



edureka!

Post Graduate Certification Program in DevOps

Industry Grade Project II

Realised by

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Introduction

In today's fast-paced technology-driven world, organizations need to adopt streamlined and efficient workflows to remain competitive. XYZ Technologies, a leading online repository for e-learning content, faces operational challenges such as slow feedback loops, accumulation of bugs, underutilized resources, and lengthy time-to-market for their applications. To address these issues and meet their long-term business objectives, XYZ Technologies has decided to implement a DevOps-driven solution to automate and enhance their software development, deployment, and monitoring processes.

This project outlines a structured approach to build and implement a Continuous Integration and Continuous Deployment (CI/CD) pipeline, leveraging industry-standard DevOps tools and practices. The focus is on creating a robust, automated workflow to compile, test, package, deploy, and monitor the application while ensuring faster delivery, scalability, and high-quality service.

The project is divided into the following key tasks:

1. Code Management and Build Automation:

- a. Clone the application code from the GitHub repository and push it to a managed Git repository.
- b. Set up Jenkins jobs to automate code compilation, testing, and packaging using Maven.

2. CI/CD Pipeline Setup:

- a. Create a CI/CD pipeline in Jenkins to automate the execution of compile, test, and package jobs.
- b. Configure a master-slave architecture in Jenkins to distribute tasks across multiple nodes for efficient resource utilization.

3. Containerization with Docker:

- a. Write a Dockerfile to containerize the application by creating a Docker image and transferring the WAR file to a Tomcat server.
- b. Integrate Docker with Jenkins to build and deploy the application within a container.

4. Configuration Management with Ansible:

- a. Write an Ansible playbook to automate the creation of Docker images and containers.
- b. Integrate Ansible with Jenkins to deploy artifacts seamlessly.
- c. Deploy the application to a Kubernetes cluster using Ansible playbooks and Kubernetes manifests for pods, services, and deployments.

5. Resources Monitoring with Prometheus:

- a. Install Prometheus and set up monitoring for CPU, memory, and network utilization.
- b. Deploy Node Exporter and configure Prometheus targets to gather system metrics for real-time monitoring and performance analysis.

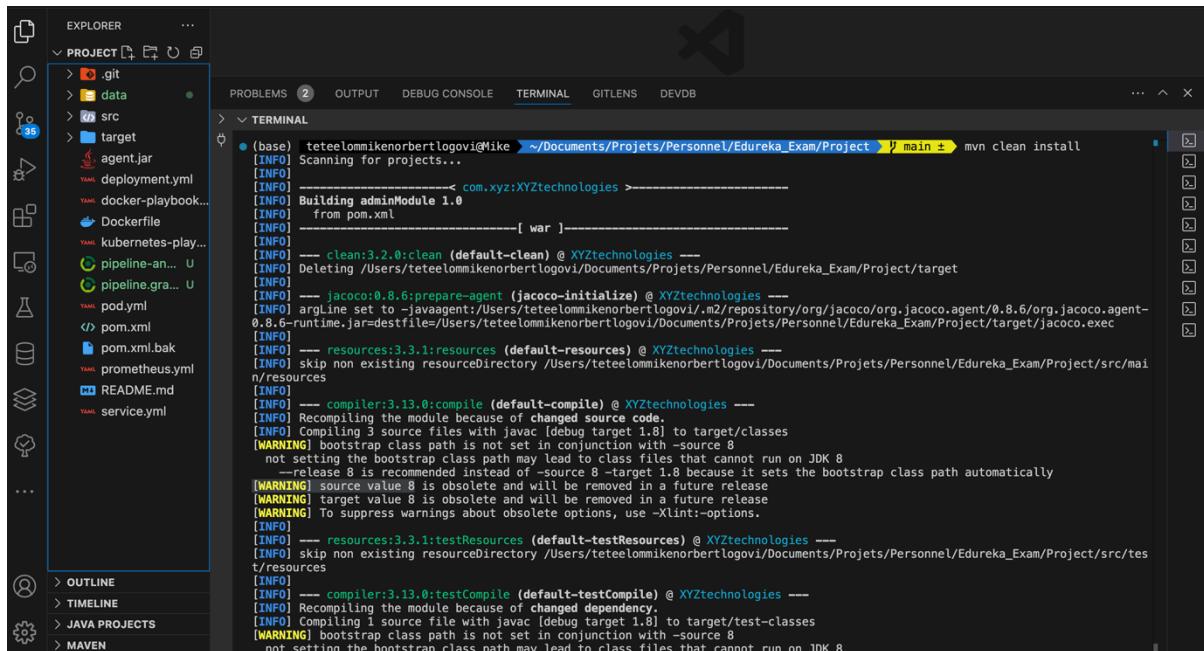
This DevOps project is designed to address the challenges identified by XYZ Technologies, ensuring faster feedback loops, improved resource utilization, and reduced time-to-market for their applications. By implementing automation at every stage of the software lifecycle, the company aims to enhance productivity, scalability, and the overall user experience. This document provides a detailed roadmap for executing each task, along with technical insights into the tools and configurations used to achieve the project objectives.

I - Task 1 : Code downloaded and Project build

For this first task, I downloaded the given project and then I built it with the command

mvn clean install

This command worked successfully and generated the target folder which contains the war file.



The screenshot shows the VS Code interface with the terminal tab active. The terminal window displays the command 'mvn clean install' being run in a base directory. The output shows the Maven build process, including scanning for projects, building the 'adminModule' version 1.0 from 'pom.xml', and creating a 'war' file. It also shows the execution of Jacoco agent preparation, resources compilation, and test resources compilation. Various informational and warning messages are present throughout the log.

II - Task 2 : Code Management with Jenkins Jobs and Pipelines

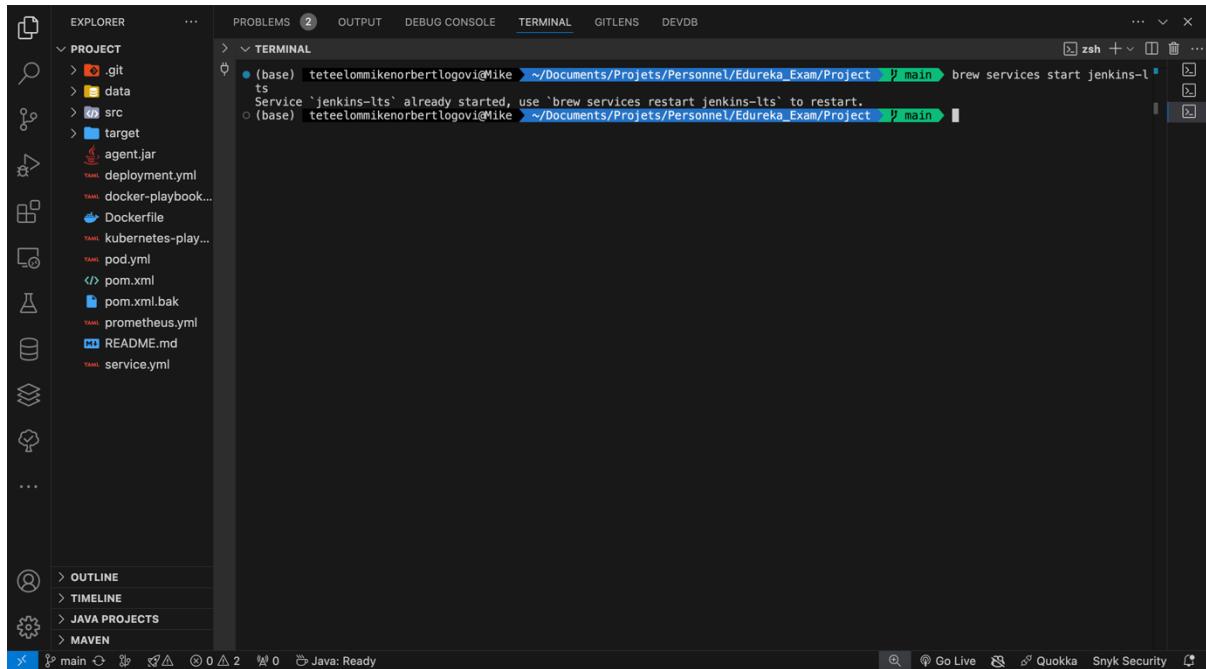
A) Repository Creation

For the task 2, firstly, I created the repository.

The repository link is: <https://github.com/MikeLogovi/EdurekaDevopsProject>

B) Jenkins Setup

After creating the repository, I started the jenkins service



Then I was to login to my jenkins account to create my jobs

The screenshot shows the Jenkins dashboard at localhost:8080. The left sidebar includes links for 'Nouveau Item', 'Historique des constructions', 'Relations entre les builds', 'Vérifier les empreintes numériques', and 'Administrer Jenkins'. Under 'File d'attente des constructions', it says 'File d'attente des constructions vide'. Under 'État du lanceur de compilations', it shows 'contrôleur' (0/2) and three slaves: 'Slave-1' (désconnecté), 'Slave-2' (désconnecté), and 'Slave-3' (désconnecté). A 'Cloud Statistics' section is also present. The main content area displays a table of jobs and pipelines:

| S | M | Nom du projet | Dernier succès | Dernier échec | Dernière durée |
|---|----|-----------------------|----------------|---------------|----------------|
| ✓ | ☀️ | Compile Code | 22 h #21 | 1 j 0 h #11 | 2,7 s |
| ✓ | ☀️ | Package Code | 22 h #11 | 23 h #4 | 3,5 s |
| ✓ | ☁️ | Pipeline CICD | 22 h #10 | 22 h #9 | 37 s |
| ✓ | ☁️ | Pipeline CICD Ansible | 21 h #14 | 21 h #13 | 6,9 s |
| ✓ | ☀️ | Test Code | 22 h #12 | 1 j 0 h #3 | 3,2 s |

Icons: S M L

REST API Jenkins 2.479.2

I was able to create all jobs and pipelines.

C) Job 1 : Compile Code

Here are screenshots of the first job named : Compile Code

Jenkins

Tableau de bord > Compile Code > Configuration

Configurer

Général

Enabled

Description

Texte brut: Prévisualisation

Ce build a des paramètres ?

Commit agent's Docker container ?

Define a Docker template

GitHub project

Project url:

Avancé ▾

Supprimer les anciens builds ?

Throttle builds ?

Exécuter des builds simultanément si nécessaire ?

Restreindre où le projet peut être exécuté ?

Sauvegarder Appliquer

localhost:8080/job/Compile Code/configure

Tableau de bord > Compile Code > Configuration

Configurer

Gestion de code source

Aucune

Git

Repositories

Repository URL:

Credentials:

+ Ajouter

Avancé ▾

Add Repository

Branches to build

Branch Specifier (blank for 'any')

Add Branch

Navigateur de la base de code

Sauvegarder Appliquer

localhost:8080/job/Compile Code/configure

Tableau de bord > Compile Code > Configuration

Configurer

Ce qui déclenche le build

- Déclencher les builds à distance (Par exemple, à partir de scripts) ?
- Construire après le build sur d'autres projets ?
- Construire périodiquement ?
- Github hook trigger for GITScm polling ?
- Scrutation de l'outil de gestion de version ?

Environnements de Build

Étapes du build

Actions à la suite du build

Environnements de Build

- Delete workspace before build starts
- Use secret text(s) or file(s) ?
- Add timestamps to the Console Output
- Inspect build log for published build scans
- Terminate a build if it's stuck
- With Ant ?

Étapes du build

Invoker les cibles Maven de haut niveau

Version de Maven
Maven-3

Cibles Maven
clean compile

Avancé ▾

Sauvegarder Appliquer

Tableau de bord > Compile Code > Configuration

Configurer

Général

Gestion de code source

Ce qui déclenche le build

Environnements de Build (modifié)

Étapes du build

Actions à la suite du build

Ajouter une étape au build ▾

Ajouter une action après le build ▾

Sauvegarder Appliquer

REST API Jenkins 2.479.2

The screenshot shows the Jenkins interface for job #21. The left sidebar has tabs for État, Modifications, Sortie de la console (which is selected), Informations de la construction, Supprimer le build "#21", Timings, Git Build Data, and Build précédent. The main area displays the build log:

```

Démarré par le projet amont "Pipeline CICD" de numéro de build 10
Causé à l'origine par :
  Démarré par l'utilisateur Mike Logovi
Exécution en tant que SYSTEM
Construction à distance sur Slave-3 dans le répertoire de travail /Users/teteelommikenorbertlogovi/.jenkins/workspace/Compile Code
The recommended git tool is: NONE
using credential humus
> git rev-parse --resolve-git-dir /Users/teteelommikenorbertlogovi/.jenkins/workspace/Compile Code/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url git@github.com:MikeLogovi/EdurekaDevopsProject.git # timeout=10
Fetching upstream changes from git@github.com:MikeLogovi/EdurekaDevopsProject.git
> git --version # 'git version 2.39.3 (Apple Git-146)'
> git --version # 'git version 2.39.3 (Apple Git-146)'
using GIT_SSH to set credentials
Verifying host key using known hosts file
> git fetch --tags --force --progress -- git@github.com:MikeLogovi/EdurekaDevopsProject.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
Checking out Revision deb6d0d4651b0e5d0b1e505f43b463d78feba31f (refs/remotes/origin/main)
> git config core.sparsecheckout # timeout=10
> git checkout -f deb6d0d4651b0e5d0b1e505f43b463d78feba31f # timeout=10
Commit message: "wip"
> git rev-list --no-walk deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f # timeout=10
[Compile Code] $ /Users/teteelommikenorbertlogovi/.jenkins/tools/hudson.tasks.Maven_MavenInstallation/Maven-3/bin/mvn clean compile
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.xyz:XYZtechnologies >-----
[INFO] Building adminModule 1.0
[INFO]   from pom.xml
[INFO] -----[ war ]-----
[INFO]
[INFO] --- clean:3.2.0:clean (default-clean) @ XYZtechnologies ---
[INFO] Deleting /Users/teteelommikenorbertlogovi/.jenkins/workspace/Compile Code/target
[INFO]
[INFO] --- jacoco:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---

```

D) Job 2 : Test Code

Here are screenshots of the second job named: Test Code

Jenkins

Tableau de bord > Test Code > Configuration

Configurer

Général

Enabled

Description

Texte brut: Prévisualisation

Ce build a des paramètres ?
 Commit agent's Docker container
 Define a Docker template
 GitHub project
 Supprimer les anciens builds ?
 Throttle builds ?
 Exécuter des builds simultanément si nécessaire ?
 Restreindre où le projet peut être exécuté ?

Avancé ▾

Gestion de code source

Aucune
 Git
Sauvegarder Appliquer

localhost:8080/job/Test Code/configure

Tableau de bord > Test Code > Configuration

Configurer

Gestion de code source

Aucune
Git
Repositories

Repository URL: git@github.com:MikeLogovi/EdurekaDevopsProject.git

Credentials: MikeLogovi

+ Ajouter

Avancé ▾

Add Repository

Branches to build

Branch Specifier (blank for 'any'): *main

Add Branch

Navigateur de la base de code: (Auto)

Additional Behaviours

Sauvegarder Appliquer

localhost:8080/job/Test Code/configure

Tableau de bord > Test Code > Configuration

Configurer

Ce qui déclenche le build

- Déclencher les builds à distance (Par exemple, à partir de scripts) ?
- Construire après le build sur d'autres projets ?
- Construire périodiquement ?
- GitHub hook trigger for GITScm polling ?
- Scrutation de l'outil de gestion de version ?

Général

Gestion de code source

Ce qui déclenche le build (selected)

Environnements de Build

Étapes du build

Actions à la suite du build

Environnements de Build

Delete workspace before build starts

Use secret text(s) or file(s) ?

Add timestamps to the Console Output

Inspect build log for published build scans

Terminate a build if it's stuck

With Ant ?

Étapes du build

Invoquer les cibles Maven de haut niveau ?

Version de Maven

Maven-3

Cibles Maven

test

Avancé ▾

Sauvegarder **Appliquer**

Tableau de bord > Test Code > Configuration

Configurer

Ce qui déclenche le build

- Delete workspace before build starts
- Use secret text(s) or file(s) ?
- Add timestamps to the Console Output
- Inspect build log for published build scans
- Terminate a build if it's stuck
- With Ant ?

Environnements de Build (selected)

Étapes du build

Invoquer les cibles Maven de haut niveau ?

Version de Maven

Maven-3

Cibles Maven

test

Avancé ▾

Ajouter une étape au build ▾

Actions à la suite du build

Ajouter une action après le build ▾

Sauvegarder **Appliquer**

REST API Jenkins 2.479.2

The screenshot shows the Jenkins interface for a job named "Test Code" (Build #12). The "Sortie de la console" (Console Output) tab is selected. The log output shows the following steps:

- Démarré par le projet amont "Pipeline CICD" de numéro de build 10
- Causé à l'origine par :
- Démarré par l'utilisateur Mike Logovi
- Exécution en tant que SYSTEM
- Construction sur le nœud contrôleur dans le répertoire de travail /Users/teteelommiakenberlogovi/.jenkins/workspace/Test Code
- The recommended git tool is: NONE
- using credential humus
- > git rev-parse --resolve-git-dir /Users/teteelommiakenberlogovi/.jenkins/workspace/Test Code/.git # timeout=10
- Fetching changes from the remote Git repository
- > git config remote.origin.url git@github.com:MikeLogovi/EdurekaDevopsProject.git # timeout=10
- Fetching upstream changes from git@github.com:MikeLogovi/EdurekaDevopsProject.git
- > git --version # timeout=10
- > git --version # 'git' version 2.39.3 (Apple Git-146)
- using GIT_SSH to set credentials
- Verifying host key using known hosts file
- > git fetch --tags --force --progress -- git@github.com:MikeLogovi/EdurekaDevopsProject.git +refs/heads/*:refs/remotes/origin/* # timeout=10
- > git rev-parse refs/remotes/origin/main^{commit} # timeout=10
- Checking out Revision deb6d0d4651be5d0b1e505f43b463d78feba31f (refs/remotes/origin/main)
- > git config core.sparsecheckout # timeout=10
- > git checkout -f deb6d0d4651be5d0b1e505f43b463d78feba31f # timeout=10
- Commit message: "wip"
- > git rev-list --no-walk deb6d0d4651be5d0b1e505f43b463d78feba31f # timeout=10
- [Test Code] \$ /Users/teteelommiakenberlogovi/.jenkins/tools/hudson.tasks.Maven_MavenInstallation/Maven-3/bin/mvn test
- [INFO] Scanning for projects...
- [INFO]
- [INFO] [com.xyz:XYZtechnologies]-----
- [INFO] Building adminModule 1.0
- [INFO] from pom.xml
- [INFO] [war]-----
- [INFO]
- [INFO] --- jacoco:0.8.6:prepare-agent (@jacoco-initialize) @ XYZtechnologies ---
- [INFO] argline set to "-javaagent:/Users/teteelommiakenberlogovi/.m2/repository/org.jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/Users/teteelommiakenberlogovi/.jenkins/workspace/Test Code/target/jacoco.exec"
- [INFO]

E) Job 3 : Package Code

Here are screenshots of the third job named: Package Code

localhost:8080/job/Package Code/configure

Jenkins

Tableau de bord > Package Code > Configuration

Configurer

Général

Enabled

Description

Texte brut: Prévisualisation

Ce build a des paramètres ?
 Commit agent's Docker container ?
 Define a Docker template
 GitHub project
 Supprimer les anciens builds ?
 Throttle builds ?
 Exécuter des builds simultanément si nécessaire ?
 Restreindre où le projet peut être exécuté ?

Avancé ▾

Gestion de code source

Aucune
 Git ?

Sauvegarder Appliquer

localhost:8080/job/Package Code/configure

Tableau de bord > Package Code > Configuration

Configurer

Gestion de code source

Git ?

Repositories ?

Repository URL: git@github.com:MikeLogov/EdurekaDevOpsProject.git

Credentials: MikeLogovi

+ Ajouter

Avancé ▾

Add Repository

Branches to build ?

Branch Specifier (blank for 'any') ? * /main

Add Branch

Navigateur de la base de code ? (Auto)

Additional Behaviours

Ajouter ▾

Sauvegarder Appliquer

localhost:8080/job/Package Code/configure

Tableau de bord > Package Code > Configuration

Configurer

Ce qui déclenche le build

- Déclencher les builds à distance (Par exemple, à partir de scripts) ?
- Construire après le build sur d'autres projets ?
- Construire périodiquement ?
- GitHub hook trigger for GITScm polling ?
- Scrutation de l'outil de gestion de version ?

Général

Gestion de code source

Ce qui déclenche le build

Environnements de Build

Étapes du build

Actions à la suite du build

- Delete workspace before build starts
- Use secret text(s) or file(s) ?
- Add timestamps to the Console Output
- Inspect build log for published build scans
- Terminate a build if it's stuck
- With Ant ?

Environnements de Build

Étapes du build

Invoker les cibles Maven de haut niveau

Version de Maven
Maven-3

Cibles Maven
package

Avancé

Sauvegarder Appliquer

localhost:8080/job/Package Code/configure

Tableau de bord > Package Code > Configuration

Configurer

Ce qui déclenche le build

- Delete workspace before build starts
- Use secret text(s) or file(s) ?
- Add timestamps to the Console Output
- Inspect build log for published build scans
- Terminate a build if it's stuck
- With Ant ?

Environnements de Build

Étapes du build

Invoker les cibles Maven de haut niveau

Version de Maven
Maven-3

Cibles Maven
package

Avancé

Ajouter une étape au build

Actions à la suite du build

Ajouter une action après le build

Sauvegarder Appliquer

REST API Jenkins 2.479.2

```

localhost:8080/job/Package%20Code/11/console
Jenkins
Tableau de bord > Package Code > #11 > Sortie de la console

État
Modifications
Sortie de la console
Informations de la construction
Supprimer le build "#11"
Timings
Git Build Data
Build précédent

Sortie de la console

Démarré par le projet amont "Pipeline CICD" de numéro de build 10
Causé à l'origine par :
Démarré par l'utilisateur Mike Logovi
Exécution en tant que SYSTEM
Construction sur le nœud contrôleur dans le répertoire de travail /Users/teteelomnikenorbertlogovi/.jenkins/workspace/Package Code
The recommended git tool is: NONE
using credential human
> git rev-parse --resolve-git-dir /Users/teteelomnikenorbertlogovi/.jenkins/workspace/Package Code/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url git@github.com:MikeLogovi/EdurekaDevopsProject.git # timeout=10
Fetching upstream changes from git@github.com:MikeLogovi/EdurekaDevopsProject.git
> git --version # timeout=10
> git --version # 'git' version 2.39.3 (Apple Git-146)
using GIT_SSH to set credentials
Verifying host key using known hosts file
> git fetch --tags --force --progress -- git@github.com:MikeLogovi/EdurekaDevopsProject.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
Checking out Revision deb6d0d4651b0e5db0b1e505f43b463d78fe0a31f (refs/remotes/origin/main)
> git config core.sparsecheckout # timeout=10
> git checkout -f deb6d0d4651b0e5db0b1e505f43b463d78fe0a31f # timeout=10
Commit message: "wip"
> git rev-list --no-walk deb6d0d4651b0e5db0b1e505f43b463d78fe0a31f # timeout=10
[Package Code] $ /Users/teteelomnikenorbertlogovi/.jenkins/tools/hudson.tasks.Maven_MavenInstallation/Maven-3/bin/mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.xyz:XYZtechnologies >-----
[INFO] Building adminModule 1.0
[INFO]   from pom.xml
[INFO] -----[ war ]-----
[INFO]
[INFO] --- jacoco:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argline set to "-javaagent:/Users/teteelomnikenorbertlogovi/.m2/repository/org.jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/Users/teteelomnikenorbertlogovi/.jenkins/workspace/Package Code/target/jacoco.exec"
[INFO]
[INFO] --- maven-war-plugin:2.3:war (default-war) @ XYZtechnologies ---

```

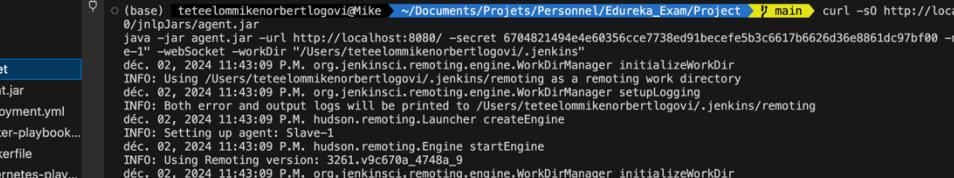
All the jobs were created successfully and are working successfully.

F) Pipeline using the three jobs

First, I setup the master-slave node

| S | Nom | Architecture | Différence entre les horloges | Espace de swap disponible | Espace disque disponible | Free Temp Space | Temps de réponse |
|---|------------------|--------------------|-------------------------------|---------------------------|--------------------------|-----------------|------------------|
| | contrôleur | Mac OS X (aarch64) | Synchronisé | 1,12 GiB | 191,64 GiB | 191,64 GiB | 0ms |
| | Slave-1 | Mac OS X (aarch64) | Synchronisé | 1,12 GiB | 191,64 GiB | 191,64 GiB | 34ms |
| | Slave-2 | Mac OS X (aarch64) | Synchronisé | 1,12 GiB | 191,64 GiB | 191,64 GiB | 31ms |
| | Slave-3 | Mac OS X (aarch64) | Synchronisé | 1,12 GiB | 191,64 GiB | 191,64 GiB | 25ms |
| | Données obtenues | 3,9 s | 3,9 s | 3,3 s | 3,9 s | 3,9 s | 3,9 s |

This is the first slave called : Slave-1 which is running



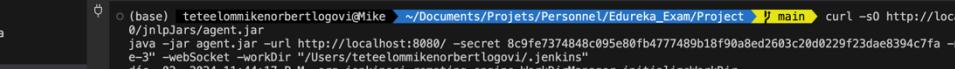
The screenshot shows a Java IDE interface with several tabs at the top: EXPLORER, PROBLEMS (2), OUTPUT, DEBUG CONSOLE, TERMINAL (selected), GITLENS, and DEVDB. The EXPLORER tab displays a project structure with a 'target' folder selected, containing files like agent.jar, deployment.yml, docker-playbook.yml, Dockerfile, kubernetes-play..., pipeline.gra..., pod.yml, pom.xml, pom.xml.bak, prometheus.yml, README.md, and service.yml. The TERMINAL tab shows a command-line session running on a Mac OS X system. The user has run a curl command to access a Jenkins instance on port 8080. The Jenkins logs output the following:

```
(base) teteelomnikenorbertlogovi@Mike ~ /Documents/Projects/Personnel/Edureka_Exam/Project $ main curl -s0 http://localhost:8080
java -jar agent.jar --url http://localhost:8080 --secret 6704821494e4e60356cce7738ed91becefe5b3c6617b6626d36e8861dc97bf00 --name "Slave"
dec. 02, 2024 11:43:09 P.M. org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using /Users/teteelomnikenorbertlogovi/.jenkins/remoting as a remoting work directory
dec. 02, 2024 11:43:09 P.M. org.jenkinsci.remoting.engine.WorkDirManager setupLogging
INFO: Both error and output logs will be printed to /Users/teteelomnikenorbertlogovi/.jenkins/remoting
dec. 02, 2024 11:43:09 P.M. hudson.remoting.Launcher createEngine
INFO: Setting up agent: Slave-1
dec. 02, 2024 11:43:09 P.M. hudson.remoting.Engine startEngine
INFO: Using Remoting version: 3261.v9c670a_4748a_9
dec. 02, 2024 11:43:09 P.M. org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using /Users/teteelomnikenorbertlogovi/.jenkins/remoting as a remoting work directory
dec. 02, 2024 11:43:10 P.M. hudson.remoting.Launcher$CuiListener status
INFO: WebSocket connection open
dec. 02, 2024 11:43:10 P.M. hudson.remoting.Launcher$CuiListener status
INFO: Connected
```

This is the second slave called : Slave-2 which is running

```
(base) teteelomnikenorbertlogovi@Mike ~ /Documents/Projets/Personnel/Edureka_Exam/Project main curl -s0 http://localhost:8080
0/jnlpJars/agent.jar
java -jar agent.jar -url http://localhost:8080 -secret ceb05e218b44161aa75794a987b59ee3a8139088ab03359db4ba3d969e1e1909 -name "Slave-2"
java -jar agent.jar -url "/Users/teteelomnikenorbertlogovi/.jenkins"
dec 02, 2024 11:43:58 P.M. org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using /Users/teteelomnikenorbertlogovi/.jenkins/remoting as a remoting work directory
dec 02, 2024 11:43:58 P.M. org.jenkinsci.remoting.engine.WorkDirManager setupLogging
INFO: Both error and output logs will be printed to /Users/teteelomnikenorbertlogovi/.jenkins/remoting
dec 02, 2024 11:43:58 P.M. hudson.remoting.Launcher createEngine
INFO: Setting up agent: Slave-2
dec 02, 2024 11:43:58 P.M. hudson.remoting.Engine startEngine
INFO: Using Remoting version: 3261.v9c670a_4748_a_9
dec 02, 2024 11:43:58 P.M. org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using /Users/teteelomnikenorbertlogovi/.jenkins/remoting as a remoting work directory
dec 02, 2024 11:43:59 P.M. hudson.remoting.Launcher$Cuilistener status
INFO: WebSocket connection open
dec 02, 2024 11:43:59 P.M. hudson.remoting.Launcher$Cuilistener status
INFO: Connected
```

This is the third slave called : Slave-3 which is running



The screenshot shows the Eclipse IDE interface with the Java perspective selected. The left-hand navigation bar displays a tree view of project files, including .git, data, src, target, agent.jar, deployment.yml, docker-playbook..., Dockerfile, kubernetes-play..., pipeline.gra..., pod.yml, pom.xml, pom.xml.bak, prometheus.yml, and README.md. The central workspace contains a terminal window titled 'TERMINAL' which is executing a Jenkins command to run a Java application. The output shows the Jenkins environment setting up a workspace and starting the Hudson remoting engine.

```
(base) teteelomnikenorbertlogovi@Mike ~ /Documents/Projets/Personnel/Edureka_Exam/Project % main curl -s0 http://localhost:8080 /jnlpJars/agent.jar
java -jar agent.jar -url http://localhost:8080/ -secret 8c9fe7374848c095e80fb4777489b18f90a8ed2603c2d08229f23dae8394c7fa -name "Slave-3" -webSocket -workDir "/Users/teteelomnikenorbertlogovi/.jenkins"
déc. 02, 2024 11:44:17 P.M. org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using /Users/teteelomnikenorbertlogovi/.jenkins/remoting as a remoting work directory
déc. 02, 2024 11:44:17 P.M. org.jenkinsci.remoting.engine.WorkDirManager setupLogging
INFO: Both error and output logs will be printed to /Users/teteelomnikenorbertlogovi/.jenkins/remoting
déc. 02, 2024 11:44:17 P.M. hudson.remoting.Launcher createEngine
INFO: Setting up agent: Slave-3
déc. 02, 2024 11:44:17 P.M. hudson.remoting.Engine startEngine
INFO: Using Remoting version: 3261.v9c670a_4748a_9
déc. 02, 2024 11:44:17 P.M. org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using /Users/teteelomnikenorbertlogovi/.jenkins/remoting as a remoting work directory
déc. 02, 2024 11:44:17 P.M. hudson.remoting.Launcher$CuListener status
INFO: WebSocket connection open
déc. 02, 2024 11:44:17 P.M. hudson.remoting.Launcher$CuListener status
INFO: Connected
```

Now, here is the pipeline written in jenkins using the three slaves

The screenshot shows the Jenkins Pipeline CICD configuration page. At the top, there are tabs for 'Tableau de bord' and 'Pipeline CICD'. Below that, the 'Configuration' tab is selected. On the left, there's a sidebar with 'Général', 'Advanced Project Options', and 'Pipeline' sections. The main area is titled 'Pipeline' and has a 'Definition' section. A dropdown menu is open, showing 'Pipeline script'. Below it is a code editor containing Groovy pipeline code. A checkbox labeled 'Use Groovy Sandbox' is checked. At the bottom of the code editor are 'Sauvegarder' and 'Appliquer' buttons. In the bottom right corner, there are links for 'REST API' and 'Jenkins 2.479.2'.

```
Script ?  
1- pipeline {  
2-     agent none  
3-     environment {  
4-         DOCKER_IMAGE = "my-koncat-app"  
5-         CONTAINER_NAME = "my-tomcat-container"  
6-     }  
7-     stages {  
8-         stage('Clone Repository') {  
9-             agent { label 'slow-1' }  
10-            steps {  
11-                echo "Cloning repository..."  
12-                git branch: "main"  
13-                url: "git@github.com:WiktorLogov/EdurekaDevopsProject.git",  
14-                credentialsId: "WiktorLogov"  
15-            }  
16-        }  
17-    }  
18-}
```

Here is the full pipeline code

```

1 pipeline {
2     agent none
3     stages {
4         stage('Compile') {
5             agent { label 'Slave-1' }
6             steps {
7                 build job: 'Compile Code'
8             }
9         }
10        stage('Test') {
11            agent { label 'Slave-2' }
12            steps {
13                build job: 'Test Code'
14            }
15        }
16        stage('Package') {
17            agent { label 'Slave-3' }
18            steps {
19                build job: 'Package Code'
20            }
21        }
22    }
23 }
24

```

```

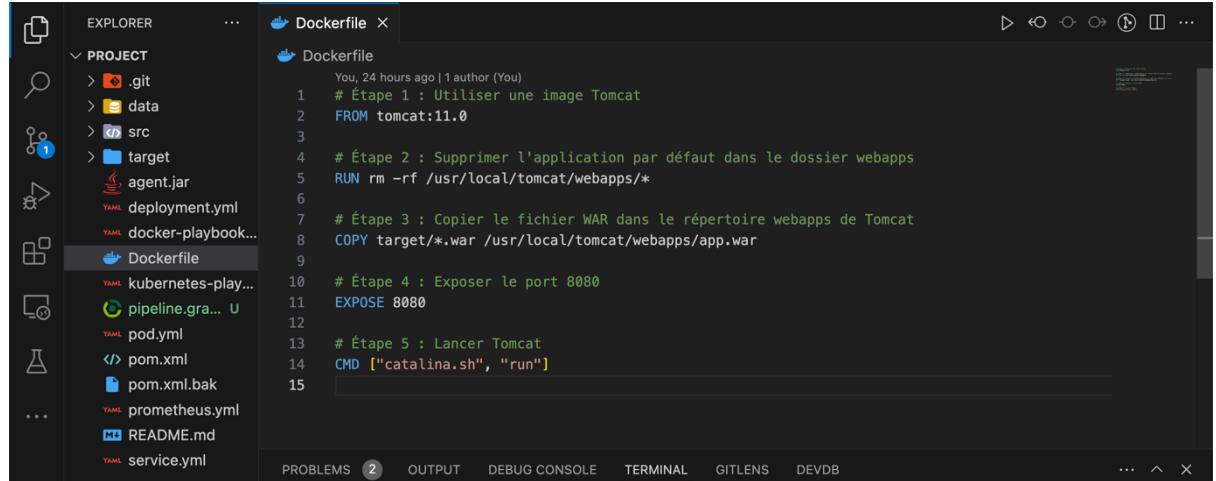
Démarré par l'utilisateur Mike Logovi
[Pipeline] Start of Pipeline
[Pipeline] withEnv
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Clone Repository)
[Pipeline] node
Running on Slave-1 in /Users/teteelommiikenorberlogovi/.jenkins/workspace/Pipeline CICD
[Pipeline] {
[Pipeline] echo
Cloning repository...
[Pipeline] git
The recommended git tool is: NONE
Warning: CredentialId "MikeLogovi" could not be found.
Cloning the remote Git repository
Cloning repository git@github.com:MikeLogovi/EdurekaDevopsProject.git
> git init /Users/teteelommiikenorberlogovi/.jenkins/workspace/Pipeline CICD # timeout=10
Fetching upstream changes from git@github.com:MikeLogovi/EdurekaDevopsProject.git
> git --version # timeout=10
> git -version # 'git version 2.39.3 (Apple Git-146)'
> git fetch --tags --force --progress --git@github.com:MikeLogovi/EdurekaDevopsProject.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git fetch --tags --force --progress --git@github.com:MikeLogovi/EdurekaDevopsProject.git +refs/heads/*:refs/remotes/origin/*
Avoid second fetch
Checking out Revision deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f (refs/remotes/origin/main)
Commit message: "wip"
First time build. Skipping changelog.
[Pipeline] }
[Pipeline] // node
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Compile)
> git config remote.origin.url git@github.com:MikeLogovi/EdurekaDevopsProject.git # timeout=10
> git config --add remote.origin.fetch +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
> git config core.ignoreCacheOnCheckout # timeout=10

```

III - Task 3 : Containerization with Docker

A) Docker file

For this part, I firstly created the dockerfile



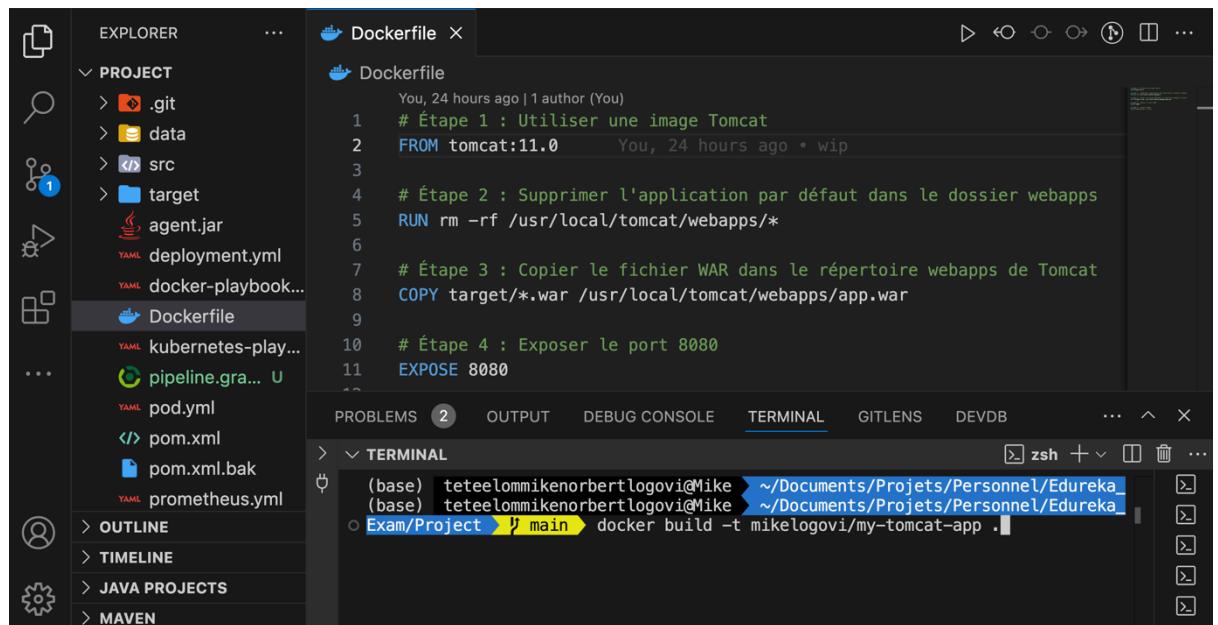
```
EXPLORER PROJECT > .git > data > src > target agent.jar deployment.yml docker-playbook... Dockerfile kubernetes-play... pipeline.gra... pod.yml pom.xml pom.xml.bak prometheus.yml README.md service.yml
```

```
Dockerfile
You, 24 hours ago | 1 author (You)
1 # Étape 1 : Utiliser une image Tomcat
2 FROM tomcat:11.0
3
4 # Étape 2 : Supprimer l'application par défaut dans le dossier webapps
5 RUN rm -rf /usr/local/tomcat/webapps/*
6
7 # Étape 3 : Copier le fichier WAR dans le répertoire webapps de Tomcat
8 COPY target/*.war /usr/local/tomcat/webapps/app.war
9
10 # Étape 4 : Exposer le port 8080
11 EXPOSE 8080
12
13 # Étape 5 : Lancer Tomcat
14 CMD ["catalina.sh", "run"]
15
```

PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL GITLENS DEVDB ... ^ X

B) Docker Image Creation

Then I built the image with docker build command



```
EXPLORER PROJECT > .git > data > src > target agent.jar deployment.yml docker-playbook... Dockerfile kubernetes-play... pipeline.gra... pod.yml pom.xml pom.xml.bak prometheus.yml
```

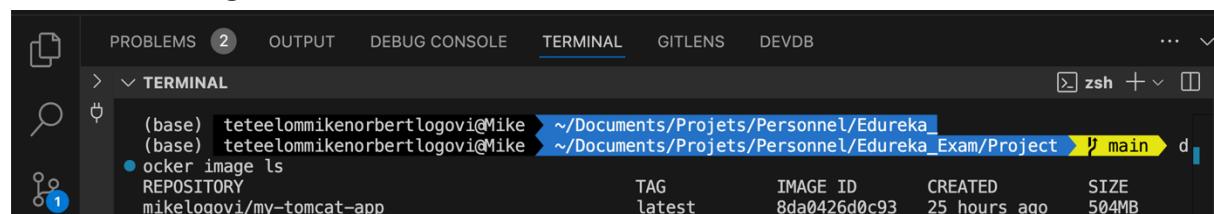
```
Dockerfile
You, 24 hours ago | 1 author (You)
1 # Étape 1 : Utiliser une image Tomcat
2 FROM tomcat:11.0 You, 24 hours ago • wip
3
4 # Étape 2 : Supprimer l'application par défaut dans le dossier webapps
5 RUN rm -rf /usr/local/tomcat/webapps/*
6
7 # Étape 3 : Copier le fichier WAR dans le répertoire webapps de Tomcat
8 COPY target/*.war /usr/local/tomcat/webapps/app.war
9
10 # Étape 4 : Exposer le port 8080
11 EXPOSE 8080
12
```

PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL GITLENS DEVDB ... ^ X

> OUTLINE > TIMELINE > JAVA PROJECTS > MAVEN

```
TERMINAL
(base) teteelommikenorbertlogovi@Mike ~Documents/Projets/Personnel/Edureka_
(base) teteelommikenorbertlogovi@Mike ~Documents/Projets/Personnel/Edureka_
○ Exam/Project ➤ main ➤ docker build -t mikelogovi/my-tomcat-app .
```

Here is the image listed



```
TERMINAL
(base) teteelommikenorbertlogovi@Mike ~Documents/Projets/Personnel/Edureka_
(base) teteelommikenorbertlogovi@Mike ~Documents/Projets/Personnel/Edureka_
○ Docker image ls
REPOSITORY          TAG      IMAGE ID      CREATED       SIZE
mikelogovi/my-tomcat-app    latest   8da0426d0c93  25 hours ago  504MB
```

C) Docker Container

```

(base) teteelommi@norbertlogovi:~/Documents/Projets/Personnel/Edureka_Exam/Project$ docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS
8035482aa5ee      mikelogovi/my-tomcat-app   "catalina.sh run"   9 seconds ago    Up 8 seconds       0.0.0.0:8080->8080/tcp

```

D) Docker Integration in Jenkins

To be able to integrate docker in jenkins, i firstly downloaded the corresponding plugins needed for docker and created my Docker cloud in jenkins.

Here are the related screenshots

The screenshot shows the Jenkins Plugins page. The search bar at the top contains the text "Docker". On the left, there is a sidebar with tabs: "Mises à jour", "Plugins disponibles", "Plugins installés" (which is selected), and "Paramètres avancés". The main area displays a list of installed Docker-related plugins:

- Docker API Plugin**: Version 3.4.0-94.vb5ced49b_a_7d5. Status: Activé. Description: This plugin provides docker-java API for other plugins. Report an issue with this plugin. A note below says: "This plugin is up for adoption! We are looking for new maintainers. Visit our Adopt-a-Plugin initiative for more information."
- Docker Commons Plugin**: Version 445.v0b_646c962a_94. Status: Activé. Description: Provides the common shared functionality for various Docker-related plugins. Report an issue with this plugin.
- Docker Pipeline**: Version 580.v0c34d688b_54. Status: Activé. Description: Build and use Docker containers from pipelines. Report an issue with this plugin.
- Docker plugin**: Version 1.70. Status: Activé. Description: This plugin integrates Jenkins with Docker. Report an issue with this plugin.

The screenshot shows the Jenkins Clouds configuration page for the "My Docker" cloud. The left sidebar has tabs: "Status", "Configure" (which is selected), "Delete Cloud", and "Cloud Statistics". The main area is titled "Configuration du cloud My Docker". It includes fields for "Name" (set to "My Docker"), "Docker Host URI" (set to "unix:///var/run/docker.sock"), "Server credentials" (set to "- aucun -"), and "Enabled" (checkbox is unchecked). There is also a note: "⚠ Note: Disabled." Below these are "Error Duration" (set to "Default = 300") and "Expose DOCKER_HOST" (checkbox is unchecked). At the bottom is a "Save" button.

E) Pipeline CICD to build image and deploy a container

In jenkins, there is the code

The screenshot shows the Jenkins Pipeline configuration page. The pipeline script is defined as follows:

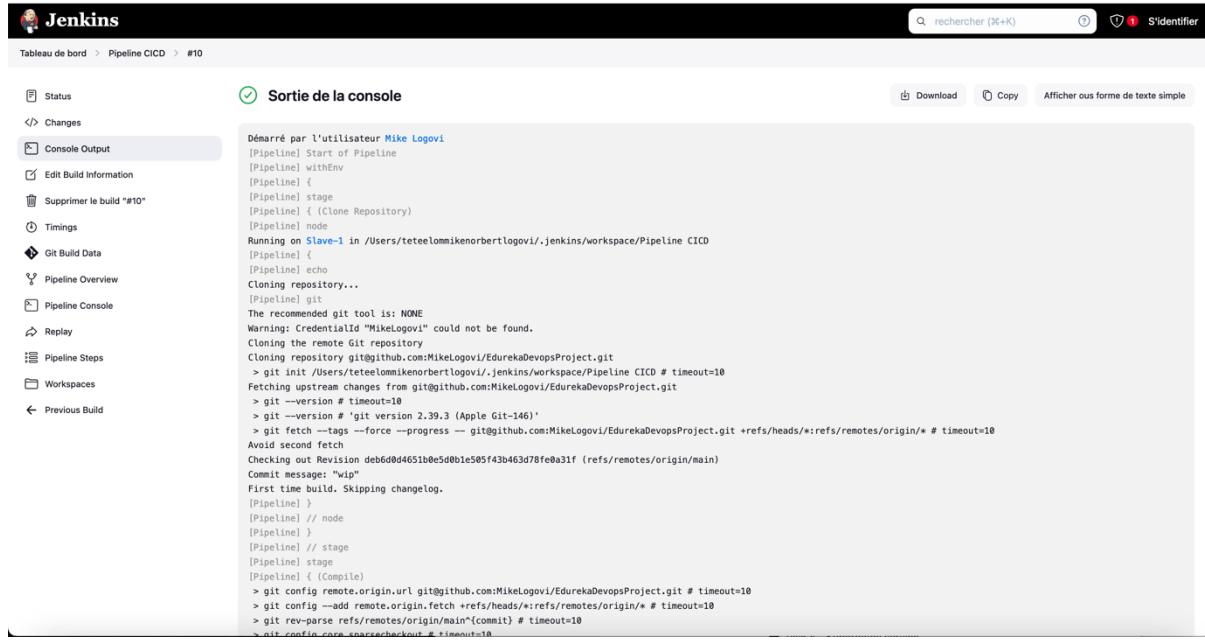
```
stage('Build Docker Image') {
    agent { label 'Slave-1' }
    steps {
        sh "docker build -t ${DOCKER_IMAGE} ."
    }
}
stage('Deploy Container') {
    agent { label 'Slave-1' }
    steps {
        sh """
            docker stop ${CONTAINER_NAME} || true
            docker rm ${CONTAINER_NAME} || true
            docker run -d -p 8083:8080 --name ${CONTAINER_NAME} ${DOCKER_IMAGE}
        """
    }
}
```

Below the script, there is a checkbox for "Use Groovy Sandbox". At the bottom, there are "Sauvegarder" and "Appliquer" buttons.

Here is the full code

```
1 pipeline {
2     agent none
3     environment {
4         DOCKER_IMAGE = "mikelogovi/my-tomcat-app"
5         CONTAINER_NAME = "my-tomcat-container"
6     }
7
8     stages {
9         stage('Clone Repository') {
10            agent { label 'Slave-1' }
11            steps {
12                echo 'Cloning repository...'
13                git branch: 'main',
14                    url: 'git@github.com:MikeLogovi/EdurekaDevopsProject.git',
15                    credentialsId: 'MikeLogovi'
16            }
17        }
18        stage('Compile') {
19            agent { label 'Slave-1' }
20            steps {
21                build job: 'Compile Code'
22            }
23        }
24        stage('Test') {
25            agent { label 'Slave-1' }
26            steps {
27                build job: 'Test Code'
28            }
29        }
30        stage('Package') {
31            agent { label 'Slave-1' }
32            steps {
33                build job: 'Package Code'
34            }
35        }
36        stage('Check Workspace') {
37            agent { label 'Slave-1' }
38            steps {
39                sh 'ls -l' // Vérifie que le Dockerfile est présent
40            }
41        }
42        stage('Build Docker Image') {
43            agent { label 'Slave-1' }
44            steps {
45                sh 'docker build -t ${DOCKER_IMAGE} .'
46            }
47        }
48        stage('Deploy Container') {
49            agent { label 'Slave-1' }
50            steps {
51                sh '''
52                docker stop ${CONTAINER_NAME} || true
53                docker rm ${CONTAINER_NAME} || true
54                docker run -d -p 8083:8080 --name ${CONTAINER_NAME} ${DOCKER_IMAGE}
55                '''
56            }
57        }
58    }
59 }
```

And then the pipeline worked successfully



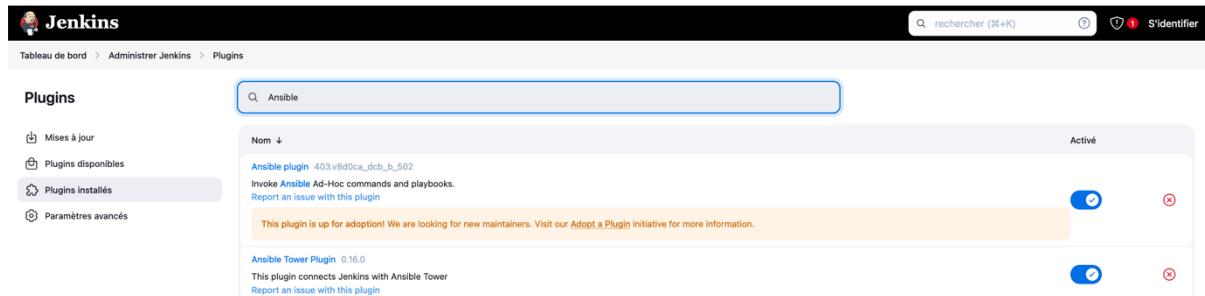
The screenshot shows the Jenkins interface for a Pipeline CICD job. The left sidebar has a 'Console Output' section selected. The main area displays the Jenkinsfile code and its execution logs. The logs show the pipeline starting, cloning a repository from GitHub, and executing a series of git commands to set up the build environment. It also shows the configuration of Ansible and the execution of Ansible ad-hoc commands.

```
Démarré par l'utilisateur Mike Logovi
[Pipeline] Start of Pipeline
[Pipeline] withEnv
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Clone Repository)
[Pipeline] node
[Pipeline] {
Running on Slave-1 in /Users/teteelomikenorbertlogovi/.jenkins/workspace/Pipeline CICD
[Pipeline] {
[Pipeline] echo
[Pipeline] Cloning repository...
[Pipeline] git
The recommended git tool is: NONE
Warning: CredentialId "mikelogovi" could not be found.
Cloning the remote Git repository
Cloning repository git@github.com:MikeLogovi/EdurekaDevopsProject.git
> git init /Users/teteelomikenorbertlogovi/.jenkins/workspace/Pipeline CICD # timeout=10
Fetching upstream changes from git@github.com:MikeLogovi/EdurekaDevopsProject.git
> git --version # timeout=10
> git -version # 'git version 2.39.3 (Apple Git-146)'
> git fetch --tags --progress -- git@github.com:MikeLogovi/EdurekaDevopsProject.git +refs/heads/*:refs/remotes/origin/*
> git config --add remote.origin.fetch +refs/heads/*:refs/remotes/origin/*
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
> git config core.sparsecheckout # timeout=10
Checking out Revision deb60d4651b0e5d00ble505f43b463d78feb031f (refs/remotes/origin/main)
Commit message: "wip"
First time build. Skipping changelog.
[Pipeline] }
[Pipeline] // node
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] {
[Pipeline] { (Compile)
> git config remote.origin.url git@github.com:MikeLogovi/EdurekaDevopsProject.git # timeout=10
> git config --add remote.origin.fetch +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
> git config core.sparsecheckout # timeout=10
```

IV - Task 4 : Configuration Management with Ansible

A) Integration of ansible in Jenkins

Fistly I installed ansible plugins in Jenkins



After that, I provided my ansible executable path to jenkins

The screenshot shows the Jenkins 'Tools' configuration page. It includes sections for 'Installations Maven', 'Installations Ansible', and 'Installations Docker'.

- Installations Maven:** Shows a single entry named 'Installations Maven' with the status 'Edited'.
- Installations Ansible:** A configuration form for Ansible:
 - Name:** My Ansible
 - Path to ansible executables directory:** /Users/teteelomnikenobertlogovi/anaconda3/bin/ansible
 - A warning message: **⚠ /Users/teteelomnikenobertlogovi/anaconda3/bin/ansible is not a directory on the Jenkins controller (but perhaps it exists on some agents)**
 - Install automatically:** An unchecked checkbox.
- Installations Docker:** A configuration form for Docker:
 - Ajouter Docker** button
 - Enregistrer** and **Appliquer** buttons

B) Ansible playbook to deploy docker container

Here is the screenshot of my ansible playbook to deploy container

```

EXPLORER      ...
PROJECT       ...
> .git
> data
> src
> target
agent.jar
deployment.yml
YAML docker-playbook...
Dockerfile
YAML kubernetes-play...
pipeline-an... U
pipeline.gra... U
pod.yml
pom.xml
pom.xml.bak
prometheus.yml
README.md
YAML service.yml
...

YAML docker-playbook.yml ×
YAML docker-playbook.yml
You, 1 hour ago | 1 author (You)
1   - name: Build Docker Image and Deploy Container
2     hosts: docker
3     tasks:
4       - name: Build Docker image
5         ansible.builtin.command:
6           cmd: docker build -t my-tomcat-app .
7           chdir: /Users/teteelomnikenobertlogovi/Documents/Projets/Personnel/Edureka_Exam/Project
8
9       - name: Check if container exists
10      ansible.builtin.command:
11        cmd: docker ps -q -f name=my-tomcat-container
12        register: container_status
13
14       - name: Stop existing container if running
15         ansible.builtin.command:
16           cmd: docker stop my-tomcat-container
17           when: container_status.stdout != ""
18
19       - name: Remove existing container
20         ansible.builtin.command:
21           cmd: docker rm my-tomcat-container || true
22           when: container_status.stdout != ""
23
24       - name: Run Docker container
25         ansible.builtin.command:
26           cmd: docker run -d -p 8083:8080 --name my-tomcat-container my-tomcat-app
27
28

```

C) Pipeline with Ansible

I was able to write pipeline in Jenkins with ansible to deploy container using ansible playbook

localhost:8080/job/Pipeline CICD Ansible/configure

Tableau de bord > Pipeline CICD Ansible > Configuration

Configurer

Période d'attente ?
 Déclencher les builds à distance (Par exemple, à partir de scripts) ?

Général

Advanced Project Options
 Pipeline

Advanced Project Options

Avancé

Pipeline

Definition

Pipeline script

```

7      echo 'Cloning repository...'
8      git branch: 'main',
9          url: 'git@github.com:MikelLogovi/EdurekaDevopsProject.git',
10         credentialsId: 'MikelLogovi'
11     }
12   }
13   stages {
14     stage('Build and Deploy with Ansible') {
15       agent { label 'Slave-1' }
16       steps {
17         ansiblePlaybook(
18           installation: 'Ansible',
19           playbook: '/etc/ansible/docker-playbook.yml'
20         )
21     }
22   }

```

Use Groovy Sandbox ?

Pipeline Syntax

Sauvegarder **Appliquer**

Jenkins

Tableau de bord > Pipeline CICD Ansible > #14

Status

Changes

Console Output

Edit Build Information
 Supprimer le build #14*

Timings

Git Build Data

Pipeline Overview

Pipeline Console

Replay

Pipeline Steps

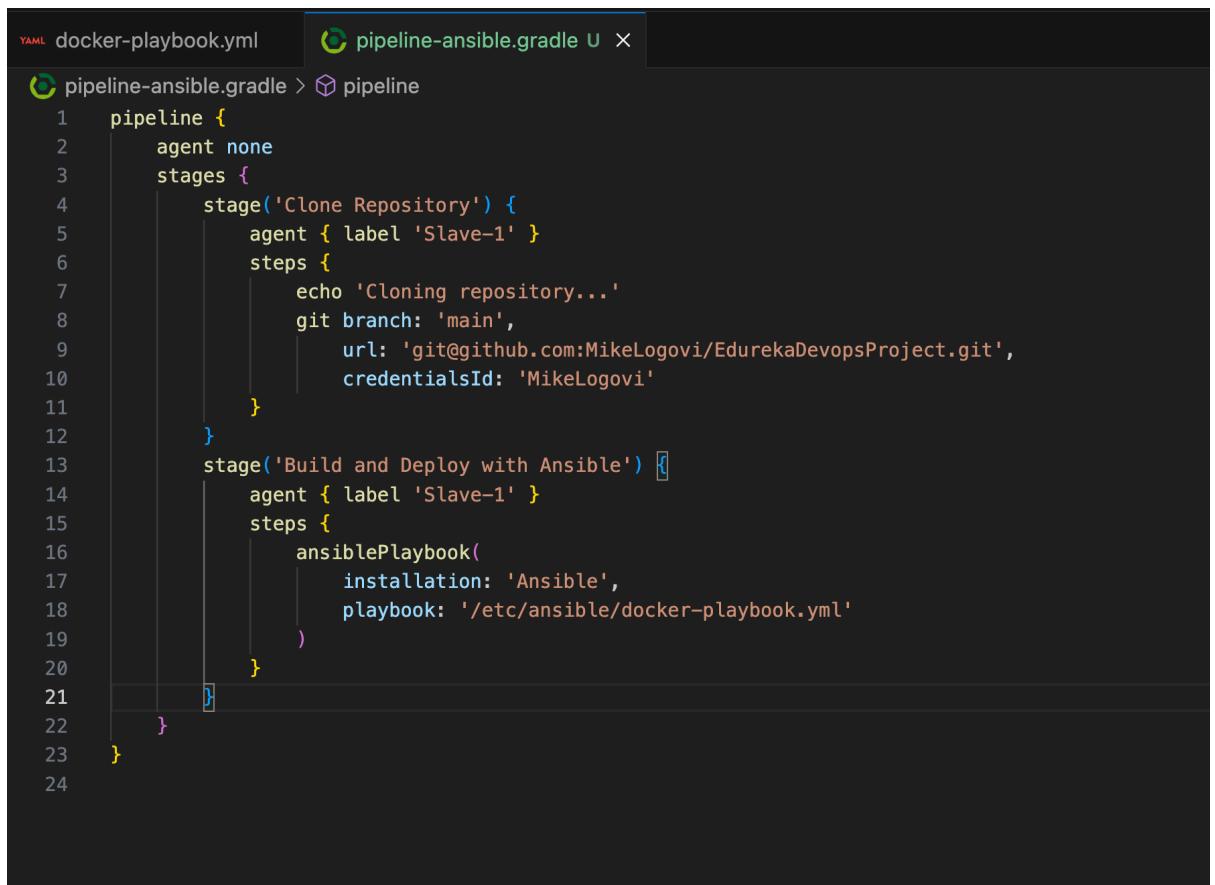
Workspaces

Previous Build

Sortie de la console

Démarré par l'utilisateur unknown or anonymous [Pipeline] Start of Pipeline [Pipeline] stage [Pipeline] { (Clone Repository) [Pipeline] node Running on Slave-1 in /Users/teteelomikkenoberlogovi/.jenkins/workspace/Pipeline CICD Ansible [Pipeline] { [Pipeline] node [Pipeline] echo Cloning repository... [Pipeline] git The recommended git tool is: NONE Warning: CredentialId "MikelLogovi" could not be found. Fetching changes from the remote Git repository Checking out Revision deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f (refs/remotes/origin/main) Commit message: "wip" > git rev-parse --resolve-git-dir /Users/teteelomikkenoberlogovi/.jenkins/workspace/Pipeline CICD Ansible/.git # timeout=10 > git config remote.origin.url git@github.com:MikelLogovi/EdurekaDevopsProject.git # timeout=10 Fetching upstream changes from git@github.com:MikelLogovi/EdurekaDevopsProject.git > git --version # timeout=10 > git --version # "git version 2.39.3 (Apple Git-146)" > git fetch --tags --force --progress -- git@github.com:MikelLogovi/EdurekaDevopsProject.git +refs/heads/*:refs/remotes/origin/* # timeout=10 > git rev-parse refs/remotes/origin/main^{commit} # timeout=10 > git config core.sparsecheckout # timeout=10 > git checkout -f deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f # timeout=10 > git branch -a -v --no-abbrev # timeout=10 > git branch -D main # timeout=10 > git checkout -b main deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f # timeout=10 > git rev-list --no-walk deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f # timeout=10 [Pipeline] {} [Pipeline] // node [Pipeline] {} [Pipeline] // stage [Pipeline] stage [Pipeline] { (Build and Deploy with Ansible) [Pipeline] node

Here is the full code :

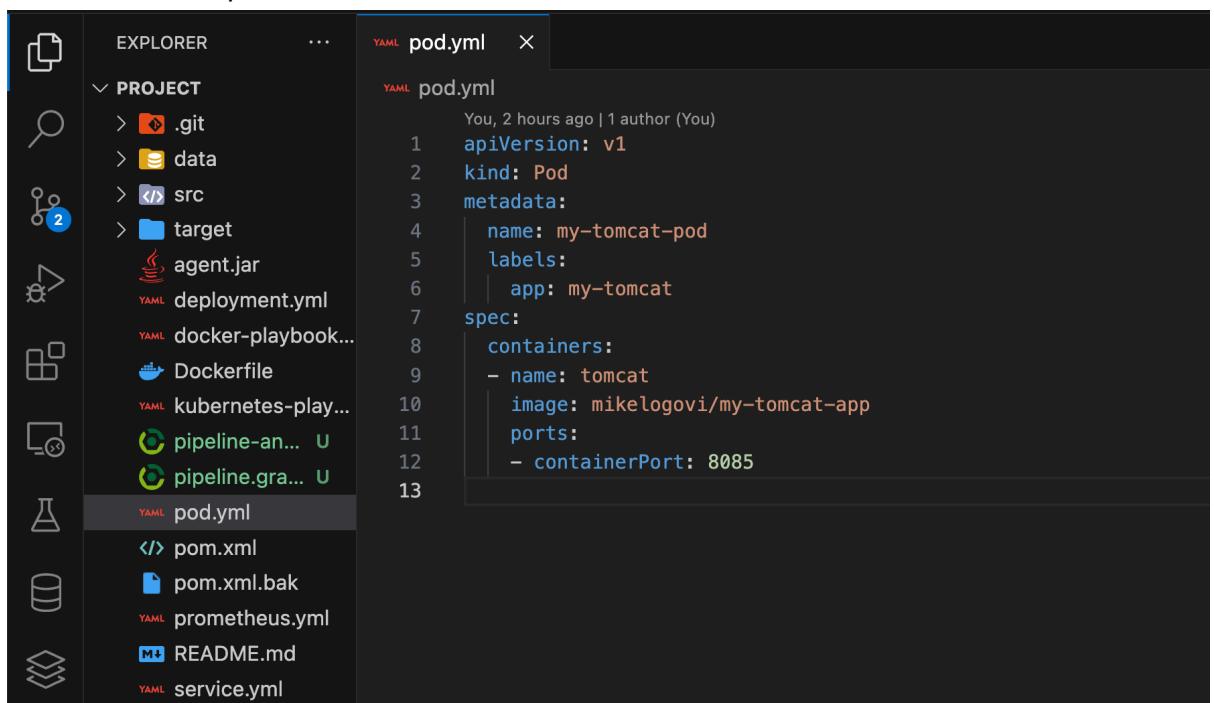


```
YAML docker-playbook.yml pipeline-ansible.gradle U X
pipeline {
    agent none
    stages {
        stage('Clone Repository') {
            agent { label 'Slave-1' }
            steps {
                echo 'Cloning repository...'
                git branch: 'main',
                    url: 'git@github.com:MikeLogovi/EdurekaDevopsProject.git',
                    credentialsId: 'MikeLogovi'
            }
        }
        stage('Build and Deploy with Ansible') {
            agent { label 'Slave-1' }
            steps {
                ansiblePlaybook(
                    installation: 'Ansible',
                    playbook: '/etc/ansible/docker-playbook.yml'
                )
            }
        }
    }
}
```

After that, I create kubernetes manifests

D) Pod

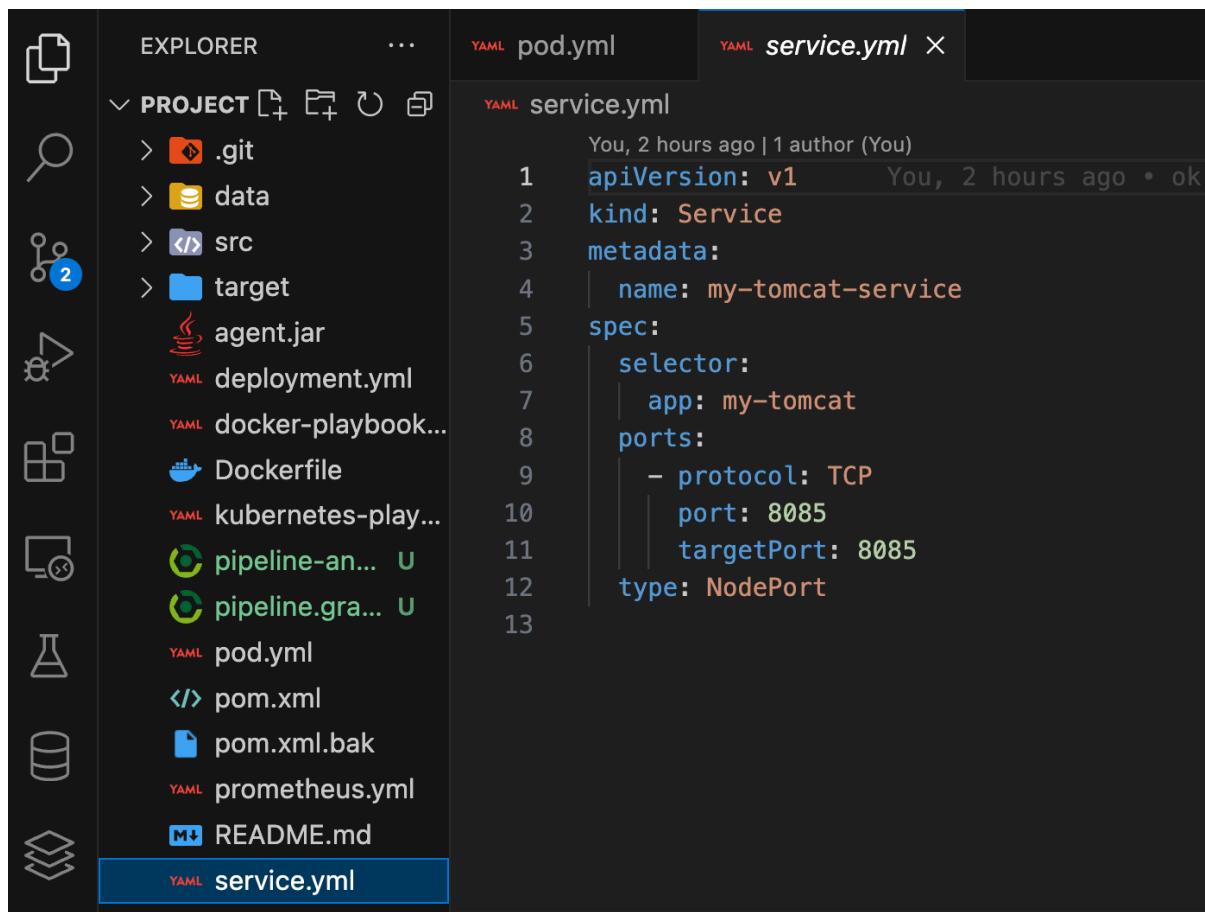
Here is the created pod code



```
YAML pod.yml
apiVersion: v1
kind: Pod
metadata:
  name: my-tomcat-pod
  labels:
    app: my-tomcat
spec:
  containers:
    - name: tomcat
      image: mikelogovi/my-tomcat-app
      ports:
        - containerPort: 8085
```

E) Service

My created service code :

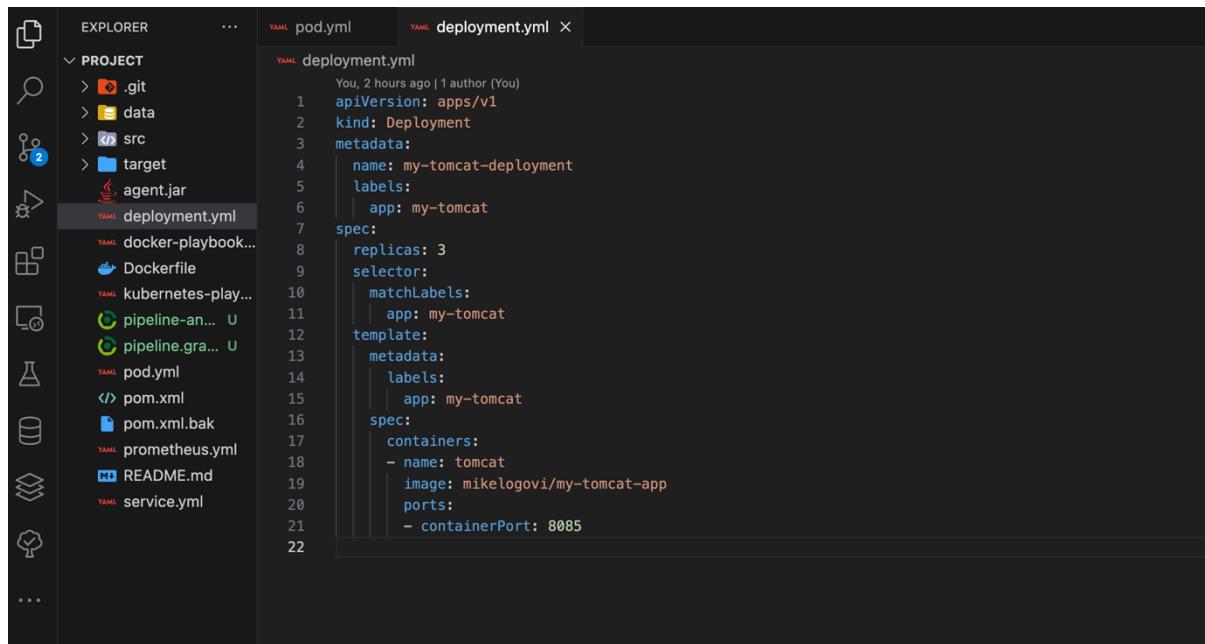


The screenshot shows the VS Code interface with the Explorer sidebar open, displaying a project structure. The service.yml file is selected in the Explorer and is also the active tab in the main editor area. The code is as follows:

```
apiVersion: v1
kind: Service
metadata:
  name: my-tomcat-service
spec:
  selector:
    app: my-tomcat
  ports:
    - protocol: TCP
      port: 8085
      targetPort: 8085
  type: NodePort
```

F) Deployment

My created deployment code :

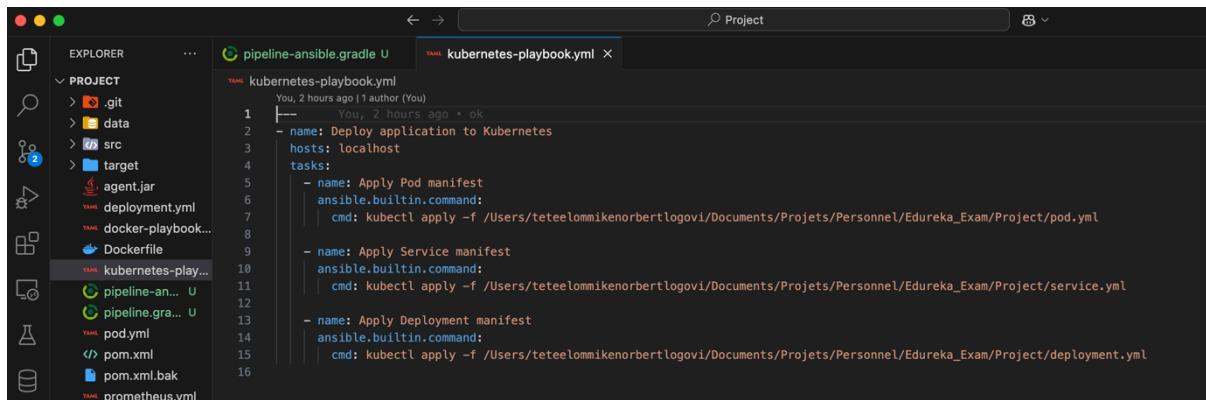


The screenshot shows the VS Code interface with the Explorer sidebar open, displaying a project structure. The deployment.yml file is selected in the Explorer and is also the active tab in the main editor area. The code is as follows:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: my-tomcat-deployment
  labels:
    app: my-tomcat
spec:
  replicas: 3
  selector:
    matchLabels:
      app: my-tomcat
  template:
    metadata:
      labels:
        app: my-tomcat
    spec:
      containers:
        - name: tomcat
          image: mikelogovi/my-tomcat-app
          ports:
            - containerPort: 8085
```

G) Ansible playbook with kubernetes

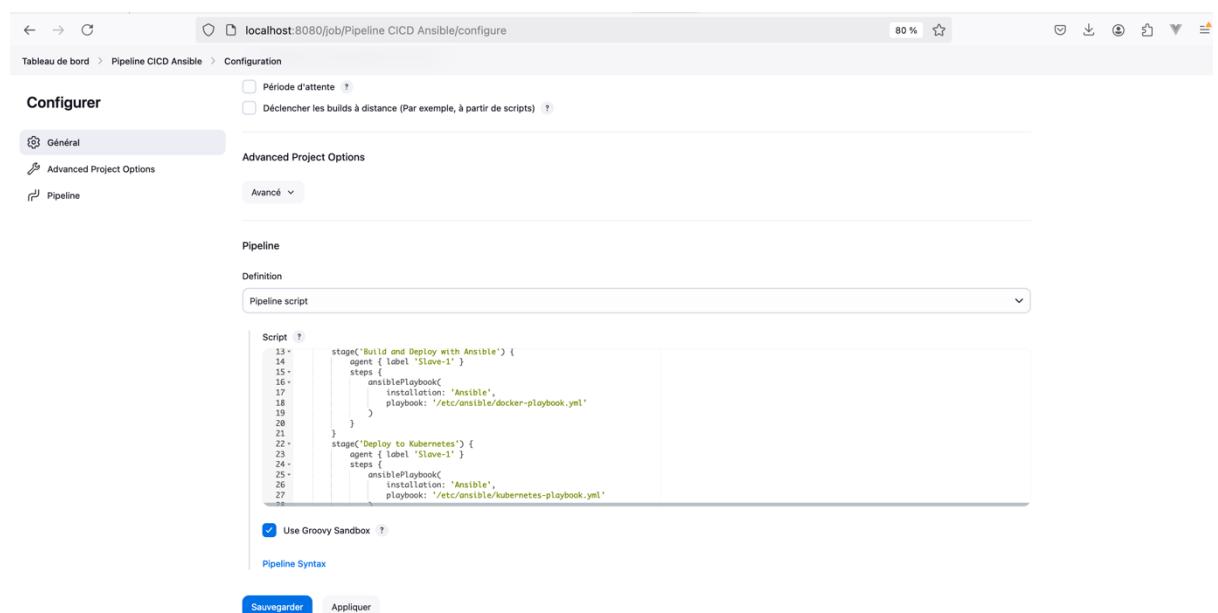
Then I created the ansible playbook using kubernetes



```
YAML kubernetes-playbook.yml
You, 2 hours ago | 1 author (You)
1   You, 2 hours ago * ok
2   - name: Deploy application to Kubernetes
3     hosts: localhost
4     tasks:
5       - name: Apply Pod manifest
6         ansible.builtin.command:
7           cmd: kubectl apply -f /Users/teteelommikenorbertlogovi/Documents/Projets/Personnel/Edureka_Exam/Project/pod.yml
8
9       - name: Apply Service manifest
10      ansible.builtin.command:
11        cmd: kubectl apply -f /Users/teteelommikenorbertlogovi/Documents/Projets/Personnel/Edureka_Exam/Project/service.yml
12
13     - name: Apply Deployment manifest
14       ansible.builtin.command:
15         cmd: kubectl apply -f /Users/teteelommikenorbertlogovi/Documents/Projets/Personnel/Edureka_Exam/Project/deployment.yml
16
```

H) Pipeline CI/CD with Ansible, Kubernetes and Jenkins

The pipeline in jenkins



The screenshot shows the Jenkins Pipeline configuration page for a project named "Pipeline CICD Ansible". The configuration is set to "Pipeline script". The pipeline script is defined as follows:

```
stage('Build and Deploy with Ansible') {
    agent { label 'Slave-1' }
    steps {
        ansiblePlaybook(
            installation: 'Ansible',
            playbook: '/etc/ansible/docker-playbook.yml'
        )
    }
}
stage('Deploy to Kubernetes') {
    agent { label 'Slave-1' }
    steps {
        ansiblePlaybook(
            installation: 'Ansible',
            playbook: '/etc/ansible/kubernetes-playbook.yml'
        )
    }
}
```

At the bottom of the page, there are "Sauvegarder" and "Appliquer" buttons.

The full code is below

```

1 pipeline {
2     agent none
3     stages {
4         stage('Clone Repository') {
5             agent { label 'Slave-1' }
6             steps {
7                 echo 'Cloning repository...'
8                 git branch: 'main',
9                     url: 'git@github.com:MikeLogovi/EdurekaDevopsProject.git',
10                    credentialsId: 'MikeLogovi'
11             }
12         }
13         stage('Build and Deploy with Ansible') {
14             agent { label 'Slave-1' }
15             steps {
16                 ansiblePlaybook(
17                     installation: 'Ansible',
18                     playbook: '/etc/ansible/docker-playbook.yml'
19                 )
20             }
21         }
22         stage('Deploy to Kubernetes') {
23             agent { label 'Slave-1' }
24             steps {
25                 ansiblePlaybook(
26                     installation: 'Ansible',
27                     playbook: '/etc/ansible/kubernetes-playbook.yml'
28                 )
29             }
30         }
31     }
32 }
33

```

Jenkins

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Status Sortie de la console Download Copy Afficher sous forme de texte simple

Changes Console Output Edit Build Information Supprimer le build "#14" Timings Git Build Data Pipeline Overview Pipeline Console Restart from Stage Replay Pipeline Steps Workspaces ← Previous Build

Démarré par l'utilisateur unknown or anonymous
[Pipeline] Start of Pipeline
[Pipeline] stage
[Pipeline] { (Clone Repository)
[Pipeline] node
Running on Slave-1 in /Users/teteelommi(enorbertlogovi/.jenkins/workspace/Pipeline CICD Ansible
[Pipeline]
[Pipeline] echo
Cloning repository...
[Pipeline] git
The recommended git tool is: NONE
Warning: CredentialId "MikeLogovi" could not be found.
Fetching changes from the remote Git repository
Checking out Revision deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f (refs/remotes/origin/main)
Commit message: "wip"
> git rev-parse --git-dir /Users/teteelommi(enorbertlogovi/.jenkins/workspace/Pipeline CICD Ansible/.git # timeout=10
> git config remote.origin.url git@github.com:MikeLogovi/EdurekaDevopsProject.git # timeout=10
Fetching upstream changes from git@github.com:MikeLogovi/EdurekaDevopsProject.git
> git --version # timeout=10
> git --version # git version 2.39.3 (Apple Git-146)
> git fetch --tags --force --progress -- git@github.com:MikeLogovi/EdurekaDevopsProject.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^(commit) # timeout=10
> git config core.sparsecheckout # timeout=10
> git checkout -f deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f # timeout=10
> git branch -a -v --no-abbrev # timeout=10
> git branch -D main # timeout=10
> git checkout -b main deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f # timeout=10
> git rev-list --no-walk deb6d0d4651b0e5d0b1e505f43b463d78fe0a31f # timeout=10
[Pipeline]
[Pipeline] // node
[Pipeline]
[Pipeline] // stage
[Pipeline] { (Build and Deploy with Ansible)

V - Task 5 : Resources monitoring with prometheus

For this task, I installed and run prometheus and the node exporter.

I also write a configuration file for prometheus to target the node exporter and scrape its data.

Here are the related screenshots

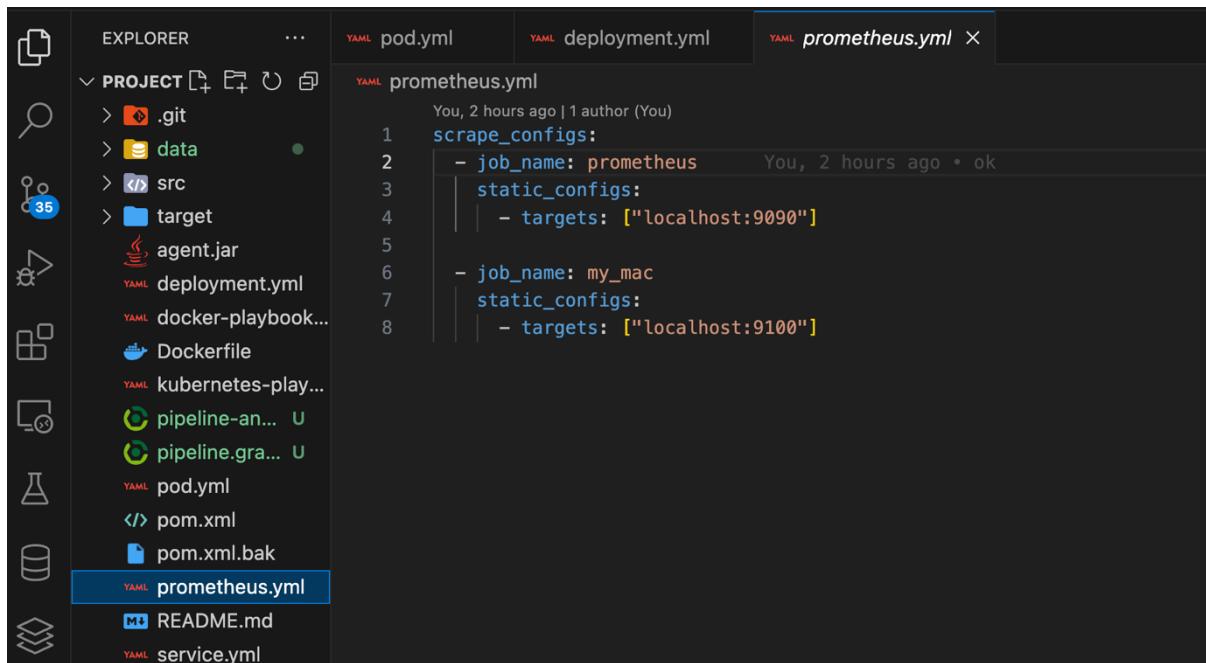
I started the prometheus here using its configuration file :

```
o (base) teteolmikenorbertlogov@Mike ~/Documents/Projets/Personnel/Edureka_Exam/Project$ ./main prometheus --config.file=~/prometheus.yml
time=2024-12-03T00:27:11.870-05:00 level=INFO source=main.go:642 msg="No time or size retention was set so using the default time retention" duration=15d
time=2024-12-03T00:27:11.870-05:00 level=INFO source=main.go:689 msg="Starting Prometheus Server" mode=server version="(version=3.0.1, branch=non-git, revision=non-git)"
time=2024-12-03T00:27:11.870-05:00 level=INFO source=main.go:694 msg="Operational information" build_context="(go=go1.23.3, platform=darwin/arm64, user=reproducible/reproducible, date=20241228-17:12:32, tags=netgo,builtinassets,stringlabels)" host_details=(darwin) fd_limits=(soft=61440, hard=unlimited) vm_limit=(soft=unlimited, hard=unlimited)"
time=2024-12-03T00:27:11.870-05:00 level=INFO source=main.go:770 msg="Leaving GOMAXPROCS=12: CPU quota undefined" component=automaxprocs
time=2024-12-03T00:27:11.875-05:00 level=INFO source=web.go:650 msg="Start listening for connections" component=web address=0.0.0.0:9090
time=2024-12-03T00:27:11.876-05:00 level=INFO source=main.go:1239 msg="Starting TSDB ..."
time=2024-12-03T00:27:11.878-05:00 level=INFO source=tls_config.go:347 msg="Listening on" component=web address=[::]:9090
time=2024-12-03T00:27:11.878-05:00 level=INFO source=tls_config.go:350 msg="TLS is disabled." component=web port2=false address=[::]:9090
time=2024-12-03T00:27:11.878-05:00 level=INFO source=repair.go:54 msg="Found healthy block" component=tsdb mint=1733140801797 maxt=1733148000000 ulid=01JE3YR4Bm7XZGZKYSBvNk7C
time=2024-12-03T00:27:11.878-05:00 level=INFO source=repair.go:54 msg="Found healthy block" component=tsdb mint=1733148163003 maxt=1733155200000 ulid=01JE457062A2V1XTKBA06XBPA
time=2024-12-03T00:27:11.878-05:00 level=INFO source=repair.go:54 msg="Found healthy block" component=tsdb mint=1733123886951 maxt=1733140800000 ulid=01JE4570N6GDR09EK958800NTZ
time=2024-12-03T00:27:11.878-05:00 level=INFO source=repair.go:54 msg="Found healthy block" component=tsdb mint=1733155393950 maxt=1733162400000 ulid=01JE4C2QY3GDD8Q6B09EXNG3Z
time=2024-12-03T00:27:11.884-05:00 level=INFO source=head.go:628 msg="Replaying on-disk memory mappable chunks if any" component=tsdb
time=2024-12-03T00:27:11.890-05:00 level=INFO source=head.go:75 msg="On-disk memory mappable chunks replay completed" component=tsdb duration=6.547417ms
time=2024-12-03T00:27:11.890-05:00 level=INFO source=head.go:723 msg="Replaying WAL, this may take a while" component=tsdb
time=2024-12-03T00:27:11.893-05:00 level=INFO source=head.go:761 msg="WAL checkpoint loaded" component=tsdb
time=2024-12-03T00:27:11.898-05:00 level=INFO source=head.go:795 msg="WAL segment loaded" component=tsdb segment=12 maxSegment=15
time=2024-12-03T00:27:11.909-05:00 level=INFO source=head.go:795 msg="WAL segment loaded" component=tsdb segment=13 maxSegment=15
time=2024-12-03T00:27:11.922-05:00 level=INFO source=head.go:795 msg="WAL segment loaded" component=tsdb segment=14 maxSegment=15
time=2024-12-03T00:27:11.922-05:00 level=INFO source=head.go:795 msg="WAL segment loaded" component=tsdb segment=15 maxSegment=15
time=2024-12-03T00:27:11.922-05:00 level=INFO source=wbl_replay.duration=2.634666ms wal_replay_
duration=29.338291ms wbl_replay.duration=125ms chunk_snapshot_load_duration=0ms mmap_chunk_replay_duration=6.547417ms total_replay_duration=38.547ms
time=2024-12-03T00:27:11.924-05:00 level=INFO source=main.go:1263 msg="TSDB started"
time=2024-12-03T00:27:11.924-05:00 level=INFO source=main.go:1263 msg="TSDB started"
time=2024-12-03T00:27:11.953-05:00 level=INFO source=main.go:1485 msg="Loading configuration file" filename=~/prometheus.yml
time=2024-12-03T00:27:11.953-05:00 level=INFO source=main.go:1485 msg="Updated GOGC" old=100 new=75
time=2024-12-03T00:27:11.953-05:00 level=INFO source=main.go:1495 msg="Completed loading of configuration file" db_storage=583ns remote_storage=2.667ns web_
handler=375ns query_engine=500ns scrape=28.315542ms scrape_sd=256.792us notify=2.458us notify_sd=500ns rules=1.084us tracing=193.375us filename=~/prometheus
.yml totalduration=29.44475ms
time=2024-12-03T00:27:11.953-05:00 level=INFO source=main.go:1224 msg="Server is ready to receive web requests."
time=2024-12-03T00:27:11.953-05:00 level=INFO source=manager.go:168 msg="Starting rule manager..." component=rule manager
time=2024-12-03T00:27:19.177-05:00 level=INFO source=compact.go:580 msg="Write block" component=tsdb mint=1733162400000 maxt=1733169600000 ulid=01JE5FSEGG6F
YC28QZT03M50V0 duration=377.279167ms ooo=false
```

This is the prometheus dashboard

The screenshot shows a browser window with the URL "localhost:9090/query". The top navigation bar includes links for Prometheus, Query, Alerts, and Status. Below the navigation is a search bar with the placeholder "Enter expression (press Shift+Enter for newlines)". Underneath the search bar are three tabs: Table, Graph, and Explain, with "Table" currently selected. A message "No data queried yet" is displayed. At the bottom left is a "+ Add query" button.

This is the prometheus config file



The screenshot shows a code editor interface with several tabs at the top: 'EXPLORER', 'pod.yml', 'deployment.yml', and 'prometheus.yml'. The 'prometheus.yml' tab is active, displaying the following YAML configuration:

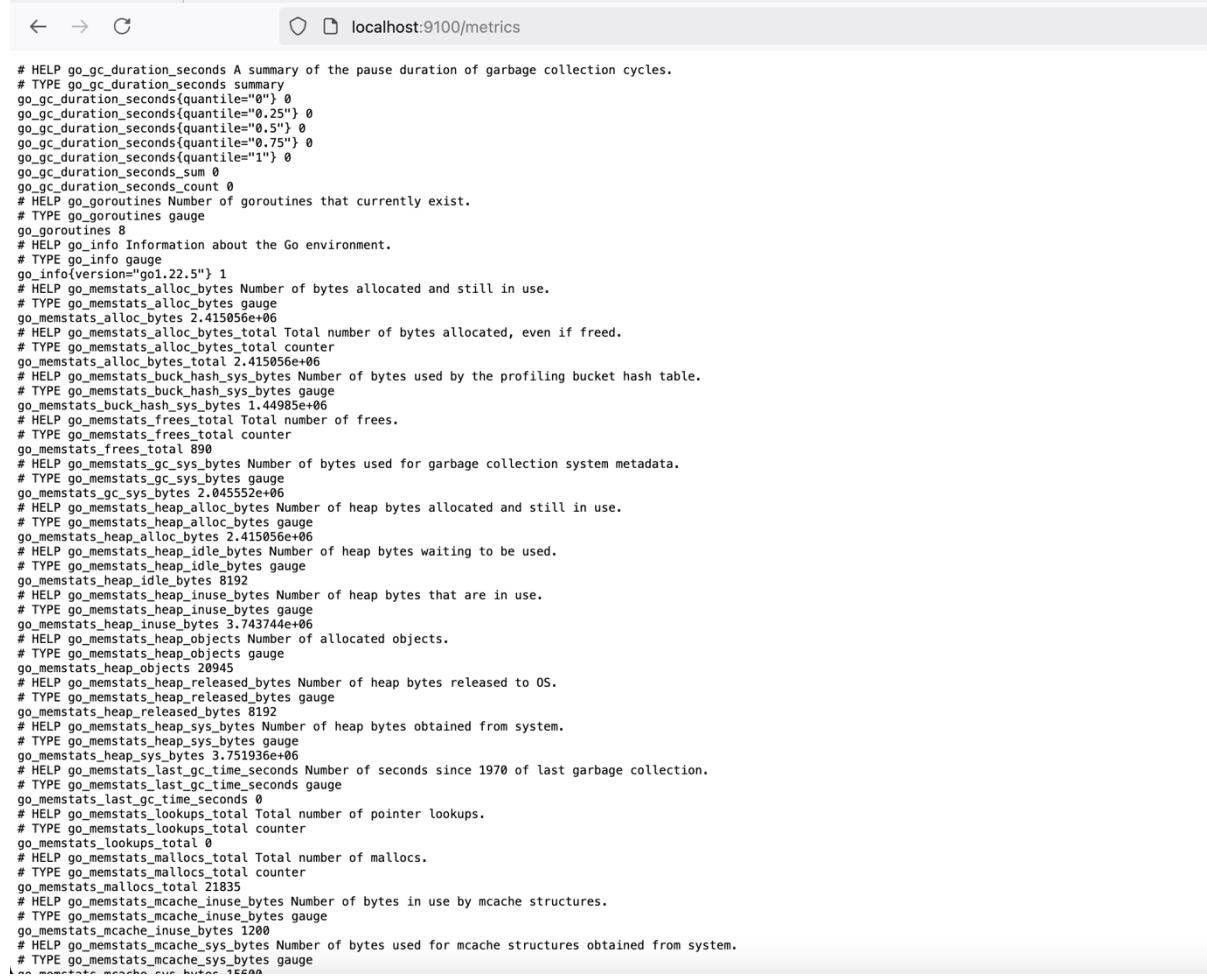
```
You, 2 hours ago | 1 author (You)
1 scrape_configs:
2   - job_name: prometheus
3     static_configs:
4       - targets: ["localhost:9090"]
5
6   - job_name: my_mac
7     static_configs:
8       - targets: ["localhost:9100"]
```

The left sidebar shows a project structure with files like '.git', 'data', 'src', 'target', 'agent.jar', 'deployment.yml', 'docker-playbook...', 'Dockerfile', 'kubernetes-play...', 'pipeline-an...', 'pipeline.gra...', 'pod.yml', 'pom.xml', 'pom.xml.bak', 'README.md', and 'service.yml'. The 'prometheus.yml' file is highlighted.

Here is how I started my node exporter

```
(base) teteelommikenorbertlogovi@Mike ~Documents/Projets/Personnel/Edureka_Exam/Project ➜ main ± brew services start node_exporter
Service `node_exporter` already started, use `brew services restart node_exporter` to restart.
(base) teteelommikenorbertlogovi@Mike ~Documents/Projets/Personnel/Edureka_Exam/Project ➜ main ±
```

Here is my node exporter



The screenshot shows a browser window with the URL "localhost:9100/metrics". The page displays a large amount of text representing the metrics exposed by the Node Exporter. The text is a series of metric definitions, each starting with a hash symbol (# HELP), followed by a metric name, a description, and its type (TYPE). The metrics include various Go runtime statistics such as GC duration, goroutines, memory allocation, heap usage, and mcache structures.

```
# HELP go_gc_duration_seconds A summary of the pause duration of garbage collection cycles.
# TYPE go_gc_duration_seconds summary
go_gc_duration_seconds{quantile="0"} 0
go_gc_duration_seconds{quantile="0.25"} 0
go_gc_duration_seconds{quantile="0.5"} 0
go_gc_duration_seconds{quantile="0.75"} 0
go_gc_duration_seconds{quantile="1"} 0
go_gc_duration_seconds_sum 0
go_gc_duration_seconds_count 0
# HELP go_goroutines Number of goroutines that currently exist.
# TYPE go_goroutines gauge
go_goroutines 8
# HELP go_info Information about the Go environment.
# TYPE go_info gauge
go_info{version="go1.22.5"} 1
# HELP go_memstats_alloc_bytes Number of bytes allocated and still in use.
# TYPE go_memstats_alloc_bytes gauge
go_memstats_alloc_bytes 2.415056e+06
# HELP go_memstats_alloc_bytes_total Total number of bytes allocated, even if freed.
# TYPE go_memstats_alloc_bytes_total counter
go_memstats_alloc_bytes_total 2.415056e+06
# HELP go_memstats_buck_hash_sys_bytes Number of bytes used by the profiling bucket hash table.
# TYPE go_memstats_buck_hash_sys_bytes gauge
go_memstats_buck_hash_sys_bytes 1.44985e+06
# HELP go_memstats_frees_total Total number of frees.
# TYPE go_memstats_frees_total counter
go_memstats_frees_total 890
# HELP go_memstats_gc_sys_bytes Number of bytes used for garbage collection system metadata.
# TYPE go_memstats_gc_sys_bytes gauge
go_memstats_gc_sys_bytes 2.045552e+06
# HELP go_memstats_heap_alloc_bytes Number of heap bytes allocated and still in use.
# TYPE go_memstats_heap_alloc_bytes gauge
go_memstats_heap_alloc_bytes 2.415056e+06
# HELP go_memstats_heap_idle_bytes Number of heap bytes waiting to be used.
# TYPE go_memstats_heap_idle_bytes gauge
go_memstats_heap_idle_bytes 8192
# HELP go_memstats_heap_inuse_bytes Number of heap bytes that are in use.
# TYPE go_memstats_heap_inuse_bytes gauge
go_memstats_heap_inuse_bytes 3.743744e+06
# HELP go_memstats_heap_objects Number of allocated objects.
# TYPE go_memstats_heap_objects gauge
go_memstats_heap_objects 20945
# HELP go_memstats_heap_released_bytes Number of heap bytes released to OS.
# TYPE go_memstats_heap_released_bytes gauge
go_memstats_heap_released_bytes 8192
# HELP go_memstats_heap_sys_bytes Number of heap bytes obtained from system.
# TYPE go_memstats_heap_sys_bytes gauge
go_memstats_heap_sys_bytes 3.751936e+06
# HELP go_memstats_last_gc_time_seconds Number of seconds since 1970 of last garbage collection.
# TYPE go_memstats_last_gc_time_seconds gauge
go_memstats_last_gc_time_seconds 0
# HELP go_memstats_lookups_total Total number of pointer lookups.
# TYPE go_memstats_lookups_total counter
go_memstats_lookups_total 0
# HELP go_memstats_mallocs_total Total number of mallocs.
# TYPE go_memstats_mallocs_total counter
go_memstats_mallocs_total 21832
# HELP go_memstats_mcache_inuse_bytes Number of bytes in use by mcache structures.
# TYPE go_memstats_mcache_inuse_bytes gauge
go_memstats_mcache_inuse_bytes 1200
# HELP go_memstats_mcache_sys_bytes Number of bytes used for mcache structures obtained from system.
# TYPE go_memstats_mcache_sys_bytes gauge
go_memstats_mcache_sys_bytes 15500
```