

**Département Mathématiques et Informatiques**

**Compte Rendu de TP**  
**Ingénierie des Infrastructures et DevOps**

**Filière d'ingénieur :**

**Ingénierie Informatique, Big Data et Cloud Computing**

**TP: Jenkins, CI/CD**

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## I) Partie 1: CI (Continuous Integration)

### 1) Installation de Jenkins

```
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ sudo wget -O
/usr/share/keyrings/jenkins-keyring.asc \
  https://pkg.jenkins.io/debian/jenkins.io-2023.key
--2024-10-10 09:18:28-- https://pkg.jenkins.io/debian/jenkins.io-2023.key
Resolving pkg.jenkins.io (pkg.jenkins.io)... 151.101.130.133, 151.101.2.133, 151
.101.66.133, ...
Connecting to pkg.jenkins.io (pkg.jenkins.io)|151.101.130.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3175 (3.1K) [application/pgp-keys]
Saving to: '/usr/share/keyrings/jenkins-keyring.asc'

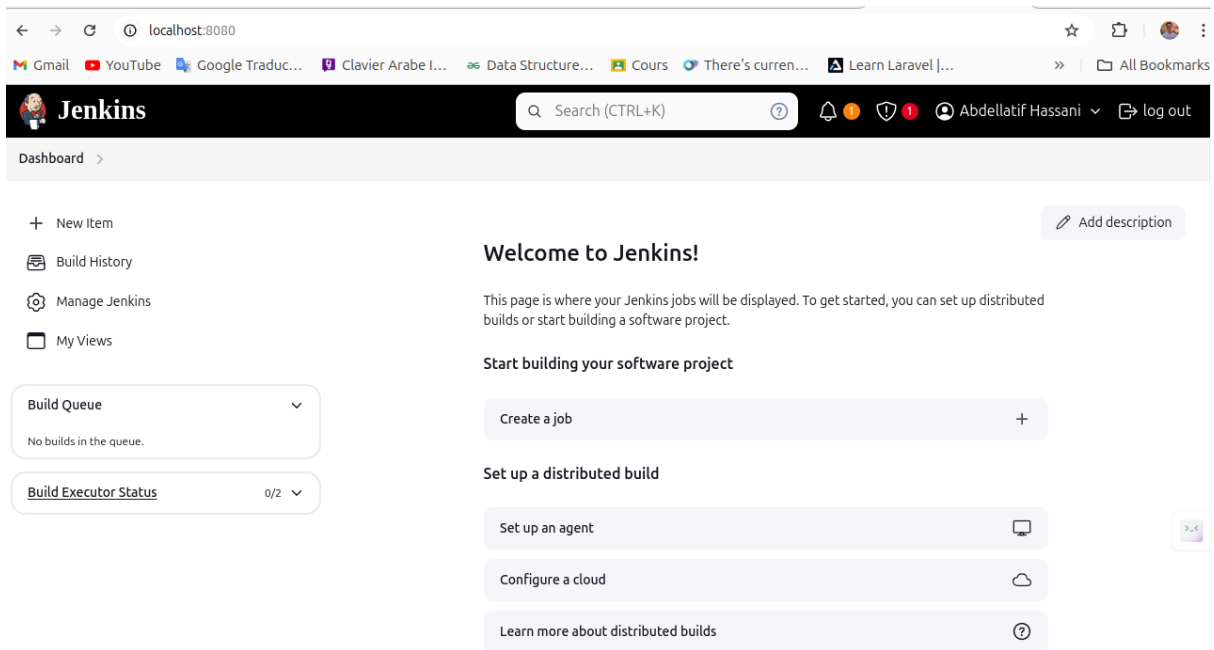
/usr/share/keyrings 100%[=====] 3.10K ---KB/s in 0s

2024-10-10 09:18:29 (15.7 MB/s) - '/usr/share/keyrings/jenkins-keyring.asc' save
d [3175/3175]

abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ echo "deb [si
gned-by=/usr/share/keyrings/jenkins-keyring.asc]" \
  https://pkg.jenkins.io/debian binary/ | sudo tee \
  /etc/apt/sources.list.d/jenkins.list > /dev/null
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ sudo apt-get
update
Hit:1 https://mirror.marwan.ma/ubuntu noble InRelease
Hit:2 https://dl.google.com/linux/chrome/deb stable InRelease

abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ sudo apt-get
install jenkins
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  acl app colord-data cups-pk-helper fonts-opensymbol gir1.2-notify-0.7
  gnome-control-center-faces gnome-online-accounts heif-gdk-pixbuf

abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ sudo systemct
l status jenkins
● jenkins.service - Jenkins Continuous Integration Server
   Loaded: loaded (/usr/lib/systemd/system/jenkins.service; enabled; preset: v
   Active: active (running) since Thu 2024-10-10 09:23:28 +01; 54s ago
   Main PID: 12153 (java)
     Tasks: 51 (limit: 14011)
    Memory: 852.8M (peak: 867.8M)
       CPU: 29.013s
    CGroup: /system.slice/jenkins.service
```



## 2) Création et configuration d'une simple page web

```
abdellatif@abdellatif-HP-250-G8-Notebook-PC: ~/ENSET/S5/DevOps/TP2
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ touch index.html
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ nano index.html
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ touch Dockerfile
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ nano Dockerfile
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/TP2$ cat Dockerfile
# Use the official Nginx image from Docker Hub
FROM nginx:alpine

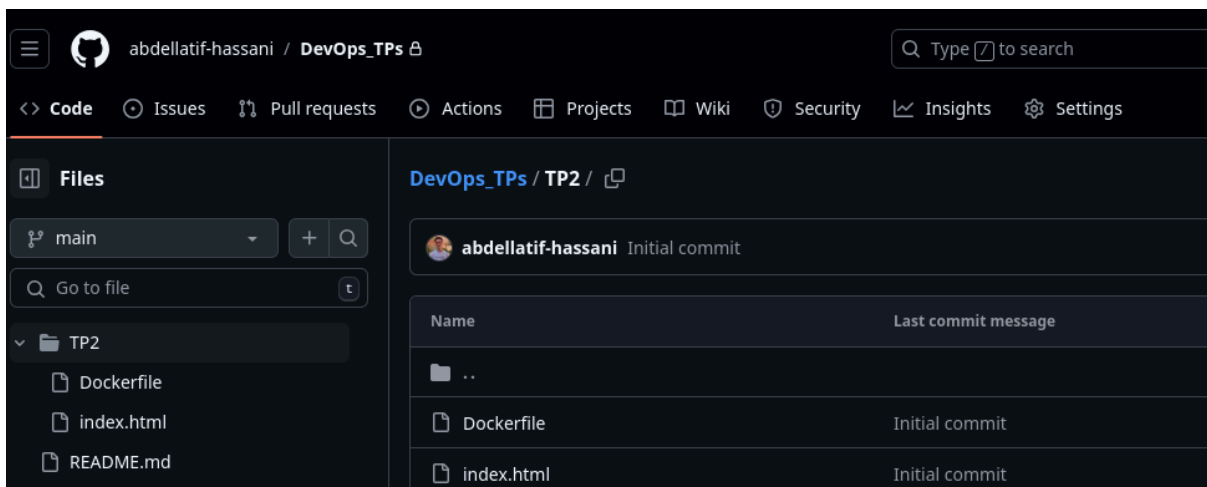
# Copy the HTML file into the Nginx web directory
COPY index.html /usr/share/nginx/html/

# Expose port 80
EXPOSE 80

# Start Nginx when the container runs
CMD ["nginx", "-g", "daemon off;"]
```

### 3) Création d'un repository github

```
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/DevOps_TPs$ git remote add origin https://github.com/abdellatif-hassani/DevOps_TPs.git
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/DevOps_TPs$ git add README.md
fatal: pathspec 'README.md' did not match any files
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/DevOps_TPs$ echo "DevOps TPs" >> README.md
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/DevOps_TPs$ git add README.md
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/DevOps_TPs$ git commit -m "adding readme file"
[main fcd7848] adding readme file
1 file changed, 1 insertion(+)
create mode 100644 README.md
abdellatif@abdellatif-HP-250-G8-Notebook-PC:~/ENSET/S5/DevOps/DevOps_TPs$ git push origin main
Username for 'https://github.com': abdellatif-hassani
Password for 'https://abdellatif-hassani@github.com':
```



The screenshot displays the GitHub interface for the repository 'DevOps\_TPs' owned by 'abdellatif-hassani'. The 'Files' tab is active, showing a file tree where the 'TP2' directory contains 'Dockerfile', 'index.html', and 'README.md'. The commit history on the right shows an 'Initial commit' for each of these files, with the commit message 'Initial commit'.

Name	Last commit message
..	
Dockerfile	Initial commit
index.html	Initial commit


## 4) Création et configuration d'un Job Jenkins


Dashboard > New Item


Enter an item name


Job1 TP2

Select an item type

**Freestyle project**  
Classic, general-purpose job type that checks out from up to one SCM, executes build steps serially, followed by post-build steps like archiving artifacts and sending email notifications.

**Pipeline**  
Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.

**Multi-configuration project**  
Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.

**Folder**  
Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a filter, a folder creates a separate namespace, so you can have multiple things of the same name as long as they are in different folders.

OK

## 5) Liste des Services Actifs dans le Cluster

<b>Docker plugin</b> 1.6.2 This plugin integrates Jenkins with <a href="#">Docker</a> <a href="#">Report an issue with this plugin</a>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>docker-build-step</b> 2.12 This plugin allows to add various docker commands to your job as build steps. <a href="#">Report an issue with this plugin</a>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<div>Warning: The currently installed plugin version may not be safe to use. Please review the following security notices:<ul style="list-style-type: none"><li><a href="#">CSRF vulnerability and missing permission check</a></li></ul></div>		

## 6) Configuration de job1tp2 pour générer et publier une image Docker du projet sur Docker Hub (Tag latest)

Dashboard > Job1 TP2 > Configuration

Configure

General

Source Code Management

Build Triggers

Build Environment

Build Steps

Post-build Actions

Configure

General

Source Code Management

Build Triggers

Build Environment

Build Steps

Post-build Actions

Git ?

Repositories ?

Repository URL ?

https://github.com/abdellatif-hassani/DevOps\_TPs

Credentials ?

abdellatifhassani1205@gmail.com/\*\*\*\*\*

+ Add

- none -

+ Add

Docker registry URL ?

Registry credentials

abdellatif2002/\*\*\*\*\*

+ Add

☒ Environment variables

List of variables ?

Name

DOCKER\_HOST

Value


tcp://172.17.0.1:2375

- Le résultat : la création de l'image dans le repository DockerHub



```
#8 writing image sha256:3c1394f921fd014ec6ecac2f8c8d8b23852b1fcec79715711033b955e364d494 done
#8 naming to docker.io/abdellatif2002/web-app1:latest done
#8 DONE 0.0s
+ echo ****
+ docker login -u abdellatif2002 --password-stdin
WARNING! Your password will be stored unencrypted in /var/lib/jenkins/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credential-stores



Login Succeeded
+ docker push abdellatif2002/web-app1:latest
The push refers to repository [docker.io/abdellatif2002/web-app1]

latest: digest: sha256:99fa6699eebd1cf73ce7a9e562616aaa811643125c687ed1cc257d84cd992ed3 size: 2196
Finished: SUCCESS
```

**abdellatif2002/web-app1** 



Last pushed 4 minutes ago

*This repository does not have a description*   INCOMPLETE

*This repository does not have a category*   INCOMPLETE

**Tags**

This repository contains 1 tag(s).

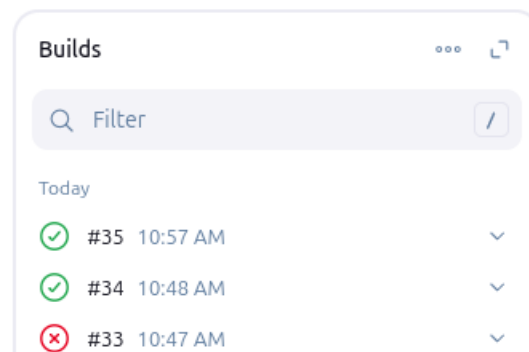
Tag	OS	Type	Pulled	Pushed
 latest		Image	9 minutes ago	4 minutes ago



7) Faire un changement dans index.html, découvrir les changements sur le job1tp2.

```
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/
Ps$ git add .
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/
Ps$ git commit -m "TP V2"
[main ac3d056] TP V2
 2 files changed, 11 insertions(+), 1 deletion(-)
 create mode 100644 info.txt
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/
Ps$ git push origin main
Username for 'https://github.com': abdellatif-hassani
Password for 'https://abdellatif-hassani@github.com':
Enumerating objects: 6, done.
Counting objects: 100% (6/6), done.
Delta compression using up to 4 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (4/4), 590 bytes | 590.00 KiB/s, done.
Total 4 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
remote: This repository moved. Please use the new location:
remote: https://github.com/abdellatif-hassani/devops_tps.git
To https://github.com/abdellatif-hassani/DevOps_TPs.git
 8b59299..ac3d056 main -> main
```

Un nouveau job est déclenché :



## II) Partie 2: CI/CD (continuous delivery/continuous deployment)

1) Création d'un CI/CD pipeline qui permet de : build, test et deployer une application web d'une instance EC2 AWS en utilisant Jenkins pipelines:

- Configuration de Pipeline

### Configure

- General
- Advanced Project Options
- Pipeline**

#### Definition

Pipeline script from SCM

SCM ?

Git

Repositories ?

Repository URL ?

https://github.com/abdellatif-hassani/DevOps\_TPs.git

Credentials ?

abdellatif-hassani/\*\*\*\*\* (GitHub Credentials)

+ Add

Save

Apply

### Configure

- General
- Advanced Project Options
- Pipeline**

Repository browser ?

(Auto)

Additional Behaviours

Add

Script Path ?

Jenkinsfile

☒ Lightweight checkout ?

[Pipeline Syntax](#)

Save

Apply

- Création d'une machine virtuel en AWS (EC2)

EC2 > Instances > i-04768e17c3874720d

Instance summary for i-04768e17c3874720d (DevOps) [Info](#)

Connect

Instance state ▼

Actions ▼

Updated 1 minute ago

<div>Instance ID</div> <div> i-04768e17c3874720d (DevOps)</div> <div>IPv6 address</div> <div>–</div> <div>Hostname type</div> <div>IP name: ip-172-31-45-178.eu-west-3.compute.internal</div> <div>Answer private resource DNS name</div> <div>IPv4 (A)</div> <div>Auto-assigned IP address</div> <div> 13.38.117.4 [Public IP]</div>	<div>Public IPv4 address</div> <div> 13.38.117.4   <a href="#">open address</a> </div> <div>Instance state</div> <div> Running</div> <div>Private IP DNS name (IPv4 only)</div> <div> ip-172-31-45-178.eu-west-3.compute.internal</div> <div>Instance type</div> <div>t2.micro</div> <div>VPC ID</div> <div> vpc-096d3eadfd50e13ac </div>	<div>Private IPv4 addresses</div> <div> 172.31.45.178</div> <div>Public IPv4 DNS</div> <div> ec2-13-38-117-4.eu-west-3.compute.amazonaws.com   <a href="#">open address</a> </div> <div>Elastic IP addresses</div> <div>–</div> <div>AWS Compute Optimizer finding</div> <div> Opt-in to AWS Compute Optimizer for recommendations.</div>
---	---	---

- Jenkins file :

```

pipeline {
    agent any
    environment {
        DOCKERHUB_CREDENTIALS = credentials('dockerhub-cred')
        DOCKER_IMAGE = "abdelatif2002/web-app1"
        DOCKER_TAG = "v${BUILD_NUMBER}"
        EC2_SERVER = "13.38.117.4"
    }
    stages {
        stage('Checkout') {
            steps {
                checkout scm
            }
        }
        stage('Build Docker Image') {
            steps {
                sh "docker build -t ${DOCKER_IMAGE}:${DOCKER_TAG} ."
                sh "docker tag ${DOCKER_IMAGE}:${DOCKER_TAG} ${DOCKER_IMAGE}:latest"
            }
        }
        stage('Login to DockerHub') {
            steps {
                sh 'echo $DOCKERHUB_CREDENTIALS_PSW | docker login -u $DOCKERHUB_CREDENTIALS_USR --password-stdin'
            }
        }
        stage('Push to DockerHub') {
            steps {
                sh "docker push ${DOCKER_IMAGE}:${DOCKER_TAG}"
                sh "docker push ${DOCKER_IMAGE}:latest"
            }
        }
        stage('Deploy to EC2') {
            steps {
                script {
                    sshagent(credentials: ['ec2-ssh-key']) {
                        sh """
                            ssh -o StrictHostKeyChecking=no ubuntu@${EC2_SERVER} '
                                # Verify Docker is running
                                if ! docker info > /dev/null 2>&1; then
                                    echo "Docker is not running or not installed"
                                    exit 1
                                fi

                                # Pull the new image
                                docker pull ${DOCKER_IMAGE}:latest

                                # Stop and remove existing container
                                if docker ps -a | grep -q webapp1; then
                                    docker stop webapp1 || true
                                    docker rm webapp1 || true
                                fi

                                # Run the new container
                                docker run -d -p 80:80 --name webapp1 ${DOCKER_IMAGE}:latest

                                # Clean up old images
                                docker system prune -f
                            """
                        }
                    }
                }
            }
        }
    }
    post {
        always {
            sh 'docker logout'
        }
        success {
            echo 'Pipeline completed successfully!'
        }
        failure {
            echo 'Pipeline failed! Check the logs for details.'
        }
    }
}

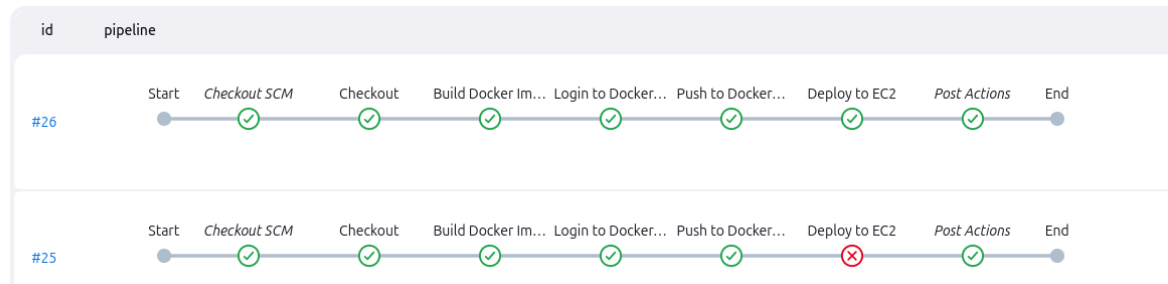
```

- Stages de pipeline:

Dashboard > TP2\_DevOps\_ENSET > Stages

## Build TP2\_DevOps\_ENSET

▶ Build



```

abdellatif@abdellatif-HP-250... x  abdellatif@abdellatif-HP-250... x  ubuntu@ip-172-31-45-178: ~ x  v
T/S5/DevOps/DevOps_TPs$ nano index.html
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/ENSE
T/S5/DevOps/DevOps_TPs$ git add .
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/ENSE
T/S5/DevOps/DevOps_TPs$ git commit -m "BDCC v1"
[main 0dbe762] BDCC v1
 1 file changed, 1 insertion(+), 1 deletion(-)
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/ENSE
T/S5/DevOps/DevOps_TPs$ git push origin main
fatal: unable to access 'https://github.com/abdellatif-hassani/devops_tps.git/': Could
not resolve host: github.com
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/ENSE
T/S5/DevOps/DevOps_TPs$ git push origin main

```

```

abdellatif@abdellatif-HP-250... x  abdellatif@abdellatif-HP-250... x  ubuntu@ip-172-31-45-178: ~ x  v
GNU nano 7.2                                index.html *
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>TP 2</title>
</head>
<body>
  <h1>ENSET BDCC-3 V2</h1>
</body>
</html>

```

```

T/S5/DevOps/DevOps_TPs$ nano index.html
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/ENSE
T/S5/DevOps/DevOps_TPs$ git add .
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/ENSE
T/S5/DevOps/DevOps_TPs$ git commit -m "BDCC v2"
[main 6387087] BDCC v2
 1 file changed, 1 insertion(+), 1 deletion(-)
abdellatif@abdellatif-HP-250-G8-Notebook-PC:/media/abdellatif/Nouveau nom/myfiles/ENSE
T/S5/DevOps/DevOps_TPs$ git push origin main

```

```
ubuntu@ip-172-31-45-178:~$ curl localhost
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>TP 2</title>
</head>
<body>
  <h1>ENSET BDCC-3 V1</h1>
</body>
</html>
ubuntu@ip-172-31-45-178:~$ curl localhost
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>TP 2</title>
</head>
<body>
  <h1>ENSET BDCC-3 V2</h1>
</body>
</html>
ubuntu@ip-172-31-45-178:~$
```