

Bài tập lớn cuối kỳ chương trình VDT 2025 lĩnh vực Cloud - GĐ 1

Chi tiết đề bài

Triển khai Kubernetes (1 điểm)

Yêu cầu:

Y/c 1:

- Triển khai được Kubernetes thông qua công cụ minikube trên 1 node: 0.5 điểm

Hoặc

- Triển khai được Kubernetes thông qua công cụ kubeadm hoặc kubespray lên 1 master node VM + 1 worker node VM: 1 điểm

Output:

- Tài liệu cài đặt (công cụ gì, các file config, ...)

File: <https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/blob/main/kubeadm/README.md>

- Ánh chụp Log của các lệnh kiểm tra hệ thống như: **kubectl get nodes -o wide, kubectl get pods -A -o wide**

Master: **192.168.113.111**

Worker 1: **192.168.113.112**

Worker 2: **192.168.113.113**

Monitor and HAProxy: **192.168.111.114**

```
devops@k8s-master-1:~$ kubectl get node -o wide
NAME           STATUS    ROLES      AGE     VERSION   INTERNAL-IP     EXTERNAL-IP   OS-IMAGE          KERNEL-VERSION   CONTAINER-RUNTIME
k8s-master-1   Ready     control-plane   3d18h   v1.30.13  192.168.113.111   <none>        Ubuntu 22.04.5 LTS  5.15.0-142-generic  containerd://1.7.27
k8s-worker-1   Ready     <none>       3d18h   v1.30.13  192.168.113.112   <none>        Ubuntu 22.04.5 LTS  5.15.0-142-generic  containerd://1.7.27
k8s-worker-2   Ready     <none>       25h    v1.30.13  192.168.113.113   <none>        Ubuntu 22.04.5 LTS  5.15.0-141-generic  containerd://1.7.27
```

devops@k8s-master-1: ~		phat@k8s-worker-1: ~		phat@k8s-worker-2: ~		phat@server: ~		phat@workstation: ~	
NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE	IP	NODE	NOMINATED NODE	READINESS GATES
argocd	argocd-application-controller-0	1/1	Running	5 (129m ago)	3d14h	172.16.230.2	k8s-worker-1	<none>	<none>
argocd	argocd-applicationset-controller-6d569f7895-7zdqz	1/1	Running	5 (129m ago)	3d14h	172.16.230.16	k8s-worker-1	<none>	<none>
argocd	argocd-dex-server-5b44d67df9-t4vr6	1/1	Running	1 (129m ago)	25h	172.16.140.26	k8s-worker-2	<none>	<none>
argocd	argocd-notifications-controller-5865dfbc8-xhlmd	1/1	Running	5 (129m ago)	3d14h	172.16.230.7	k8s-worker-1	<none>	<none>
argocd	argocd-redis-6bb798784-zbtls	1/1	Running	5 (129m ago)	3d14h	172.16.230.8	k8s-worker-1	<none>	<none>
argocd	argocd-repo-server-dfb9fd78-qw5kh	1/1	Running	1 (129m ago)	25h	172.16.140.37	k8s-worker-2	<none>	<none>
argocd	argocd-repo-server-dfb9fd78-qnsk5	0/1	Completed	0	26h	<none>	k8s-worker-1	<none>	<none>
argocd	argocd-server-6d896f6785-nqgfm	1/1	Running	5 (129m ago)	3d14h	172.16.230.13	k8s-worker-1	<none>	<none>
cattle-fleet-system	fleet-agent-0	2/2	Running	10 (129m ago)	3d16h	172.16.230.24	k8s-worker-1	<none>	<none>
cattle-system	cattle-cluster-agent-75f4c5dc8f-6v45z	1/1	Running	13 (128m ago)	3d17h	172.16.196.23	k8s-master-1	<none>	<none>
cattle-system	cattle-cluster-agent-75f4c5dc8f-74pn9	0/1	Completed	3 (2d18h ago)	3d16h	<none>	k8s-worker-1	<none>	<none>
cattle-system	cattle-cluster-agent-75f4c5dc8f-l2q9s	1/1	Running	10 (128m ago)	2d8h	172.16.196.24	k8s-master-1	<none>	<none>
cattle-system	rancher-webhook-5db6f87b7f-8djkg	1/1	Running	5 (129m ago)	3d16h	172.16.230.63	k8s-worker-1	<none>	<none>
database	mysql-5ffbd4df99-8d5sv	1/1	Running	2 (129m ago)	39h	172.16.230.23	k8s-worker-1	<none>	<none>
jenkins	jenkins-5688d7ddd-hb88p	1/1	Running	7 (129m ago)	3d16h	172.16.230.18	k8s-worker-1	<none>	<none>
kube-system	calico-kube-controllers-5b9b456c66-rnwtb	1/1	Running	4 (129m ago)	3d18h	172.16.196.21	k8s-master-1	<none>	<none>
kube-system	calico-node-l4fl2	1/1	Running	4 (129m ago)	3d18h	192.168.113.111	k8s-master-1	<none>	<none>
kube-system	calico-node-q4rcr	1/1	Running	1 (129m ago)	25h	192.168.113.113	k8s-worker-2	<none>	<none>
kube-system	calico-node-zcnvs	1/1	Running	6 (129m ago)	3d18h	192.168.113.112	k8s-worker-1	<none>	<none>
kube-system	coredns-55cb58b774-f5fbg	1/1	Running	4 (129m ago)	3d18h	172.16.196.22	k8s-master-1	<none>	<none>
kube-system	coredns-55cb58b774-z47qx	1/1	Running	4 (129m ago)	3d18h	172.16.196.20	k8s-master-1	<none>	<none>
kube-system	etcd-k8s-master-1	1/1	Running	6 (129m ago)	3d18h	192.168.113.111	k8s-master-1	<none>	<none>
kube-system	kube-apiserver-k8s-master-1	1/1	Running	6 (129m ago)	3d18h	192.168.113.111	k8s-master-1	<none>	<none>
kube-system	kube-controller-manager-k8s-master-1	1/1	Running	11 (129m ago)	3d18h	192.168.113.111	k8s-master-1	<none>	<none>
kube-system	kube-proxy-kc0fz	1/1	Running	6 (129m ago)	3d18h	192.168.113.112	k8s-worker-1	<none>	<none>
kube-system	kube-proxy-ls8fr	1/1	Running	1 (129m ago)	25h	192.168.113.113	k8s-worker-2	<none>	<none>
kube-system	kube-proxy-mrhv9	1/1	Running	4 (129m ago)	3d18h	192.168.113.111	k8s-master-1	<none>	<none>
kube-system	kube-scheduler-k8s-master-1	1/1	Running	10 (129m ago)	3d18h	192.168.113.111	k8s-master-1	<none>	<none>
vdt	frontend-web-6dcfdc78b4-hm24x	1/1	Running	0	30m	172.16.140.46	k8s-worker-2	<none>	<none>
vdt	service-auth-6cdfc77f5c-vpxp2	1/1	Running	0	41m	172.16.140.39	k8s-worker-2	<none>	<none>
vdt	service-crud-65dbd6c6bb-wrtfz	1/1	Running	0	26m	172.16.140.43	k8s-worker-2	<none>	<none>

Triển khai web application sử dụng các DevOps tools & practices

Sinh viên chọn 1 app bất kỳ theo cấu trúc microservices (ví dụ web app và api service).

Backend: <https://github.com/Fat1512/VDT-Backend>

Frontend: <https://github.com/Fat1512/VDT-Frontend>

K8S Helm Chart (1.5đ)

Yêu cầu 1:

- Cài đặt ArgoCD lên Kubernetes Cluster, expose được ArgoCD qua NodePort
- Cài đặt Jenkins lên Kubernetes Cluster, expose được Jenkins qua NodePort

Output 1:

- File manifests sử dụng để triển khai ArgoCD lên K8S Cluster
File: <https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/blob/main/argocd/install.yaml>
- Ảnh chụp giao diện màn hình hệ thống ArgoCD khi truy cập qua trình duyệt trình duyệt

Tạo namespace

```
# kubectl create namespace argocd
```

Apply file manifest

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

Chuyển thành ClusterIP thành NodePort

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

Lấy password

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

Kiểm tra trạng thái các tài nguyên

```
# kubectl get all -n argocd
```

Address: **192.168.113.111:32489**

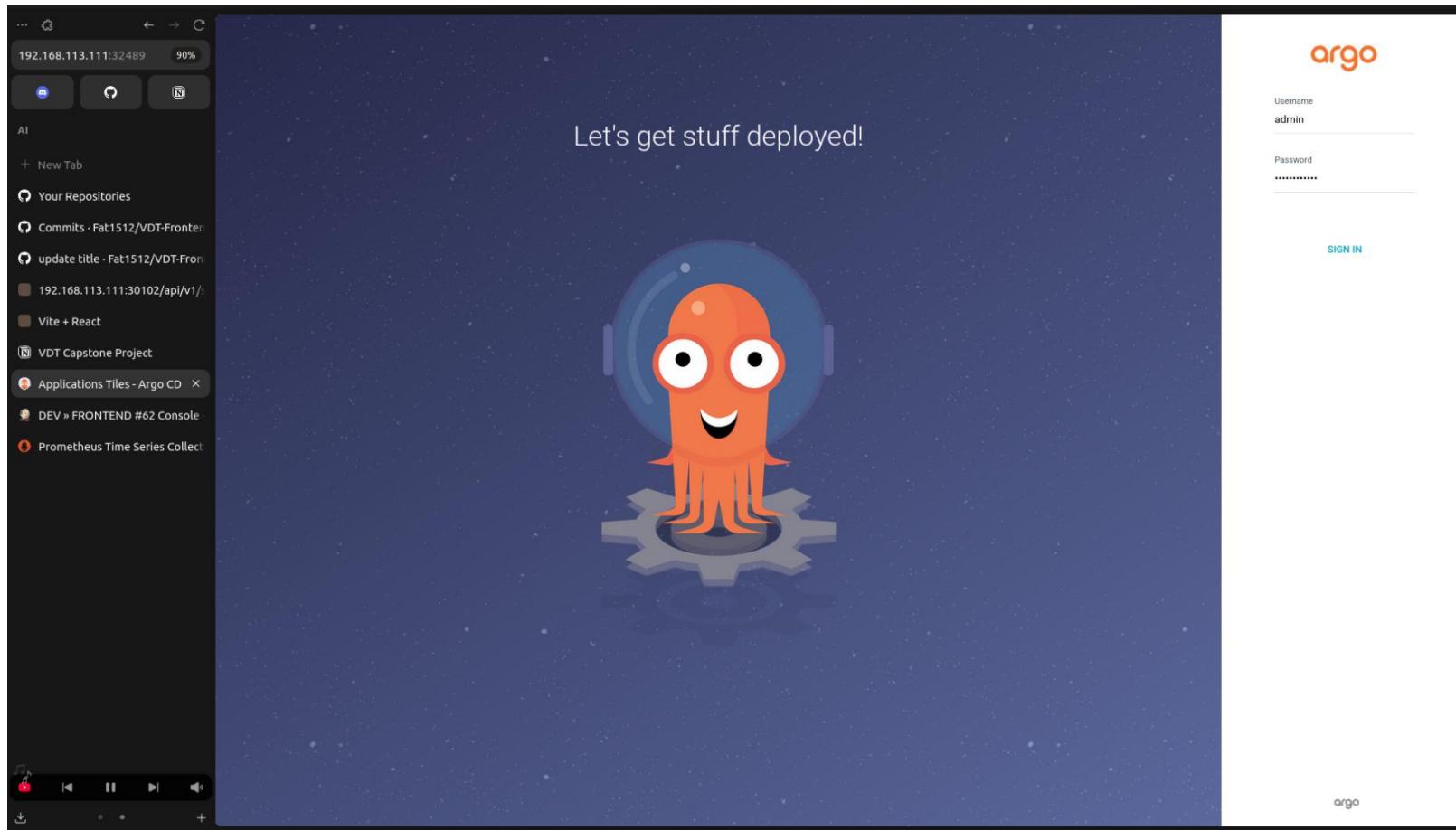
```
devops@k8s-master-1:/home/phat$ kubectl get all -n argocd
NAME                                         READY   STATUS    RESTARTS   AGE
pod/argocd-application-controller-0          1/1    Running   6 (95s ago)  4d13h
pod/argocd-applicationset-controller-6d569f7895-7zdqz 1/1    Running   6 (95s ago)  4d13h
pod/argocd-dex-server-5b44d67df9-t4vr6       1/1    Running   2 (94s ago)  2d
pod/argocd-notifications-controller-5865dfbc8-xhlmd 1/1    Running   6 (95s ago)  4d13h
pod/argocd-redis-6bb7987874-zbtls           1/1    Running   6 (95s ago)  4d13h
pod/argocd-repo-server-df8b9fd78-gw5kh        1/1    Running   2 (94s ago)  2d
pod/argocd-repo-server-df8b9fd78-qnsk5        0/1    Completed  0          2d1h
pod/argocd-server-6d896f6785-nqgfm          1/1    Running   6 (95s ago)  4d13h

NAME                           TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
service/argocd-applicationset-controller   ClusterIP   10.103.241.114 <none>           7000/TCP,8080/TCP 4d13h
service/argocd-dex-server                  ClusterIP   10.101.15.252  <none>           5556/TCP,5557/TCP,5558/TCP 4d13h
service/argocd-metrics                   ClusterIP   10.99.94.117  <none>           8082/TCP          4d13h
service/argocd-notifications-controller-metrics ClusterIP  10.100.215.6   <none>           9001/TCP          4d13h
service/argocd-redis                     ClusterIP   10.96.216.205 <none>           6379/TCP          4d13h
service/argocd-repo-server                ClusterIP   10.110.221.115 <none>           8081/TCP,8084/TCP 4d13h
service/argocd-server                    NodePort    10.106.5.255  <none>           80:31269/TCP,443:32489/TCP 4d13h
service/argocd-server-metrics            ClusterIP   10.98.178.64  <none>           8083/TCP          4d13h

NAME                               READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/argocd-applicationset-controller 1/1     1           1           4d13h
deployment.apps/argocd-dex-server           1/1     1           1           4d13h
deployment.apps/argocd-notifications-controller 1/1     1           1           4d13h
deployment.apps/argocd-redis               1/1     1           1           4d13h
deployment.apps/argocd-repo-server         1/1     1           1           4d13h
deployment.apps/argocd-server             1/1     1           1           4d13h

NAME                               DESIRED  CURRENT   READY   AGE
replicaset.apps/argocd-applicationset-controller-6d569f7895 1        1        1        4d13h
replicaset.apps/argocd-dex-server-5b44d67df9           1        1        1        4d13h
replicaset.apps/argocd-notifications-controller-5865dfbc8 1        1        1        4d13h
replicaset.apps/argocd-redis-6bb7987874           1        1        1        4d13h
replicaset.apps/argocd-repo-server-df8b9fd78          1        1        1        4d13h
replicaset.apps/argocd-server-6d896f6785           1        1        1        4d13h

NAME                               READY   AGE
statefulset.apps/argocd-application-controller 1/1     4d13h
```



- File manifests sử dụng để triển khai Jenkins lên K8S Cluster

File: <https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/tree/main/jenkins>

Tạo namespace

```
# kubectl apply -f jenkins-ns.yaml
```

Tạo volume

```
# kubectl apply -f jenkins-pv.yaml
```

Tạo service account

```
# kubectl apply -f jenkins-sa.yaml
```

Tạo deployment

```
# kubectl apply -f jenkins-deployment.yaml
```

Tạo service NodePort

```
# kubectl apply -f jenkins-service.yaml
```

Kiểm tra trạng thái các tài nguyên

```
# kubectl get all -n jenkins
```

Address: **192.168.113.111:32474**

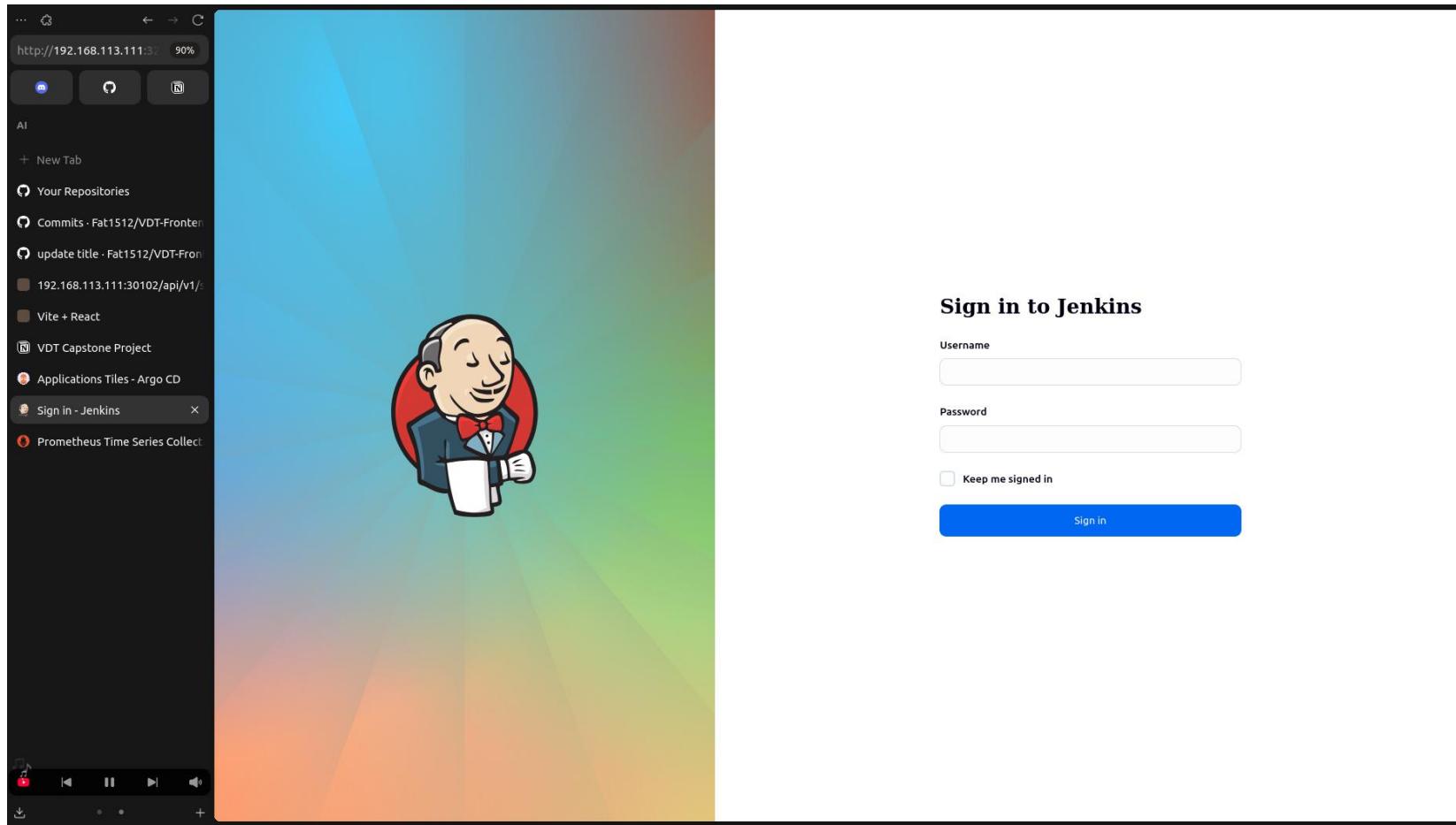
```
devops@k8s-master-1:~$ k get all -n jenkins
NAME                      READY   STATUS    RESTARTS   AGE
pod/jenkins-5688d7ddd-hb88p   1/1     Running   7 (4h30m ago)   3d19h

NAME                TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
service/jenkins-service   NodePort    10.102.203.37   <none>           8080:32474/TCP,50000:31966/TCP   3d19h

NAME                  READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/jenkins   1/1       1           1           3d19h

NAME            DESIRED   CURRENT   READY   AGE
replicaset.apps/jenkins-5688d7ddd   1         1         1         3d19h
```

- Ảnh chụp giao diện màn hình hệ thống Jenkins khi truy cập qua trình duyệt trình duyệt



Yêu cầu 2:

- Viết hoặc tìm mẫu Helm Chart cho app bất kỳ, để vào 1 folder riêng trong repo app
- Tạo Repo Config cho app trên, trong repo này chứa các file values.yaml với nội dung của cá file values.yaml là các config cần thiết để chạy ứng dụng trên k8s bằng Helm Chart

Output 2:

- Các Helm Chart sử dụng để triển khai app lên K8S Cluster

Backend: <https://github.com/Fat1512/VDT-Backend-Config>

Frontend: <https://github.com/Fat1512/VDT-Frontend-Config>

Frontend Address: 192.168.113.111:32647

Auth service Address: 192.168.113.111:30101

Crud service Address: 192.168.113.111:30102

- Các file values.yaml trong config repo của app

Backend: <https://github.com/Fat1512/VDT-Backend-Config>

Frontend: <https://github.com/Fat1512/VDT-Frontend-Config>

- Manifest của ArgoCD Application:

```
project: default
source:
  repoURL: https://github.com/Fat1512/VDT-Frontend-Config
  path: charts
  targetRevision: HEAD
  helm:
    valueFiles:
      - values.yaml
destination:
  server: https://kubernetes.default.svc
```

```
project: default
source:
  repoURL: https://github.com/Fat1512/VDT-Backend-Config
  path: service-auth/charts
  targetRevision: HEAD
  helm:
    valueFiles:
      - values.yaml
destination:
  server: https://kubernetes.default.svc
```

```
project: default
source:
  repoURL: https://github.com/Fat1512/VDT-Backend-Config
  path: service-crud/charts
  targetRevision: HEAD
  helm:
    valueFiles:
      - values.yaml
destination:
  server: https://kubernetes.default.svc
```

- Ảnh chụp giao diện màn hình hệ thống ArgoCD trên trình duyệt

The screenshot shows the ArgoCD web interface with the URL `192.168.113.111:32480` in the address bar. The interface has a dark theme with a sidebar on the left containing navigation links like Applications, Settings, User Info, Documentation, and Application filters. The main area displays three application tiles:

- frontend**: Project: default, Labels: Status: Healthy, OutOfSync, Repository: <https://github.com/Fat1512/VDT-Frontend-Config>, Target Revision: HEAD, Path: charts, Destination: in-cluster, Namespace: Default, Created At: 06/21/2025 17:42:26 (20 hours ago), Last Sync: 06/21/2025 22:36:09 (15 hours ago). Buttons: SYNC, REFRESH, DELETE.
- service-auth**: Project: default, Labels: Status: Healthy, Synced, Repository: <https://github.com/Fat1512/VDT-Backend-Config>, Target Revision: HEAD, Path: service-auth/charts, Destination: in-cluster, Namespace: Default, Created At: 06/21/2025 17:39:17 (20 hours ago), Last Sync: 06/22/2025 00:09:16 (13 hours ago). Buttons: SYNC, REFRESH, DELETE.
- service-crud**: Project: default, Labels: Status: Healthy, OutOfSync, Repository: <https://github.com/Fat1512/VDT-Backend-Config>, Target Revision: HEAD, Path: service-crud/charts, Destination: in-cluster, Namespace: Default, Created At: 06/21/2025 17:39:57 (20 hours ago), Last Sync: 06/22/2025 00:00:12 (14 hours ago). Buttons: SYNC, REFRESH, DELETE.

At the bottom of the sidebar, there are sections for HEALTH STATUS, LABELS, PROJECTS, CLUSTERS, and NAMESPACES, each with a corresponding button.

Service Auth

192.168.113.111:3248 90%

argo v3.0.6+db93798

AI
+ New Tab
VDT Capstone Project
service-auth - Application
BACKEND [DEV] - Jenkins
Prometheus Time Series Col
192.168.113.112:30102/actu
192.168.113.111:30101/actu

Applications
Settings
User Info
Documentation
Resource filters
NAME
NAME
KINDS
KINDS
SYNC STATUS
Synced 3
OutOfSync 0
HEALTH STATUS
Progressing 0
Suspended 0
Healthy 6
Degraded 0
Missing 0
Unknown 0

Applications / Q service-auth

DETAILS DIFF SYNC SYNC STATUS HISTORY AND ROLLBACK DELETE REFRESH

APP HEALTH Healthy

SYNC STATUS Synced to HEAD (2807bec)

LAST SYNC Sync OK to a165c6a

Auto sync is not enabled.

Author: Fat1512 <letanphat15122004@gmail.com>
Comment: ci: Update manifests for commit 60bd0c52

Succeeded 14 hours ago (Sun Jun 22 2022 00:09:16 GMT+0700)
Author: Fat1512 <letanphat15122004@gmail.com>
Comment: ci: Update manifests for commit 3b81fed4

APPLICATION DETAILS TREE

110%

service-auth

vdt ns

20 hours

service-auth

SVC

20 hours

service-auth

deploy

20 hours rev:3

service-auth-695959568c

rs

14 hours rev:3

service-auth-545d955d7d

rs

14 hours rev:2

service-auth-6bd96bd55d

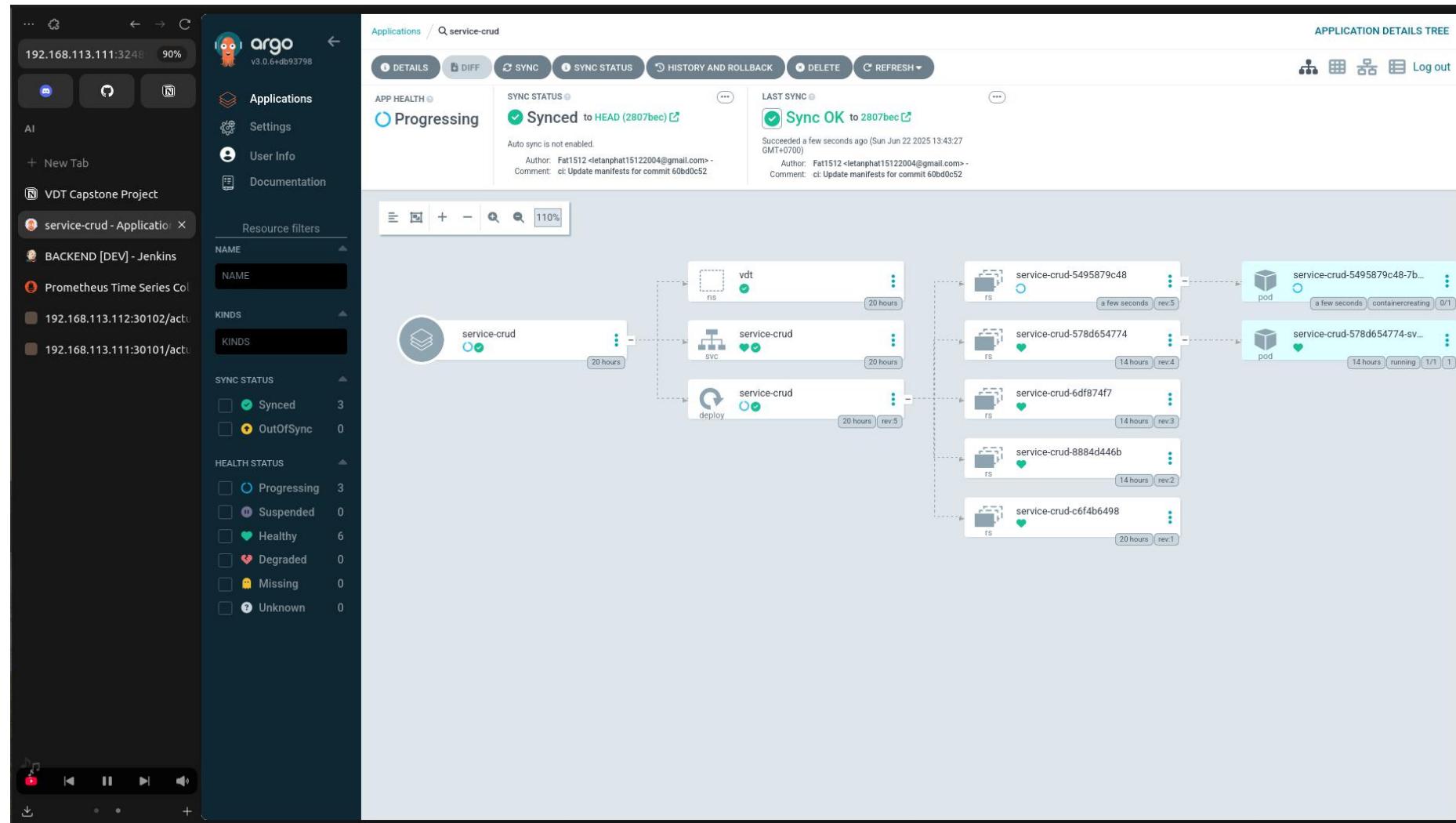
rs

20 hours rev:1

pod

14 hours running 1/1 1

Service Crud



Frontend

192.168.113.111:3248 90%

AI
+ New Tab
VDT Capstone Project
frontend - Application D X
BACKEND [DEV] - Jenkins
Prometheus Time Series Col
192.168.113.112:30102/actu
192.168.113.111:30101/actu

NAME
KINDS
SYNC STATUS
HEALTH STATUS

192.168.113.111:3248 90%

Applications / Q frontend

DETAILS DIFF SYNC SYNC STATUS HISTORY AND ROLLBACK DELETE REFRESH

APP HEALTH SYNC STATUS LAST SYNC APP CONDITIONS

Healthy OutOfSync from HEAD (164c175) Sync OK to 164c175

Auto sync is not enabled.
Author: Fat1512 <etanphat15122004@gmail.com>
Comment: ci: update e0143fef

Succeeded 15 hours ago (Sat Jun 21 2025 22:36:09 GMT+0700)
Author: Fat1512 <etanphat15122004@gmail.com>
Comment: ci: update e0143fef

1 Warning

frontend-web-74dfbb44dd
rs 15 hours rev:9
frontend-web-6765dbc5ff
rs 19 hours rev:8
frontend-web-547bbf4999
rs 19 hours rev:7
frontend-web-746d59f9ff
rs 19 hours rev:6
frontend-web-74ccc6c78b
rs 20 hours rev:5
frontend-web-7557889b8
rs 20 hours rev:4
frontend-web-67df6fdc6f
rs 20 hours rev:3
frontend-web-6bd6fc8545
rs 20 hours rev:2
frontend-web-675bf94895
rs 20 hours rev:1

pod 15 hours running 1/1 1

vdt ns 20 hours
frontend svc 20 hours
frontend deploy 20 hours rev:9

192.168.113.111:3248 90%

- Ánh chụp giao diện màn hình trình duyệt khi truy cập vào Web URL, API URL

Lấy thông tin về namespace vdt

kubectl get all -n vdt

```
devops@k8s-master-1:/home/phat$ k get all -n vdt
NAME                                         READY   STATUS    RESTARTS   AGE
pod/frontend-web-6f4d9f4588-94fsj          1/1     Running   0          98s
pod/service-auth-6cdfc77f5c-vpxp2          1/1     Running   3 (63m ago)  27h
pod/service-crud-65dbd6c6bb-wrtfz         1/1     Running   3 (63m ago)  27h

NAME           TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
service/frontend-web  NodePort  10.109.107.211  <none>        30100:30100/TCP  47h
service/service-auth  NodePort  10.111.222.93   <none>        30101:30101/TCP  47h
service/service-crud  NodePort  10.104.101.241  <none>        30102:30102/TCP  47h

NAME           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/frontend-web   1/1       1           1           47h
deployment.apps/service-auth   1/1       1           1           47h
deployment.apps/service-crud   1/1       1           1           47h

NAME           DESIRED  CURRENT  READY   AGE
replicaset.apps/frontend-web-547bbbf4999  0         0         0       46h
replicaset.apps/frontend-web-675bf94895   0         0         0       47h
replicaset.apps/frontend-web-6765dbc5ff   0         0         0       46h
replicaset.apps/frontend-web-67df6fdc6f   0         0         0       47h
replicaset.apps/frontend-web-6bd6fc8545   0         0         0       47h
replicaset.apps/frontend-web-6dcfdc78b4   0         0         0       27h
replicaset.apps/frontend-web-6f4d9f4588   1         1         1       98s
replicaset.apps/frontend-web-746d59f9ff   0         0         0       46h
replicaset.apps/frontend-web-74ccc6c78b   0         0         0       47h
replicaset.apps/frontend-web-74dfbb44dd   0         0         0       42h
replicaset.apps/frontend-web-7557889b8   0         0         0       47h
replicaset.apps/service-auth-545d955d7d   0         0         0       41h
replicaset.apps/service-auth-695959568c   0         0         0       41h
replicaset.apps/service-auth-6bd96bd55d   0         0         0       47h
replicaset.apps/service-auth-6cdfc77f5c   1         1         1       27h
replicaset.apps/service-crud-5495879c48   0         0         0       27h
replicaset.apps/service-crud-578d654774   0         0         0       41h
replicaset.apps/service-crud-65dbd6c6bb   1         1         1       27h
replicaset.apps/service-crud-6df874f7    0         0         0       41h
replicaset.apps/service-crud-8884d446b   0         0         0       41h
replicaset.apps/service-crud-c6f4b6498   0         0         0       47h
```

API Service

The screenshot shows a browser window displaying a JSON API response. The URL is `http://192.168.113.111:30102/api/v1`. The response message is "SUCCESSFULLY RETRIEVED". The data is an array of 10 user objects, indexed from 0 to 9. Each user object contains the following fields: id, username, password, name, dateOfBirth, university, and role. The users are as follows:

- User 0: id: 93, name: "Nguyễn Đăng Quân", dateOfBirth: "2004-05-11", university: "Đại học Công nghệ (UET)", role: "USER"
- User 1: id: 94, name: "Trịnh Vinh Tuấn Đạt", dateOfBirth: "2003-10-05", university: "Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc", role: "USER"
- User 2: id: 95, name: "Ngô Xuân Hòa", dateOfBirth: "2004-07-27", university: "Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc", role: "USER"
- User 3: id: 96, name: "Bùi Đức Hùng", dateOfBirth: "2004-07-31", university: "Đại học Bách Khoa Hà Nội (HUST)", role: "USER"
- User 4: id: 97, name: "Nguyễn Tuân Anh", dateOfBirth: "2003-01-25", university: "Đại học Bách Khoa Hà Nội (HUST)", role: "USER"
- User 5: id: 98, name: "Lương Nhật Hào", dateOfBirth: "2003-09-07", university: "Đại học Công nghệ (UET)", role: "USER"
- User 6: id: 99, name: "Nguyễn Đức Anh"

Web

The screenshot shows a web browser window with a dark theme. The address bar displays the URL <http://192.168.113.111:32647>. The page title is "Student Information". On the left, there is a sidebar with various project tabs: "Vite + React" (selected), "AI", "+ New Tab", "Problem loading page", "VDT Capstone Project", "Applications Tiles - Argo CD", "BACKEND [DEV] - Jenkins", and "Prometheus Time Series Collection". The main content area contains a table titled "Student Information" with the following columns: #, Name, Date of Birth, University, and Actions (Update, Delete). The table lists 115 rows of student data, such as Nguyễn Đăng Quân (born 2004-05-11 at Đại học Công nghệ (UET)) and Nguyễn Hồng Linh (born 2003-12-08 at Đại học Bách Khoa Hà Nội (HUST)).

#	Name	Date of Birth	University	Actions
93	Nguyễn Đăng Quân	2004-05-11	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
94	Trịnh Vinh Tuấn Đạt	2003-10-05	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
95	Ngô Xuân Hòa	2004-07-27	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
96	Bùi Đức Hùng	2004-07-31	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
97	Nguyễn Tuấn Anh	2003-01-25	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
98	Lương Nhật Hào	2003-09-07	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
99	Nguyễn Đức Anh	2003-01-23	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
100	Đinh Trường Lâm	2001-02-23	Đại học Khoa học tự nhiên - DHQG TPHCM (HCMUS)	<button>Update</button> <button>Delete</button>
101	Nguyễn Đăng Bảo Lâm	2004-08-17	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
102	Phạm Ngọc Hải Dương	2005-03-20	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
103	Nguyễn Minh Quân	2004-01-05	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
104	Nguyễn Sỹ Tân	2004-07-07	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
105	Mai Xuân Duy Quang	2003-04-21	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
106	Lê Tấn Phát	2004-12-15	ĐH Mở Tp.HCM	<button>Update</button> <button>Delete</button>
107	Nguyễn Quang Ninh	2004-04-24	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
108	Nguyễn Trung Vương	2003-10-03	Đại học Khoa học tự nhiên - DHQG TPHCM (HCMUS)	<button>Update</button> <button>Delete</button>
109	Nguyễn Phước Vương Long	2004-10-12	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
110	Nguyễn Văn Dương	2003-10-30	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
111	Lê Minh Hoàng	2004-05-17	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
112	Nguyễn Đức Thịnh	2004-10-09	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
113	Hoàng Minh Tháng	1999-01-06	Đại học Thủy Lợi	<button>Update</button> <button>Delete</button>
114	Vũ Đình Ngọc Bảo	2005-01-29	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
115	Nguyễn Hồng Linh	2003-12-08	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>

CI/CD (1.5đ)

Yêu cầu:

- Viết 1 luồng CI/CD cho app, khi có thay đổi từ source code, 1 tag mới được tạo ra trên repo này thì luồng CI/CD tương ứng của repo đó thực hiện các công việc sau:lo
 - Sửa code trong source code
 - Thực hiện build source code trên jenkins bằng docker với image tag là tag name đã được tạo ra trên gitlab/github và push docker image sau khi build xong lên Docker Hub
 - Sửa giá trị Image version trong file values.yaml trong config repo và push thay đổi lên config repo.
 - Cấu hình ArgoCD tự động triển khai lại web Deployment và api Deployment khi có sự thay đổi trên config repo.

Output:

- Các file setup công cụ của luồng CI/CD
File: <https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/tree/main/jenkins>
- Output log của luồng CI/CD khi tạo tag mới trên repo app

Thay đổi title của app frontend và push lên git

File log: https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/blob/main/log/pipeline_log.txt

Cải thiện: Hiện tại pipeline đang được cấu hình CI/CD cho mỗi sự commit do nếu sử dụng tag phải deploy jenkins lên một server có public IP hoặc sử dụng giải pháp tunelling cho server jenkins.

github.com Fat1512 / VDT-Frontend 110%

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

Commit c2c9182

Fat1512 committed 13 minutes ago

update title

main

1 parent e0143fe commit c2c9182

Filter files... src/feature StudentList.jsx

1 file changed +1 -1 lines changed

src/feature/StudentList.jsx

```
@@ -84,7 +84,7 @@ function StudentList() {  
 84 84  
 85 85      return (  
 86 86          <div className="p-4">  
- 87  -          <h1 className="text-2xl font-bold mb-4 text-center">Student Information</h1>  
+ 87  +          <h1 className="text-2xl font-bold mb-4 text-center">Student Information - V2</h1>  
 88 88          <div className="mb-4">  
 89 89              <button  
 90 90                  onClick={() => handleOpenForm()}>
```

Comments 0 Lock conversation

Comment

Subscribe You're not receiving notifications from this thread.

AI
New Tab
Your Repositories
Commits · Fat1512/VDT-Frontend-Commit
update title · Fat1512/VDT-Frontend-Commit
Vite + React
DT Capstone Project
Frontend - Application Details Tree
DEV » FRONTEND #62 Console - Jenkins
Prometheus Time Series Collection

Pipeline đã được kích hoạt thành công

The screenshot shows the Jenkins interface with the following details:

- Left Sidebar:** Shows a dark-themed sidebar with various Jenkins projects and recent activity. Projects include "Commits - Fat1512/VDT-Frontend", "Vite + React", "DT Capstone Project", "Applications Tiles - Argo CD", and "DEV » FRONTEND #62".
- Top Header:** Displays the URL "http://192.168.113.111:32474" and a progress bar at 90%.
- Central Content:** The main area is titled "Console Output" with a green checkmark icon. It shows the log output for build #62.
- Log Output:** The log shows the following key events:
 - Started by an SCM change
 - Obtained Jenkinsfile from git <https://github.com/Fat1512/VDT-Frontend>
 - [Pipeline] Start of Pipeline
 - [Pipeline] podTemplate
 - [Pipeline] {
 - [Pipeline] node
 - Created Pod: k8s jenkins/dev-frontend-62-j050t-6lcnv-5sh9h
 - [PodInfo] jenkins/dev-frontend-62-j050t-6lcnv-5sh9h
 - Container [jnlpl] waiting [ContainerCreating] No message
 - Container [kaniko] waiting [ContainerCreating] No message
 - Pod [Pending][ContainersNotReady] containers with unready status: [jnlpl kaniko]
 - [PodInfo] jenkins/dev-frontend-62-j050t-6lcnv-5sh9h
 - Container [jnlpl] waiting [ContainerCreating] No message
 - Container [kaniko] waiting [ContainerCreating] No message
 - Pod [Pending][ContainersNotReady] containers with unready status: [jnlpl kaniko]
 - Still waiting to schedule task
 - 'dev-frontend-62-j050t-6lcnv-5sh9h' is offline
 - [PodInfo] jenkins/dev-frontend-62-j050t-6lcnv-5sh9h
 - Container [jnlpl] waiting [ContainerCreating] No message
 - Container [kaniko] waiting [ContainerCreating] No message
 - Pod [Pending][ContainersNotReady] containers with unready status: [jnlpl kaniko]
 - Agent dev-frontend-62-j050t-6lcnv-5sh9h is provisioned from template DEV_FRONTEND_62-j050t-6lcnv
 - ...
 - apiVersion: "v1"
 - kind: "Pod"
 - metadata:
 - annotations:
 - kubernetes.jenkins.io/last-refresh: "1750576095365"
 - buildUrl: "<http://jenkins-service.jenkins.svc.cluster.local:8080/job/DEV/job/FRONTEND/62/>"
 - runUrl: "job/DEV/job/FRONTEND/62/"
 - labels:
 - jenkins: "slave"
 - jenkins/label-digest: "964934ab744c4cd1261575ef2380d9356645589"
 - jenkins/label: "DEV_FRONTEND_62-j050t"
 - kubernetes.jenkins.io/controller: "http__jenkins-service_jenkins_svc_cluster_local_8080x"
 - name: "dev-frontend-62-j050t-6lcnv-5sh9h"
 - namespace: "jenkins"
 - spec:
 - containers:
 - args:
 - \$(JENKINS_SECRET)"
 - "\$(JENKINS_NAME)"
 - env:
 - name: "JENKINS_SECRET"

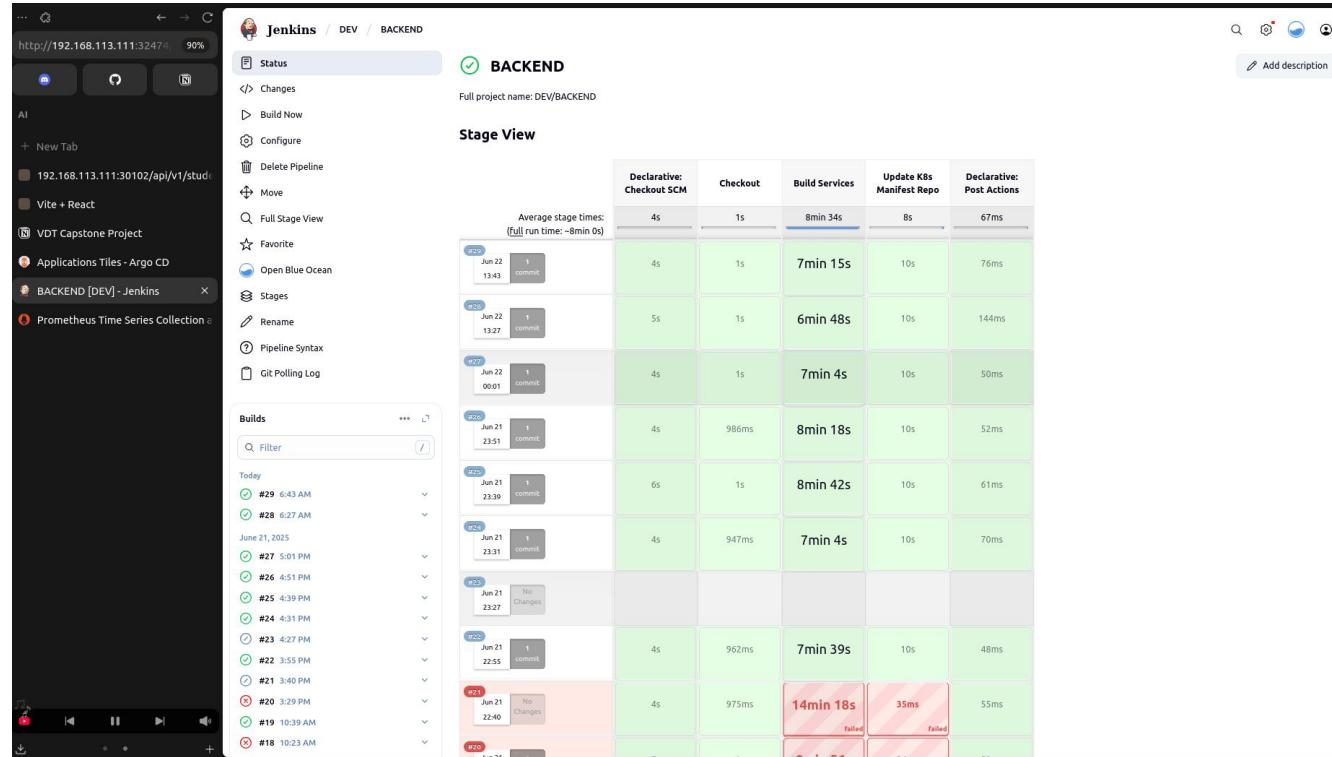
- Show log chứng minh jenkin đã chạy đúng
File log: https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/blob/main/log/pipeline_log.txt

- Jenkin file cấu hình các luồng
Frontend: <https://github.com/Fat1512/VDT-Frontend/blob/main/Jenkinsfile>
Backend: <https://github.com/Fat1512/VDT-Backend/blob/main/Jenkinsfile>

Backend đang chạy 2 service trong cùng một pipeline, pipeline này sẽ được chạy dựa trên sự thay đổi ở folder của từng service và build service tương ứng.

- Ảnh luồng CI/CD chạy qua các stage trên giao diện Jenkins (sử dụng Plugin Pipeline Stage View)

Backend



Frontend

http://192.168.113.111:32474 90%

AI
+ New Tab

Your Repositories
Commits · Fat1512/VDT-Frontend
Vite + React
DT Capstone Project
Applications Tiles - Argo CD
FRONTEND [DEV] - Jenkins ×
Prometheus Time Series Collection a

FRONTEND / DEV / FRONTEND

Status ✓ FRONTEND

Full project name: DEV/FRONTEND

Add description

Changes Build Now Configure Delete Pipeline Move Full Stage View Favorite Open Blue Ocean Stages Rename Pipeline Syntax Git Polling Log

Declarative: Checkout SCM Checkout Build & Push Docker Image (with Kaniko) Update K8s Manifest Repo Declarative: Post Actions

Average stage times:
(full run time: ~2min 26s)

Declarative: Checkout SCM	Checkout	Build & Push Docker Image (with Kaniko)	Update K8s Manifest Repo	Declarative: Post Actions
Jun 22 14:08	4s	991ms	1min 0s	11s
1 commit	4s	991ms	1min 0s	66ms

Permalinks

- Last build (#62), 4 min 25 sec ago
- Last stable build (#62), 4 min 25 sec ago
- Last successful build (#62), 4 min 25 sec ago
- Last failed build (#57), 19 h ago
- Last unsuccessful build (#61), 6 min 25 sec ago
- Last completed build (#62), 4 min 25 sec ago

Builds

Filter

Today

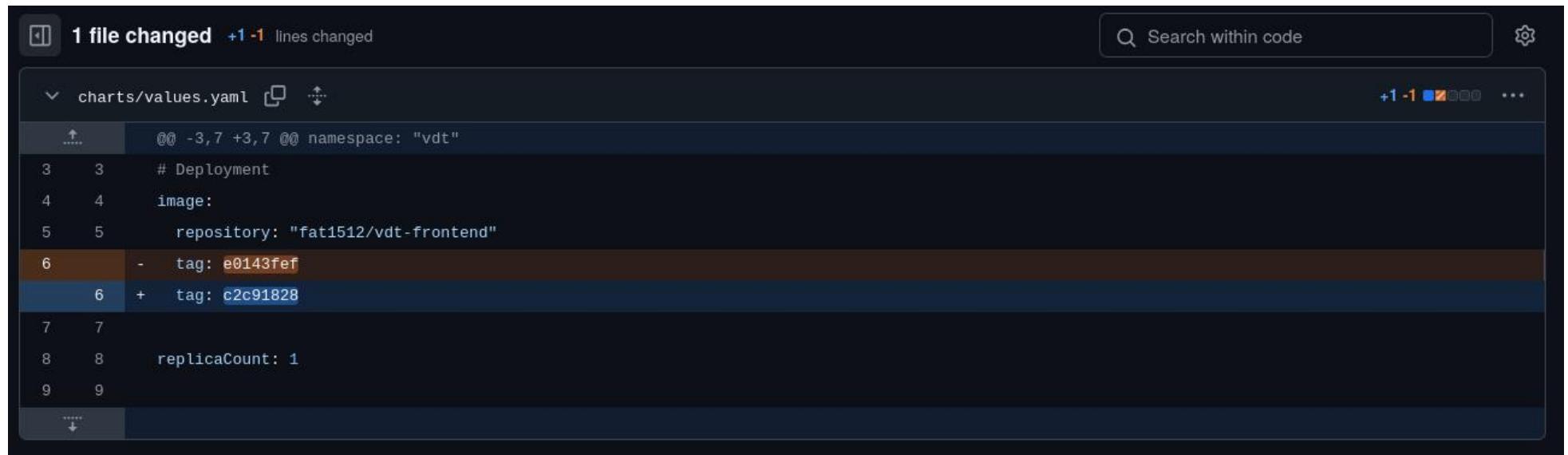
- #62 7:08 AM
- #61 7:06 AM

June 21, 2025

- #60 3:28 PM
- #59 11:36 AM
- #58 11:33 AM
- #57 11:31 AM
- #56 11:29 AM
- #55 11:28 AM
- #54 11:27 AM
- #53 11:25 AM

REST API Jenkins 2.515

- Hình ảnh app triển khai argoCD, hình ảnh diff khi argoCD phát hiện thay đổi ở config repo tương tự hình ảnh sau
Folder CD của frontend đã được cập nhật



The screenshot shows a code diff interface with the following details:

- Top Bar:** Shows "1 file changed +1 -1 lines changed".
- Search Bar:** "Search within code".
- File Path:** "charts/values.yaml".
- Diff Content:**

```
@@ -3,7 +3,7 @@ namespace: "vdt"
 3   3     # Deployment
 4   4       image:
 5   5         repository: "fat1512/vdt-frontend"
 6 -   -   tag: e0143fef
 6 +   +   tag: c2c91828
 7   7
 8   8     replicaCount: 1
 9   9
```
- Bottom Bar:** "Search within code" and other UI elements.

Dockerhub được cập nhật với tag c2c91828

The screenshot shows the Docker Hub interface for the repository `fat1512/vdt-frontend`. The left sidebar shows the user's profile and navigation links. The main content area displays the repository details, including the latest pushed tag `c2c91828`, which was pushed about 1 hour ago. A table lists several tags with their details. Below the table, there is a section for adding a repository overview.

Tags

Tag	OS	Type	Pulled	Pushed
c2c91828	🐧	Image	less than 1 day	about 1 hour
e0143fef	🐧	Image	less than 1 day	about 17 hours
e93a193b	🐧	Image	less than 1 day	about 21 hours
cedd9509	🐧	Image	less than 1 day	about 21 hours
2561af1f	🐧	Image	less than 1 day	about 21 hours

[See all](#)

Repository overview (INCOMPLETE)

An overview describes what your image does and how to run it. It displays in [the public view of your repository](#) once you have pushed some content.

[Add overview](#)

Docker commands

To push a new tag to this repository:

```
docker push fat1512/vdt-frontend:tagname
```

buildcloud

Build with Docker Build Cloud

Accelerate image build times with access to cloud-based builders and shared cache.

Docker Build Cloud executes builds on optimally-dimensioned cloud infrastructure with dedicated per-organization isolation.

Get faster builds through shared caching across your team, native multi-platform support, and encrypted data transfer - all without managing infrastructure.

[Go to Docker Build Cloud](#) →

ArgoCD thấy được sự thay đổi từ tag e0143fef -> c2c91828

The screenshot shows the ArgoCD interface in the 'DIFF' tab. At the top, there are tabs for SUMMARY, PARAMETERS, MANIFEST, DIFF (which is selected), and EVENTS. Below the tabs, there are two checkboxes: 'Compact diff' (checked) and 'Inline diff'. The main content area displays a deployment manifest under the path /Namespace/vdt. The manifest section is labeled 'apps/Deployment/vdt/frontend-web'. It shows code differences between two versions of the deployment spec. The left side shows version 136 with a red background, and the right side shows version 138 with a green background. The difference is in the 'spec.containers' field, where the 'image' key has been updated from 'e0143fef' to 'c2c91828'. The code blocks are as follows:

```
136   spec:  
137     containers:  
138       - image: fat1512/vdt-frontend:e0143fef  
139         imagePullPolicy: IfNotPresent  
140         name: frontend-web  
136   spec:  
137     containers:  
138       - image: fat1512/vdt-frontend:c2c91828  
139         imagePullPolicy: IfNotPresent  
140         name: frontend-web
```

- Hình ảnh app trước khi sửa code và sau khi sửa code.

Trước

Student Information

#	Name	Date of Birth	University	Actions
93	Nguyễn Đăng Quân	2004-05-11	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
94	Trịnh Vinh Tuấn Đạt	2003-10-05	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
95	Ngô Xuân Hòa	2004-07-27	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
96	Bùi Đức Hùng	2004-07-31	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
97	Nguyễn Tuấn Anh	2003-01-25	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
98	Lương Nhật Hào	2003-09-07	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
99	Nguyễn Đức Anh	2003-01-23	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
100	Đinh Trường Lâm	2001-02-23	Đại học Khoa học tự nhiên - ĐHQG TPHCM (HCMUS)	<button>Update</button> <button>Delete</button>
101	Nguyễn Đăng Bảo Lâma	2004-08-17	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
102	Phạm Ngọc Hải Dương	2005-03-20	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
103	Nguyễn Minh Quân	2004-01-05	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
104	Nguyễn Sỹ Tân	2004-07-07	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
105	Mai Xuân Duy Quang	2003-04-21	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
106	Lê Tân Phát	2004-12-15	ĐH Mở Tp.HCM	<button>Update</button> <button>Delete</button>
107	Nguyễn Quang Ninh	2004-04-24	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
108	Nguyễn Trung Vương	2003-10-03	Đại học Khoa học tự nhiên - ĐHQG TPHCM (HCMUS)	<button>Update</button> <button>Delete</button>
109	Nguyễn Phước Vương Long	2004-10-12	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
110	Nguyễn Văn Dương	2003-10-30	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
111	Lê Minh Hoàng	2004-05-17	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
112	Nguyễn Đức Thịnh	2004-10-09	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
113	Hoàng Minh Tháng	1999-01-06	Đại học Thủ Lợi	<button>Update</button> <button>Delete</button>
114	Vũ Đình Ngọc Bảo	2005-01-29	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
115	Nguyễn Hồng Linha	2003-12-08	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>

Sau

The screenshot shows a web browser window with a sidebar on the left containing various project tabs and a media player at the bottom.

Student Information - V2

#	Name	Date of Birth	University	Actions
93	Nguyễn Đăng Quân	2004-05-11	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
94	Trịnh Vinh Tuấn Đạt	2003-10-05	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
95	Ngô Xuân Hòa	2004-07-27	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
96	Bùi Đức Hùng	2004-07-31	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
97	Nguyễn Tuấn Anh	2003-01-25	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
98	Lương Nhật Hào	2003-09-07	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
99	Nguyễn Đức Anh	2003-01-23	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
100	Đinh Trường Lâm	2001-02-23	Đại học Khoa học tự nhiên - ĐHQG TPHCM (HCMUS)	<button>Update</button> <button>Delete</button>
101	Nguyễn Đăng Bảo Lâma	2004-08-17	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
102	Phạm Ngọc Hải Dương	2005-03-20	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
103	Nguyễn Minh Quân	2004-01-05	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
104	Nguyễn Sỹ Tân	2004-07-07	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
105	Mai Xuân Duy Quang	2003-04-21	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
106	Lê Tấn Phát	2004-12-15	ĐH Mở Tp.HCM	<button>Update</button> <button>Delete</button>
107	Nguyễn Quang Ninh	2004-04-24	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
108	Nguyễn Trung Vương	2003-10-03	Đại học Khoa học tự nhiên - ĐHQG TPHCM (HCMUS)	<button>Update</button> <button>Delete</button>
109	Nguyễn Phước Vương Long	2004-10-12	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>
110	Nguyễn Văn Dương	2003-10-30	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
111	Lê Minh Hoàng	2004-05-17	Đại học Công nghệ (UET)	<button>Update</button> <button>Delete</button>
112	Nguyễn Đức Thịnh	2004-10-09	Đại học tổng hợp ITMO	<button>Update</button> <button>Delete</button>
113	Hoàng Minh Thắng	1999-01-06	Đại học Thủy Lợi	<button>Update</button> <button>Delete</button>
114	Vũ Đình Ngọc Bảo	2005-01-29	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	<button>Update</button> <button>Delete</button>
115	Nguyễn Hồng Linha	2003-12-08	Đại học Bách Khoa Hà Nội (HUST)	<button>Update</button> <button>Delete</button>

=> Thay đổi ở title

Monitoring (1.5đ)

Yêu cầu:

- Expose metric của app ra 1 http path. Tham khảo:
 - <https://github.com/korfuri/django-prometheus>
- Sử dụng ansible playbooks để triển khai container Prometheus server. Sau đó cấu hình prometheus add target giám sát các metrics đã expose ở trên.

Output:

- Các file setup để triển khai Prometheus

File: <https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/tree/main/prometheus/files>

Server được truy cập thông qua port 9090 của server monitor: **192.168.111.114:9090**

Thực hiện chạy ansible:

```
# ansible-playbook -i inventory.ini deploy-prometheus.yml
```

```
phat@workstation:~/Documents/viettel/capstone/viettel-digital-talent-2025/prometheus$ ansible-playbook -i inventory.ini deploy-prometheus.yml
PLAY [Deploy Prometheus container on VM] ****
TASK [Gathering Facts] ****
ok: [192.168.113.114]
TASK [Install Python3 and pip] ****
ok: [192.168.113.114]
TASK [Create Prometheus config directory] ****
ok: [192.168.113.114]
TASK [Copy prometheus.yml to target VM] ****
ok: [192.168.113.114]
TASK [Create Prometheus data directory] ****
[WARNING]: The value 65534 (type int) in a string field was converted to '65534' (type string). If this does not look like what you expect, quote the entire value to ensure it does not change.
ok: [192.168.113.114]
TASK [Run Prometheus container] ****
ok: [192.168.113.114]
PLAY RECAP ****
192.168.113.114 : ok=6    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

Kiểm tra container đã lên hay chưa
docker ps

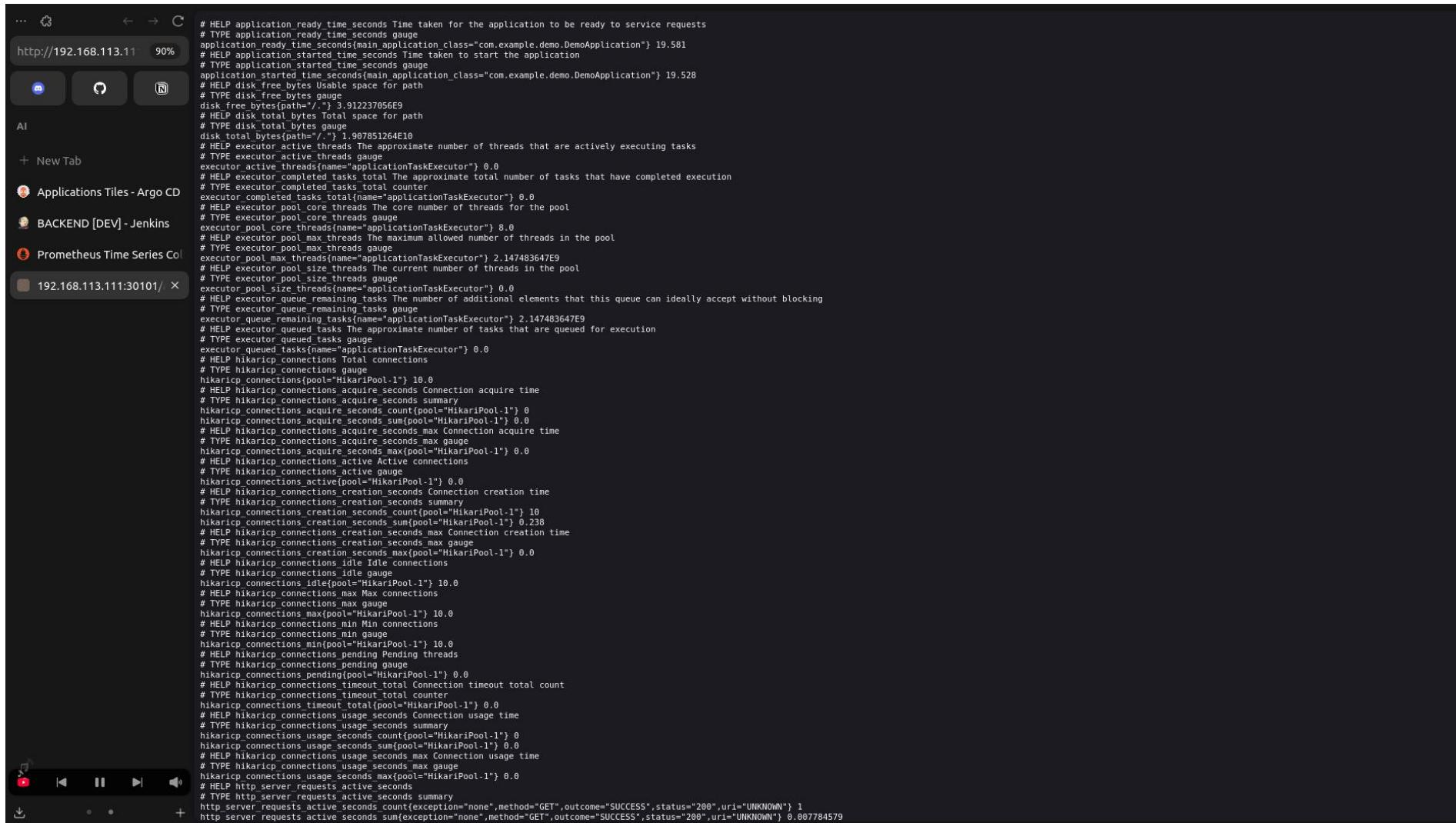
```
root@k8s-master-1: ~          phat@k8s-worker-1: ~          phat@k8s-worker-2: ~          root@server: /home/phat          phat@workstation: ~
root@server:/home/phat# sudo su
root@server:/home/phat# docker ps
CONTAINER ID   IMAGE           COMMAND          CREATED         STATUS          PORTS
00d49bd215e8   prom/prometheus:latest   "/bin/prometheus --c..."   22 hours ago   Up 8 hours    0.0.0.0:9090->9090/tcp
de20677c88fa   rancher/rancher:v2.9.2   "entrypoint.sh"      4 days ago    Up 8 hours    0.0.0.0:80->80/tcp, 0.0.0.0:443->443/tcp, 0.0.0.0:443->443/tcp
root@server:/home/phat#
```

● Hình ảnh khi truy cập vào Prometheus UI thông qua trình duyệt

The screenshot shows the Prometheus UI interface. At the top, there's a header with tabs for 'Status > Target health'. Below the header, there are search and filter fields. The main area displays two targets: 'prometheus' and 'spring-boot-application'. The 'prometheus' target is listed under the '1 / 1 up' section. It has one endpoint: `http://192.168.113.111:30101/actuator/prometheus`. The 'Labels' column shows `Instance="192.168.113.111:30101"`, `job="spring-boot-application"`, and other discovered labels like `_address_="192.168.113.111:30101"`, `_metrics_path_="/actuator/prometheus"`, etc. The 'Last scrape' column shows `11.989s ago` and `7ms`. The 'State' column shows a green 'UP' button. The 'spring-boot-application' target is listed under the '2 / 2 up' section. It has two endpoints: `http://192.168.113.111:30101/actuator/prometheus` and `http://192.168.113.112:30102/actuator/prometheus`. Both endpoints show 'Last scrape' times of `15.118s ago` and `14ms` respectively, and both are in the 'UP' state. The left sidebar shows a list of other tiles like 'Applications Tiles - Argo CD', 'BACKEND [DEV] - Jenkins', and 'Prometheus Time Series'.

- Hình ảnh danh sách target của App được giám sát bởi Prometheus

App service auth



```

# HELP application_ready_time_seconds Time taken for the application to be ready to service requests
# TYPE application_ready_time_seconds gauge
application_ready_time_seconds{main_application_class="com.example.demo.DemoApplication"} 19.581
# HELP application_started_time_seconds Time taken to start the application
# TYPE application_started_time_seconds gauge
application_started_time_seconds{main_application_class="com.example.demo.DemoApplication"} 19.528
# HELP disk_free_bytes Usable space for path
# TYPE disk_free_bytes gauge
disk_free_bytes(path="/") 3.912237056E9
# HELP disk_total_bytes Total space for path
# TYPE disk_total_bytes gauge
disk_total_bytes(path="/") 1.907851264E10
# HELP executor_active_threads The approximate number of threads that are actively executing tasks
# TYPE executor_active_threads gauge
executor_active_threads{name="applicationTaskExecutor"} 0.0
# HELP executor_completed_tasks The approximate total number of tasks that have completed execution
# TYPE executor_completed_tasks gauge
executor_completed_tasks{name="applicationTaskExecutor"} 0.0
# HELP executor_pool_core_threads The core number of threads for the pool
# TYPE executor_pool_core_threads gauge
executor_pool_core_threads{name="applicationTaskExecutor"} 8.0
# HELP executor_pool_max_threads The maximum allowed number of threads in the pool
# TYPE executor_pool_max_threads gauge
executor_pool_max_threads{name="applicationTaskExecutor"} 2.147483647E9
# HELP executor_pool_size_threads The current number of threads in the pool
# TYPE executor_pool_size_threads gauge
executor_pool_size_threads{name="applicationTaskExecutor"} 0.0
# HELP executor_queue_remaining_tasks The number of additional elements that this queue can ideally accept without blocking
# TYPE executor_queue_remaining_tasks gauge
executor_queue_remaining_tasks{name="applicationTaskExecutor"} 2.147483647E9
# HELP executor_queued_tasks The approximate number of tasks that are queued for execution
# TYPE executor_queued_tasks gauge
executor_queued_tasks{name="applicationTaskExecutor"} 0.0
# HELP hikaricp_connections Active connections
# TYPE hikaricp_connections active gauge
hikaricp_connections{pool="HikariPool-1"} 10.0
# HELP hikaricp_connections_acquire_seconds Connection acquire time
# TYPE hikaricp_connections_acquire_seconds summary
hikaricp_connections_acquire_seconds_count{pool="HikariPool-1"} 0
hikaricp_connections_acquire_seconds_sum{pool="HikariPool-1"} 0.0
# HELP hikaricp_connections_acquire_seconds_max Connection acquire time
# TYPE hikaricp_connections_acquire_seconds_max gauge
hikaricp_connections_acquire_seconds_max{pool="HikariPool-1"} 0.0
# HELP hikaricp_connections_active Active connections
# TYPE hikaricp_connections_active gauge
hikaricp_connections_active{pool="HikariPool-1"} 0.0
# HELP hikaricp_connections_creation_seconds Connection creation time
# TYPE hikaricp_connections_creation_seconds summary
hikaricp_connections_creation_seconds_count{pool="HikariPool-1"} 10
hikaricp_connections_creation_seconds_sum{pool="HikariPool-1"} 0.238
# HELP hikaricp_connections_creation_seconds_max Connection creation time
# TYPE hikaricp_connections_creation_seconds_max gauge
hikaricp_connections_creation_seconds_max{pool="HikariPool-1"} 0.0
# HELP hikaricp_connections_idle Idle connections
# TYPE hikaricp_connections_idle gauge
hikaricp_connections_idle{pool="HikariPool-1"} 10.0
# HELP hikaricp_connections_max Max connections
# TYPE hikaricp_connections_max gauge
hikaricp_connections_max{pool="HikariPool-1"} 10.0
# HELP hikaricp_connections_min Min connections
# TYPE hikaricp_connections_min gauge
hikaricp_connections_min{pool="HikariPool-1"} 10.0
# HELP hikaricp_connections_pending Pending threads
# TYPE hikaricp_connections_pending gauge
hikaricp_connections_pending{pool="HikariPool-1"} 0.0
# HELP hikaricp_connections_timeout_total Total connection timeout
# TYPE hikaricp_connections_timeout_total counter
hikaricp_connections_timeout_total{pool="HikariPool-1"} 0.0
# HELP hikaricp_connections_usage_seconds Connection usage time
# TYPE hikaricp_connections_usage_seconds summary
hikaricp_connections_usage_seconds_count{pool="HikariPool-1"} 0
hikaricp_connections_usage_seconds_sum{pool="HikariPool-1"} 0.0
# HELP hikaricp_connections_usage_seconds_max Connection usage time
# TYPE hikaricp_connections_usage_seconds_max gauge
hikaricp_connections_usage_seconds_max{pool="HikariPool-1"} 0.0
# HELP http_server_requests_active_seconds Active seconds
# TYPE http_server_requests_active_seconds summary
http_server_requests_active_seconds_count{exception="none",method="GET",outcome="SUCCESS",status="200",uri="UNKNOWN"} 1
http_server_requests_active_seconds_sum{exception="none",method="GET",outcome="SUCCESS",status="200",uri="UNKNOWN"} 0.007784579

```

App service crud

The screenshot shows a terminal window displaying Prometheus metrics for a Java application. The URL in the address bar is `http://192.168.113.112:30102/actuator/prometheus`. The metrics listed include:

- # HELP application_ready_time_seconds Time taken for the application to be ready to service requests
- # TYPE application_ready_time_seconds gauge
- application_ready_time_seconds{main_application_class="com.example.demo.DemoApplication"} 20.095
- # HELP application_started_time_seconds Time taken to start the application
- # TYPE application_started_time_seconds gauge
- application_started_time_seconds{main_application_class="com.example.demo.DemoApplication"} 19.939
- # HELP disk_free_bytes Usable space for path
- # TYPE disk_free_bytes gauge
- disk_free_bytes(path="/") 3.846709248E9
- # HELP disk_total_bytes Total space for path
- # TYPE disk_total_bytes gauge
- disk_total_bytes(path="/") 1.907851264E10
- # HELP executor_active_threads The approximate number of threads that are actively executing tasks
- # TYPE executor_active_threads gauge
- executor_active_threads{name="applicationTaskExecutor"} 0.0
- # HELP executor_completed_tasks_total The approximate total number of tasks that have completed execution
- # TYPE executor_completed_tasks_total counter
- executor_completed_tasks_total{name="applicationTaskExecutor"} 0.0
- # HELP executor_pool_core_threads The core number of threads for the pool
- # TYPE executor_pool_core_threads gauge
- executor_pool_core_threads{name="applicationTaskExecutor"} 8.0
- # HELP executor_pool_max_threads The maximum allowed number of threads in the pool
- # TYPE executor_pool_max_threads gauge
- executor_pool_max_threads{name="applicationTaskExecutor"} 2.147483647E9
- # HELP executor_pool_size_threads The current number of threads in the pool
- # TYPE executor_pool_size_threads gauge
- executor_pool_size_threads{name="applicationTaskExecutor"} 0.0
- # HELP executor_queue_remaining_tasks The number of additional elements that this queue can ideally accept without blocking
- # TYPE executor_queue_remaining_tasks gauge
- executor_queue_remaining_tasks{name="applicationTaskExecutor"} 2.147483647E9
- # HELP executor_queued_tasks The approximate number of tasks that are queued for execution
- # TYPE executor_queued_tasks gauge
- executor_queued_tasks{name="applicationTaskExecutor"} 0.0
- # HELP hikaricp_connections Total connections
- # TYPE hikaricp_connections gauge
- hikaricp_connections(pool="HikariPool-1") 10.0
- # HELP hikaricp_connections_acquire_seconds Connection acquire time
- # TYPE hikaricp_connections_acquire_seconds summary
- hikaricp_connections_acquire_seconds_count{pool="HikariPool-1"} 0
- hikaricp_connections_acquire_seconds_sum{pool="HikariPool-1"} 0.0
- # HELP hikaricp_connections_acquire_seconds_max Connection acquire time
- # TYPE hikaricp_connections_acquire_seconds_max gauge
- hikaricp_connections_acquire_seconds_max{pool="HikariPool-1"} 0.0
- # HELP hikaricp_connections_active Active connections
- # TYPE hikaricp_connections_active gauge
- hikaricp_connections_active{pool="HikariPool-1"} 0.0
- # HELP hikaricp_connections_creation_seconds Connection creation time
- # TYPE hikaricp_connections_creation_seconds summary
- hikaricp_connections_creation_seconds_count{pool="HikariPool-1"} 10
- hikaricp_connections_creation_seconds_sum{pool="HikariPool-1"} 0.23
- # HELP hikaricp_connections_creation_seconds_max Connection creation time
- # TYPE hikaricp_connections_creation_seconds_max gauge
- hikaricp_connections_creation_seconds_max{pool="HikariPool-1"} 0.0
- # HELP hikaricp_connections_idle Idle connections
- # TYPE hikaricp_connections_idle gauge
- hikaricp_connections_idle{pool="HikariPool-1"} 10.0
- # HELP hikaricp_connections_max Max connections
- # TYPE hikaricp_connections_max gauge
- hikaricp_connections_max{pool="HikariPool-1"} 10.0
- # HELP hikaricp_connections_min Min connections
- # TYPE hikaricp_connections_min gauge
- hikaricp_connections_min{pool="HikariPool-1"} 10.0
- # HELP hikaricp_connections_pending Pending threads
- # TYPE hikaricp_connections_pending gauge
- hikaricp_connections_pending{pool="HikariPool-1"} 0.0
- # HELP hikaricp_connections_timeout_total Connection timeout total count
- # TYPE hikaricp_connections_timeout_total counter
- hikaricp_connections_timeout_total{pool="HikariPool-1"} 0.0

Logging (1.5đ)

Yêu cầu:

- Sử dụng ansible playbooks để triển khai stack EFK (elasticsearch, fluentd, kibana), sau đó cấu hình logging cho web service và api service, đảm bảo khi có http request gửi vào web service hoặc api service thì trong các log mà các service này sinh ra, có ít nhất 1 log có các thông tin:
 - Request Path(VD: /api1/1, /api2/3 ..)
 - HTTP Method VD: (GET PUT POST...)
 - Response Code: 302, 200, 202, 201...

Output:

File: <https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/tree/main/efk>

Thực hiện chạy ansible:

ansible-playbook -i inventory.ini deploy-prometheus.yml

Bước này sẽ được triển khai trên node master

```
root@workstation:/home/phat/Documents/viettel/capstone/viettel-digital-talent-2025/efk# ansible-playbook -i inventory.ini playbook.yml
[WARNING]: Collection kubernetes.core does not support Ansible version 2.13.13

PLAY [Deploy EFK stack to Kubernetes] ****
TASK [Gathering Facts] ****
ok: [192.168.113.111]

TASK [Ensure 'logging' namespace exists] ****
ok: [192.168.113.111]

TASK [Deploy Elasticsearch] ****
TASK [elasticsearch : Apply Elasticsearch manifest] ****
ok: [192.168.113.111]

TASK [elasticsearch : Expose Elasticsearch] ****
ok: [192.168.113.111]

TASK [Deploy Kibana] ****
TASK [kibana : Deploy Kibana] ****
ok: [192.168.113.111]

TASK [kibana : Expose Kibana via NodePort] ****
ok: [192.168.113.111]

TASK [Deploy Fluentd] ****
TASK [fluentd : Create Fluentd configmap] ****
ok: [192.168.113.111]

TASK [fluentd : Deploy Fluentd] ****
ok: [192.168.113.111]

PLAY RECAP ****
192.168.113.111      : ok=8    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

kubectl get all -n logging						
NAME	READY	STATUS	RESTARTS	AGE		
pod/elasticsearch-688c8669c8-bxfzb	1/1	Running	0	7m5s		
pod/fluentd-n67zq	1/1	Running	0	7m		
pod/kibana-75d8644765-25t6c	0/1	Evicted	0	7m		
pod/kibana-75d8644765-4jrl2	0/1	Evicted	0	7m1s		
pod/kibana-75d8644765-5m7hh	0/1	Evicted	0	7m1s		
pod/kibana-75d8644765-746bt	0/1	Evicted	0	7m2s		
pod/kibana-75d8644765-75k4c	0/1	Evicted	0	7m		
pod/kibana-75d8644765-82qsk	0/1	Evicted	0	7m1s		
pod/kibana-75d8644765-8kmqh	0/1	Evicted	0	7m1s		
pod/kibana-75d8644765-8t6k7	0/1	Evicted	0	7m2s		
pod/kibana-75d8644765-bx4hq	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-fb7vm	0/1	Evicted	0	7m		
pod/kibana-75d8644765-g4xvw	0/1	Evicted	0	7m2s		
pod/kibana-75d8644765-ghmsx	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-h5fvw	0/1	Evicted	0	7m1s		
pod/kibana-75d8644765-kcvtk	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-l2jbd	0/1	Evicted	0	7m1s		
pod/kibana-75d8644765-n8dck	0/1	Evicted	0	7m2s		
pod/kibana-75d8644765-ncn5l	0/1	Evicted	0	6m59s		
pod/kibana-75d8644765-pjzwg	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-ptx4c	0/1	Evicted	0	7m1s		
pod/kibana-75d8644765-qrl98	0/1	Evicted	0	7m		
pod/kibana-75d8644765-ss97k	0/1	Evicted	0	7m		
pod/kibana-75d8644765-tbtnx	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-tgjzk	0/1	Evicted	0	7m2s		
pod/kibana-75d8644765-tz5cg	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-vzfzd	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-w8nv2	0/1	Evicted	0	7m2s		
pod/kibana-75d8644765-wl4n7	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-wqgpt	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-z48lk	0/1	Evicted	0	7m		
pod/kibana-75d8644765-zctmq	0/1	Evicted	0	7m3s		
pod/kibana-75d8644765-zpmkm	0/1	ContainerCreating	0	6m59s		
kubectl get services -n logging						
NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE	
service/elasticsearch	ClusterIP	10.105.163.202	<none>	9200/TCP	7m6s	
service/kibana	NodePort	10.104.106.108	<none>	5601:30601/TCP	7m4s	
kubectl get daemonsets -n logging						
NAME	DESIRED	CURRENT	READY	UP-TO-DATE	AVAILABLE	NODE SELECTOR AGE
daemonset.apps/fluentd	3	3	1	3	1	<none> 7m16s
kubectl get deployments -n logging						
NAME	READY	UP-TO-DATE	AVAILABLE	AGE		
deployment.apps/elasticsearch	1/1	1	1	7m21s		
deployment.apps/kibana	0/1	1	0	7m19s		
kubectl get replicaset -n logging						
NAME	DESIRED	CURRENT	READY	AGE		
replicaset.apps/elasticsearch-688c8669c8	1	1	1	7m22s		
replicaset.apps/kibana-75d8644765	1	1	0	7m20s		

Các node đã bị disk pressure nên không thể khởi tạo pod

```
devops@k8s-master-1:/etc/kubernetes$ k get svc -n logging
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)
kibana    NodePort  10.109.48.25   <none>          5601:30601/TCP
```

- Hình ảnh chụp màn hình Kibana kết quả tìm kiếm log của các service theo **url path**

Security

Yêu cầu 1 (1đ):

- Dựng HAProxy Loadbalancer trên 1 VM riêng (trong trường hợp cụm lab riêng của sinh viên) với **mode TCP**, mở port trên LB trỏ đến NodePort của App trên K8S Cluster. (0.5)
- Sử dụng giải pháp Ingress cho các deployment, đảm bảo các truy cập đến các port App sử dụng https (0.5)
- Cho phép sinh viên sử dụng self-signed cert để làm bài

Output 1:

- File cấu hình của HAProxy Loadbalancer cho App
File: <https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/blob/main/haproxy/haproxy.cfg>
NodePort 30301 service auth
NodePort 30302 service crud

Thực hiện truy cập thông qua ip address của server HAProxy: **192.168.113.114**

The screenshot shows a browser window with the following details:

- URL: `http://192.168.113.114:82/api/v1/students`
- Message: "SUCCESSFULLY RETRIEVED"
- Data structure:
 - `data:` An array containing 10 elements (records).
 - Each element has properties: `id`, `username`, `password`, `name`, `dateOfBirth`, `university`, and `role`.
 - The first record (`id: 93`) is highlighted.

ID	Username	Password	Name	Date of Birth	University	Role
93	null	null	Nguyễn Đăng Quân	2004-05-11	Đại học Công nghệ (UET)	USER
94	null	null	Trịnh Vinh Tuấn Đạt	2003-10-05	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	USER
95	null	null	Ngô Xuân Hòa	2004-07-27	Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc	USER
96	null	null	Bùi Đức Hùng	2004-07-31	Đại học Bách Khoa Hà Nội (HUST)	USER
97	null	null	Nguyễn Tuấn Anh	2003-01-25	Đại học Bách Khoa Hà Nội (HUST)	USER
98	null	null	Lương Nhật Hào	2003-09-07	Đại học Công nghệ (UET)	USER

- File cấu hình ingress.
- Kết quả truy cập vào App từ trình duyệt thông qua giao thức https hoặc dùng curl.

Yêu cầu 2 (1đ):

- Đảm bảo 1 số URL của api service khi truy cập phải có xác thực thông qua 1 trong số các phương thức cookie, basic auth, token auth, nếu không sẽ trả về HTTP response code 403. (0.5)
- Thực hiện phân quyền cho 2 loại người dùng trên API:
 - Nếu người dùng có role là user thì truy cập vào GET request trả về code 200, còn truy cập vào POST/DELETE thì trả về 403
 - Nếu người dùng có role là admin thì truy cập vào GET request trả về code 200, còn truy cập vào POST/DELETE thì trả về 2xx

Output:

- File trình bày giải pháp sử dụng để authen/authorization cho các service

File: https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/blob/main/docs/author_authen.md

The screenshot shows a Postman request for a login endpoint. The request method is POST, and the URL is `http://localhost:8089/api/v1/auth/login`. The request body is a JSON object with fields `username` and `password`, both set to `admin` and `123` respectively. The response status is 200 OK, with a message of "SUCCESSFULLY_LOGIN" and an access token returned in the JSON response body.

```

POST http://localhost:8089/api/v1/auth/login
{
  "username": "admin",
  "password": "123"
}
200 OK
{
  "message": "SUCCESSFULLY_LOGIN",
  "data": {
    "accessToken": "eyJhbGciOiJIUzI1NiJ9.eyJhdWlkIjoiMmNmZdk0OWQtYzg1YiJ9.DN93PmAdGAiF7etJW0zLskF4q91r_s9fZlQvMiAkIBzyxmu1a0hJ2QzVwQFOJK",
    "refreshToken": "eyJhbGciOiJIUzI1NiJ9.eyJhdWlkIjoiMmNmZdk0OWQtYzg1Yi00NDJlLTlmM2QtMTljMzk0OTk0MmZmIiwidXNlcktleSI6IjEwNiIsInN1YiI6ImFkbWluIiwiawFOIjoxNzUwNjYzMzg2LCJleHAiOjM1MDExMjI3NzM3MzQwMH0.DN93PmAdGAiF7etJW0zLskF4q91r_s9fZlQvMiAkIBzyxmu1a0hJ2QzVwQFOJK"
  },
  "status": "OK"
}
  
```

Sau khi login, một access token sẽ được trả về và sẽ được dùng để truy cập vào các API hệ thống

- Kết quả HTTP Response khi curl hoặc dùng postman gọi vào các URL khi truyền thêm thông tin xác thực và khi không truyền thông tin xác thực

Không có thông tin xác thực

The screenshot shows a POST request in Postman to `http://localhost:8081/api/v1/students`. The 'Authorization' tab is selected, showing 'No Auth'. The response status is 401 Unauthorized, with a timestamp of 1750611795331. The response body is:

```
1 {  
2   "error": "Unauthorized",  
3   "status": 401,  
4   "message": "Full authentication is required to access this resource",  
5   "timestamp": 1750611795331  
6 }
```

Có thông tin xác thực

HTTP vdt / Get All

Save

GET http://localhost:8081/api/v1/students

Send

Params Authorization Headers (9) Body Scripts Settings Cookies

Auth Type: Bearer Token

Token: [REDACTED]

The authorization header will be automatically generated when you send the request. Learn more about [Bearer Token](#) authorization.

Body Cookies Headers (20) Test Results

200 OK 191 ms 4.86 KB Save Response

{ } JSON ▾ Preview Visualize

```
1 {
2   "message": "SUCCESSFULLY_RETRIEVED",
3   "data": [
4     {
5       "id": 93,
6       "username": null,
7       "password": null,
8       "name": "Nguyễn Đăng Quân",
9       "dateOfBirth": "2004-05-11",
10      "university": "Đại học Công nghệ (UET)",
11      "role": "USER"
12    },
13    {
14      "id": 94,
15      "username": null,
16      "password": null,
17      "name": "Trịnh Vinh Tuấn Đạt",
18      "dateOfBirth": "2003-10-05",
19      "university": "Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc",
20      "role": "USER"
21    }
  ]
```

Postbot Runner Capture requests Cookies Vault Trash

- Kết quả HTTP Response khi curl hoặc dùng postman vào các URL với các method GET/POST/DELETE khi lần lượt dùng thông tin xác thực của các user có role là user và admin

User được phép get

The screenshot shows the Postman application interface. At the top, there's a header bar with 'HTTP vdt / Get All' and buttons for 'Save' and 'Share'. Below the header, the request details are shown: Method 'GET' and URL 'http://localhost:8081/api/v1/students'. The 'Authorization' tab is selected, showing 'Bearer Token' and a token value 'zGPwkjlkW4YbhrOWHYC57DhP-pbJ7' highlighted with a yellow box. Other tabs like 'Params', 'Headers (7)', 'Body', 'Scripts', and 'Settings' are visible. A note below the token says: 'The authorization header will be automatically generated when you send the request. Learn more about [Bearer Token](#) authorization.' On the right side, there are buttons for 'Send' and 'Cookies'. The main body of the interface shows the response details: a green '200 OK' status bar at the top right, followed by a preview of the JSON response. The JSON response is as follows:

```

1  {
2   "message": "SUCCESSFULLY_RETRIEVED",
3   "data": [
4     {
5       "id": 93,
6       "username": null,
7       "password": null,
8       "name": "Nguyễn Đăng Quân",
9       "dateOfBirth": "2004-05-11",
10      "university": "Đại học Công nghệ (UET)",
11      "role": "USER"
12    },
13    {
14      "id": 94,
15      "username": null,
16      "password": null,
17      "name": "Trịnh Vinh Tuấn Đạt",
18      "dateOfBirth": "2003-10-05",
19      "university": "Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc",
20      "role": "USER"
21    }
],
  
```

At the bottom right, there are various icons for managing the response. The bottom navigation bar includes links for 'Postbot', 'Runner', 'Capture requests', 'Cookies', 'Vault', and 'Trash'.

User không được phép delete và post

The screenshot shows a Postman request configuration and its resulting response.

Request Details:

- Method: **DELETE**
- URL: <http://localhost:8081/api/v1/students/126>
- Auth Type: **Bearer Token**
- Token: `zGPwkjlkW4YbhrOWHYC57DhP-pbJ7`

Response Headers:

- 403 Forbidden
- 17 ms
- 729 B
- Save Response

Response Body (JSON):

```
1 {  
2   "error": "Access denied",  
3   "status": 403,  
4   "message": "Access Denied",  
5   "timestamp": 1750572824324  
6 }
```

Postman Footer:

- Postbot
- Runner
- Capture requests
- Cookies
- Vault
- Trash

HTTP vdt / post

Save Share

POST http://localhost:8081/api/v1/students

Send

Params Authorization Headers (9) Body Scripts Settings Cookies

none form-data x-www-form-urlencoded raw binary GraphQL JSON Beautify

```
1 {  
2   "name": "new member",  
3   "dateOfBirth": "2012-05-05",  
4   "universiy": "HCMUS"  
5 }
```

Body Cookies Headers (17) Test Results

403 Forbidden 20 ms 729 B Save Response

{ } JSON Preview Visualize

```
1 {  
2   "error": "Access denied",  
3   "status": 403,  
4   "message": "Access Denied",  
5   "timestamp": 1750572772570  
6 }
```

Postbot Runner Capture requests Cookies Vault Trash

Admin được get, post, delete

The screenshot shows the Postman interface with the following details:

- Request URL:** http://localhost:8081/api/v1/students
- Method:** GET
- Headers:** Authorization (set to Bearer [redacted])
- Body:** None
- Response Status:** 200 OK
- Response Time:** 115 ms
- Response Size:** 4.75 KB
- Response Content:**

```
1 {  
2     "message": "SUCCESSFULLY_RETRIEVED",  
3     "data": [  
4         {  
5             "id": 93,  
6             "username": null,  
7             "password": null,  
8             "name": "Nguyễn Đăng Quân",  
9             "dateOfBirth": "2004-05-11",  
10            "university": "Đại học Công nghệ (UET)",  
11            "role": "USER"  
12        },  
13        {  
14            "id": 94,  
15            "username": null,  
16            "password": null,  
17            "name": "Trịnh Vinh Tuấn Đạt",  
18            "dateOfBirth": "2003-10-05",  
19            "university": "Học viện Công nghệ Bưu chính Viễn thông - Cơ sở phía Bắc",  
20            "role": "USER"  
21        }  
22    ]  
23 }
```

HTTP vdt / post

Save Share

POST

http://localhost:8081/api/v1/students

Send

Params Authorization Headers (9) Body Scripts Settings

Cookies

none form-data x-www-form-urlencoded raw binary GraphQL JSON

Beautify

```
1 {  
2   "name": "new member",  
3   "dateOfBirth": "2012-05-05",  
4   "universiy": "HCMUS"  
5 }
```



Body Cookies Headers (20) Test Results

200 OK 72 ms 767 B Save Response

{ } JSON ▾ Preview Visualize

≡ ⌂ Q ⌂ ⌂

```
1 {  
2   "message": "SUCCESSFULLY_CREATED",  
3   "data": null,  
4   "status": "CREATED"  
5 }
```

Postbot Runner Capture requests Cookies Vault Trash

HTTP vdt / delete

Save Share

Send

DELETE

http://localhost:8081/api/v1/students/126

Params Authorization ● Headers (7) Body Scripts Settings

Cookies

Auth Type

Bearer Token

Token

?TAwgCI4XDzERJN2gVI4Rdf5ccsr2Kd

The authorization header will be automatically generated when you send the request. Learn more about [Bearer Token](#) authorization.

Body Cookies Headers (20) Test Results

200 OK • 35 ms • 770 B • Save Response

{ } JSON ▾ ▶ Preview ⚡ Visualize ▾

≡ 🔍 ⚡ ⌂ ⚡

```
1 {  
2   "message": "SUCCESSFULLY_DELETED",  
3   "data": null,  
4   "status": "NO_CONTENT"  
5 }
```

Postbot Runner Capture requests Cookies Vault Trash

Yêu cầu 3 (1đ):

Sử dụng 1 trong số các giải pháp để ratelimit cho Endpoint của api Service, sao cho nếu có quá **10 request trong 1 phút** gửi đến Endpoint của api service thì các request sau đó bị trả về HTTP Response 409

Output:

- File tài liệu trình bày giải pháp
- File: https://github.com/Fat1512/Viettel-Digital-Talent-Cloud-2025/blob/main/docs/rate_limit.md
- Sử dụng Token Bucket Algorithm thực hiện ratelimit cùng với Bucket4j của Spring Boot
 - File ghi lại kết quả thử nghiệm khi gọi quá 10 request trong 1 phút vào Endpoint của API Service.
 - Thực hiện file script test ddos



```
GNU nano 4.8                                     ddos.sh
Send 15 requests in 1 minute
for i in {1..15}; do
    curl -w "Request $i: ${http_code}\n" http://localhost:8081/api/v1/students
done
```

Fail ở request thứ 11 trả về

```
"}], {"id": 127, "username": "admin", "password": "123456"}, {"id": 128, "username": "student", "password": "123456"}, {"id": 129, "username": "teacher", "password": "123456"}, {"id": 130, "username": "parent", "password": "123456"}]
```

Request 11: 409
Request 12: 409
Request 13: 409
Request 14: 409
Request 15: 409

Time	Logger	Message	Status
2025-06-22T21:48:52.256+07:00	INFO 94774	--- [nio-8081-exec-7] c.e.demo.controller.StudentController	: Allowed - remaining requests: 9
2025-06-22T21:48:52.382+07:00	INFO 94774	--- [nio-8081-exec-9] c.e.demo.controller.StudentController	: Allowed - remaining requests: 8
2025-06-22T21:48:52.399+07:00	INFO 94774	--- [nio-8081-exec-1] c.e.demo.controller.StudentController	: Allowed - remaining requests: 7
2025-06-22T21:48:52.418+07:00	INFO 94774	--- [nio-8081-exec-2] c.e.demo.controller.StudentController	: Allowed - remaining requests: 6
2025-06-22T21:48:52.434+07:00	INFO 94774	--- [nio-8081-exec-4] c.e.demo.controller.StudentController	: Allowed - remaining requests: 5
2025-06-22T21:48:52.449+07:00	INFO 94774	--- [nio-8081-exec-6] c.e.demo.controller.StudentController	: Allowed - remaining requests: 4
2025-06-22T21:48:52.467+07:00	INFO 94774	--- [nio-8081-exec-8] c.e.demo.controller.StudentController	: Allowed - remaining requests: 3
2025-06-22T21:48:52.482+07:00	INFO 94774	--- [io-8081-exec-10] c.e.demo.controller.StudentController	: Allowed - remaining requests: 2
2025-06-22T21:48:52.497+07:00	INFO 94774	--- [nio-8081-exec-2] c.e.demo.controller.StudentController	: Allowed - remaining requests: 1
2025-06-22T21:48:52.511+07:00	INFO 94774	--- [nio-8081-exec-4] c.e.demo.controller.StudentController	: Allowed - remaining requests: 0
2025-06-22T21:48:52.527+07:00	INFO 94774	--- [nio-8081-exec-5] c.e.demo.controller.StudentController	: Over limit
2025-06-22T21:48:52.537+07:00	INFO 94774	--- [nio-8081-exec-7] c.e.demo.controller.StudentController	: Over limit
2025-06-22T21:48:52.546+07:00	INFO 94774	--- [nio-8081-exec-9] c.e.demo.controller.StudentController	: Over limit
2025-06-22T21:48:52.554+07:00	INFO 94774	--- [nio-8081-exec-1] c.e.demo.controller.StudentController	: Over limit
2025-06-22T21:48:52.563+07:00	INFO 94774	--- [nio-8081-exec-3] c.e.demo.controller.StudentController	: Over limit