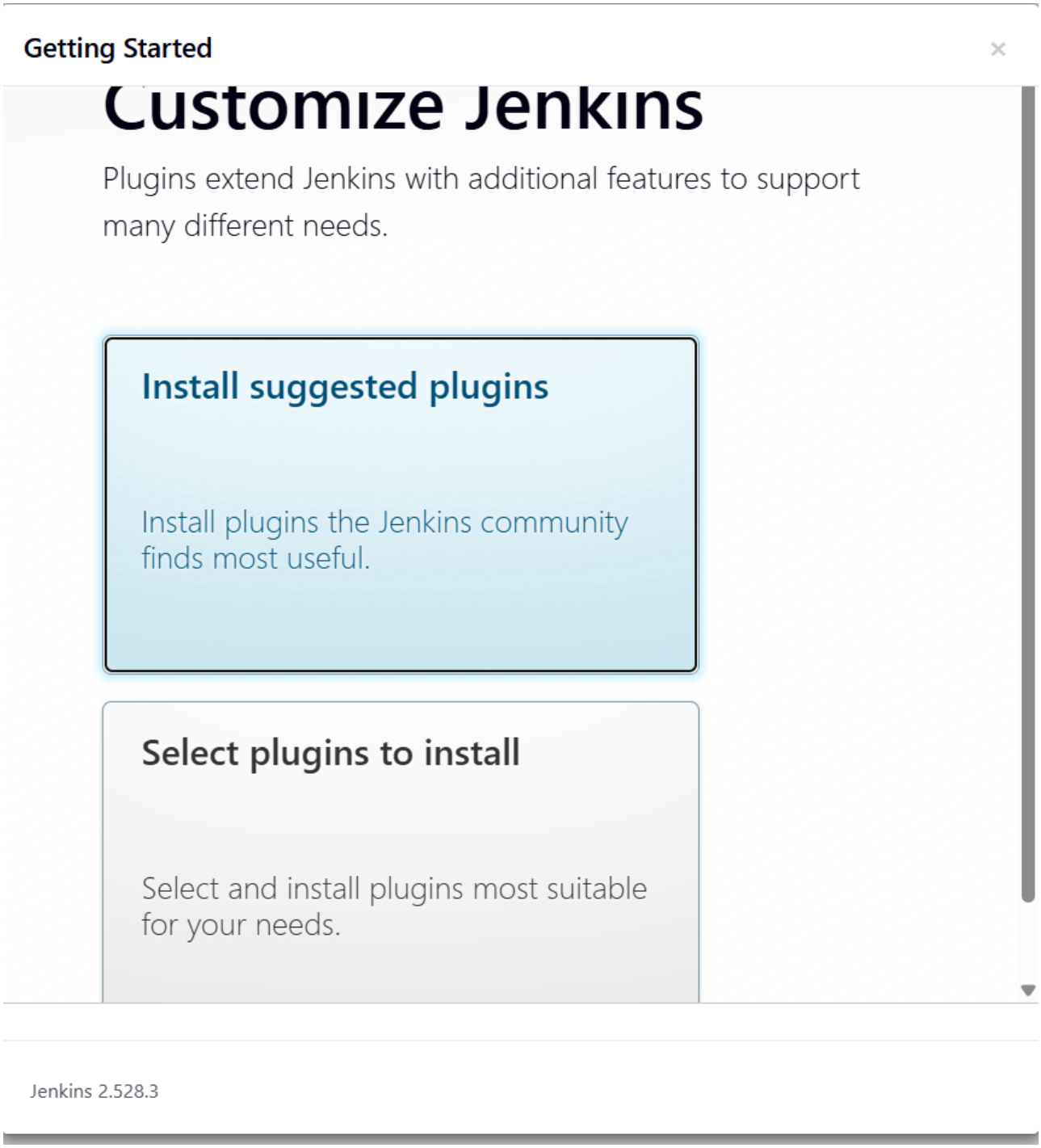
```
kubectl apply -f jenkins/jenkins_namespace.yml
```

  - Lấy mật khẩu:

```
kubectl exec -it jenkins-5dd88f7bf9-7vtvp -n jenkins -- cat
/var/jenkins_home/secrets/initialAdminPassword
```

```
devops@master1:~$ kubectl exec -it jenkins-5dd88f7bf9-7vtvp -n jenkins -- cat /var/jenkins_home/secrets/initialAdminPassword
fb4e2e37053e4070943132 4f6f0c5060
devops@master1:~$
```





2.2. Yêu cầu 2

- **Source code & Helm Chart:** fhcoffee_v2
- **Config Repo:** fh-coffee-config
- Cài đặt Helm Chart:

```
curl -fsSL -o get_helm.sh
https://raw.githubusercontent.com/helm/helm/main/scripts/get-helm-3

chmod 700 get_helm.sh

./get_helm.sh
```

```
helm version
```

- Khởi tạo cấu trúc

```
mkdir -p ~/k8s-practice/cuoikhoa/fhcoffee_v2/charts

cd ~/k8s-practice/cuoikhoa/fhcoffee_v2/charts

helm create fh-coffee-chart
```

- Kiểm tra các cú pháp trong heml:

```
helm lint fh-coffee-chart/
helm template fh-coffee ./fh-coffee-chart
```

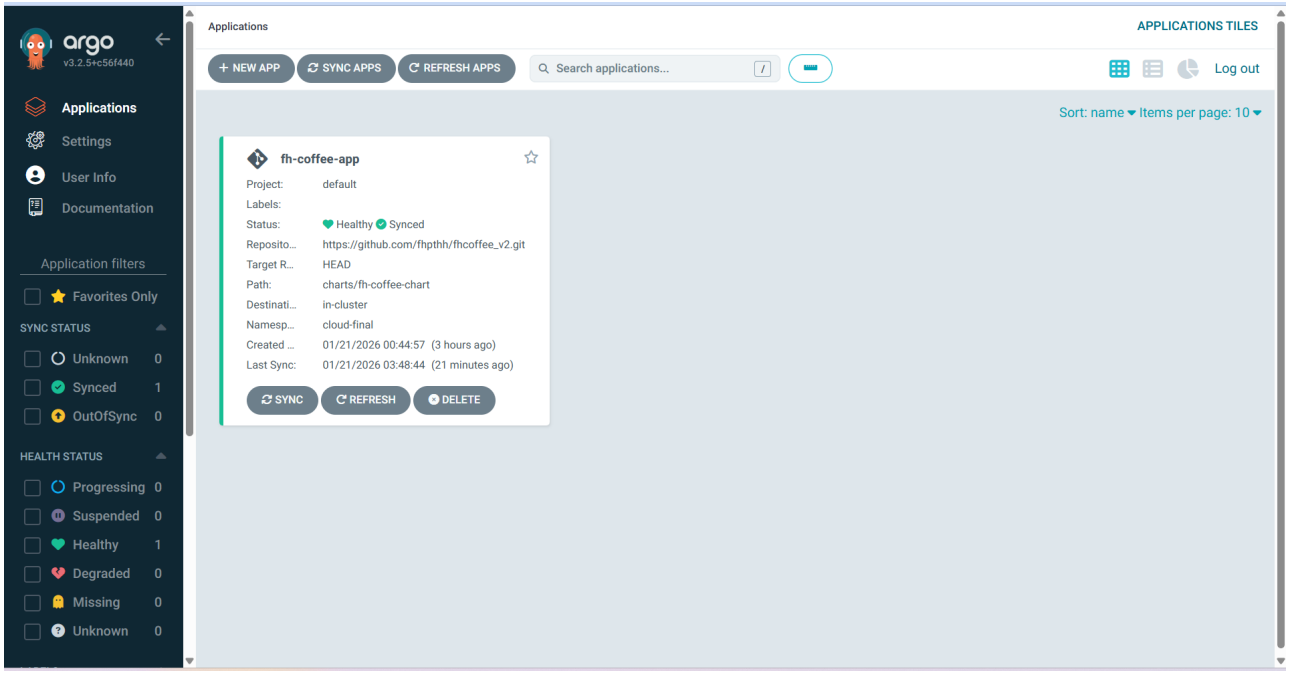
- File Manifest ArgoCD Application:

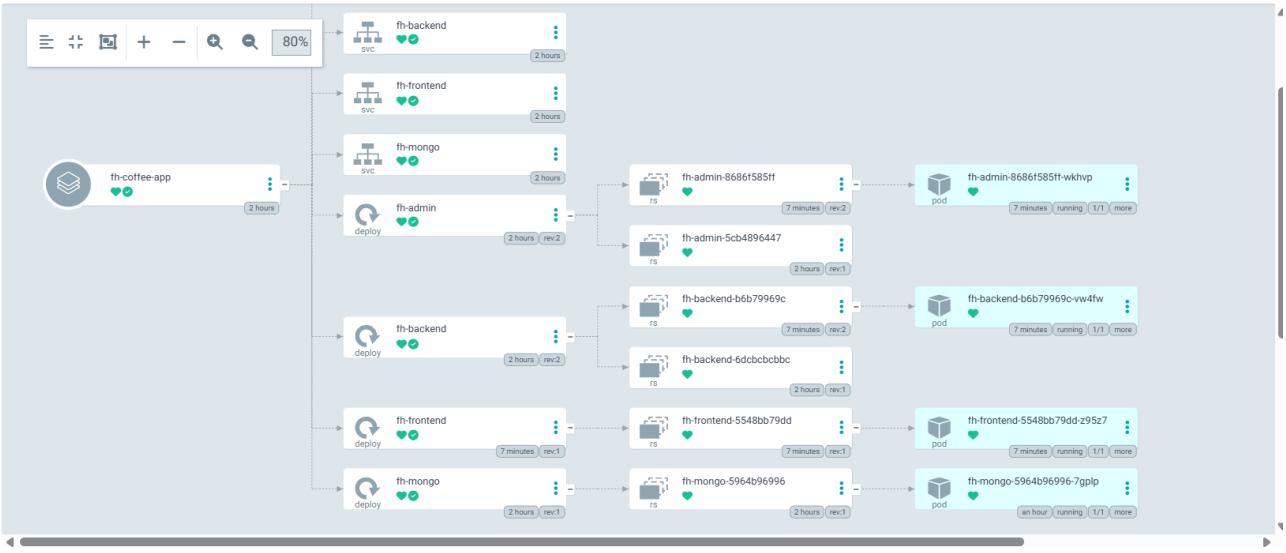
```
apiVersion: argoproj.io/v1alpha1
kind: Application
metadata:
  name: fh-coffee-app
  namespace: argocd
spec:
  project: default
  sources:
    - repoURL: 'https://github.com/fhpthh/fhcoffee_v2.git'
      targetRevision: HEAD
      path: charts/fh-coffee-chart
      helm:
        valueFiles:
          - $values/values-prod.yaml
    - repoURL: 'https://github.com/fhpthh/fh-coffee-config.git'
      targetRevision: HEAD
      ref: values
  destination:
    server: 'https://kubernetes.default.svc'
    namespace: cloud-final
  syncPolicy:
    automated:
      prune: true
      selfHeal: true
    syncOptions:
      - CreateNamespace=true
```

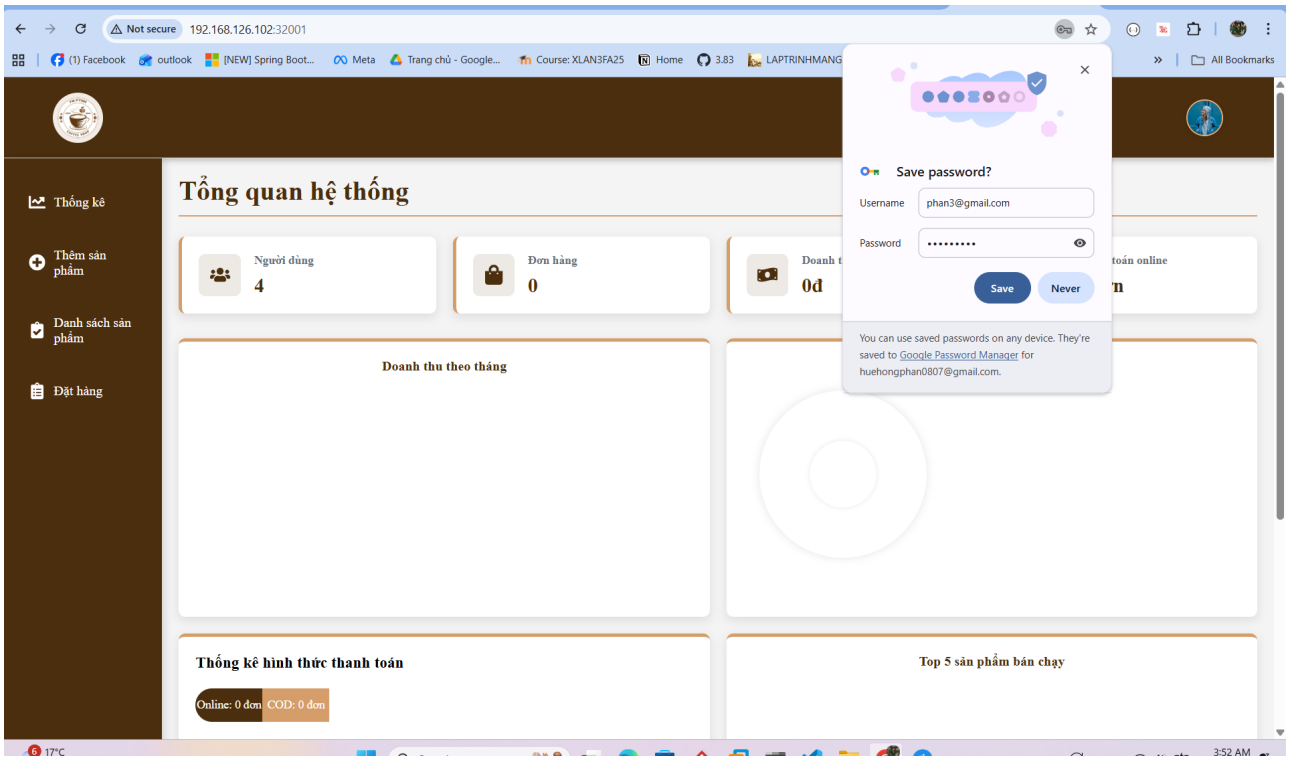
  - Để chạy Helm Chart:

```
kubectl apply -f application.yaml
```

Kết quả:





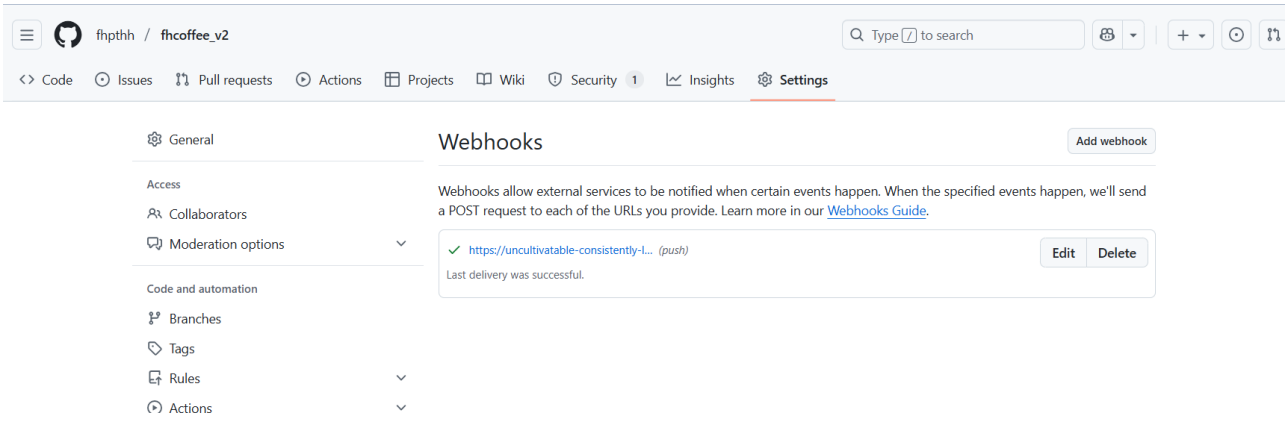


CI/CD

- Trigger:
  - Đổi http sang https để add vào webhook trên github

```
ngrok http 192.168.126.100:32080
```

```
ngrok                                                    (Ctrl+C to quit)

⚠ Free Users: Agents ≤3.19.x stop connecting 2/17/26. Update or upgrade: ht

Session Status                online
Account                       Phan Thi Hong Hue (Plan: Free)
Update                        update available (version 3.35.0, Ctrl-U to up
Version                       3.34.1
Region                        Asia Pacific (ap)
Latency                       168ms
Web Interface                 http://127.0.0.1:4040
Forwarding                    https://uncultivatable-consistently-lavonna.ng

Connections                   ttl     opn     rt1     rt5     p50     p90
                              1       0       0.01    0.00    34.82   34.82

HTTP Requests
-------------

09:56:04.235 UTC POST /github-webhook/         200 OK
```


fhpthh / fhcoffee_v2
Type / to search
Code
Issues
Pull requests
Actions
Projects
Wiki
Security 1
Insights
Settings
General
Access
Collaborators
Moderation options
Code and automation
Branches
Tags
Rules
Actions
Webhooks
Add webhook
Webhooks allow external services to be notified when certain events happen. When the specified events happen, we'll send a POST request to each of the URLs you provide. Learn more in our Webhooks Guide.
https://uncultivatable-consistently-l... (push)
Last delivery was successful.
Edit
Delete