Step-by-Step Guide to Deploying a Spring Boot Application with Docker and Kubernetes 🚀

NAME : SANDEEP P S

ROLLNUM : 22CSL261

1. Initialize and Clone the Repository

Initializes a new Git repository.
Clones the Spring Framework PetClinic project from GitHub.
Code:

git init
git clone "https://github.com/AranganathanPrakash/spring-framework-petclinic"

Screenshot:

```
root@Ubuntu:/home/vboxuser/task5.1# git init
hint: Using 'master' as the name for the initial branch. This default branch nam
e
hint: is subject to change. To configure the initial branch name to use in all
hint: of your new repositories, which will suppress this warning, call:
hint:
hint:   git config --global init.defaultBranch <name>
hint:
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
hint: 'development'. The just-created branch can be renamed via this command:
hint:
hint:   git branch -m <name>
Initialized empty Git repository in /home/vboxuser/task5.1/.git/
```

2. Navigate to the Project Directory
Moves into the cloned repository folder.
Code:

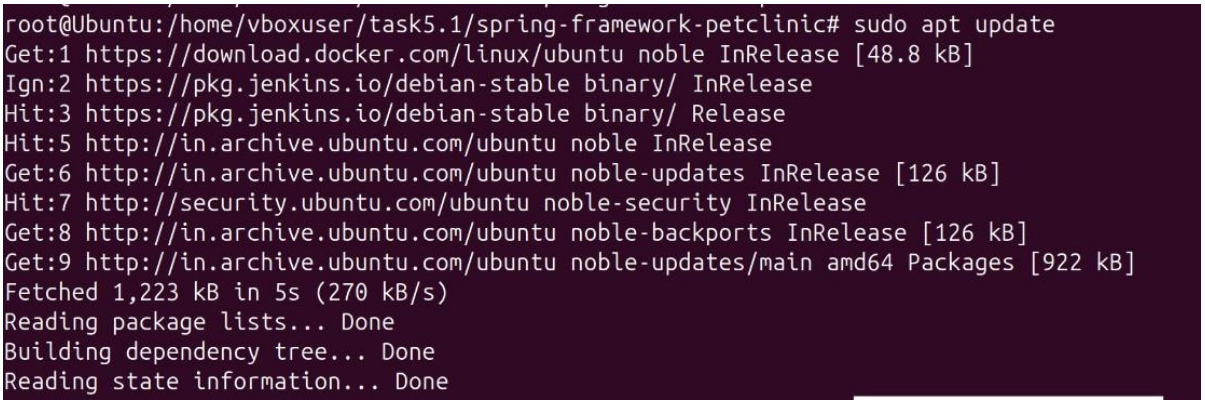
cd spring-framework-petclinic

3. Update System Packages

Updates the package list to ensure the latest versions are available.
Code:

sudo apt update

Screenshot:



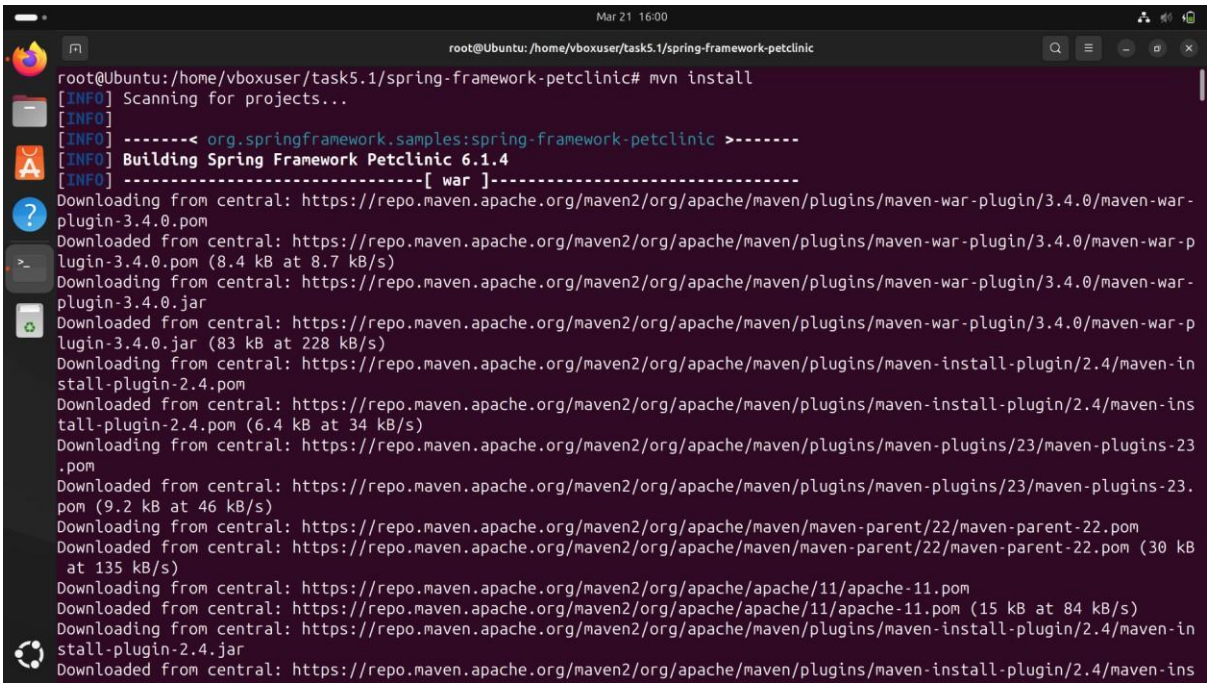
4. Install Maven

Installs Apache Maven, required for building the Spring Boot application.

Code:

sudo apt install maven

Screenshot:



5. Verify Maven Installation

Checks if Maven is installed correctly and displays the version.

Code:

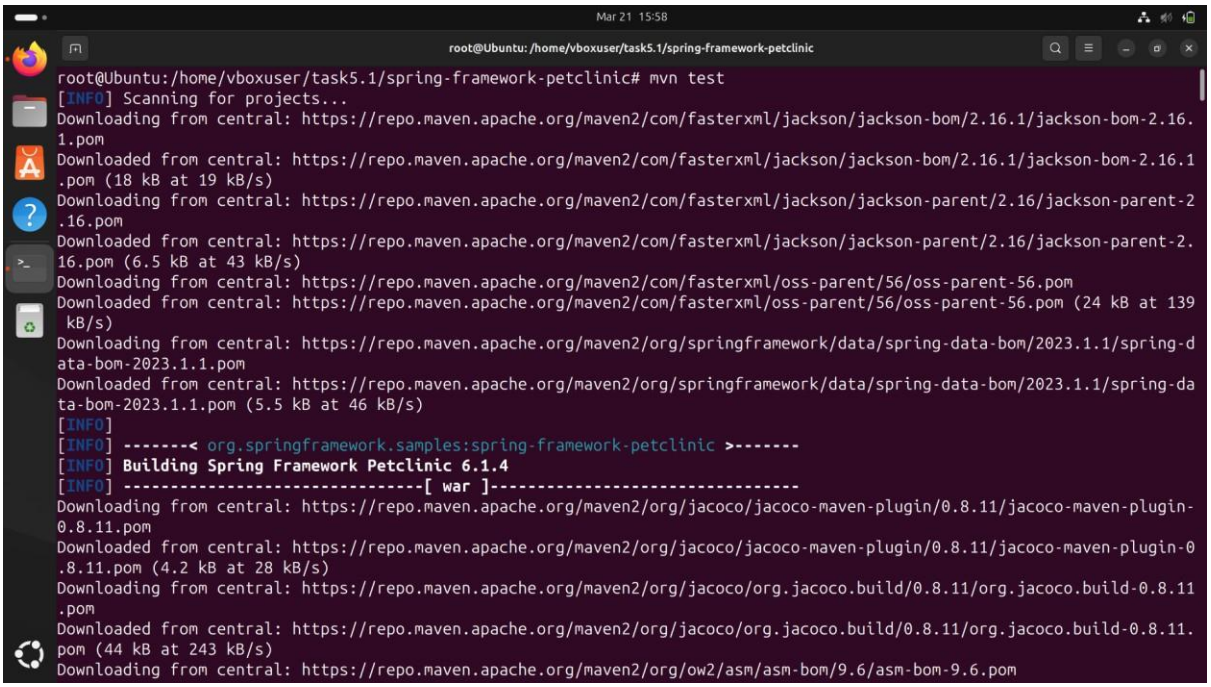
mvn --version

ScreenShot:

6. Run Tests (Optional)
Executes unit tests to ensure the application works correctly.
Code:

mvn test

Screenshot:



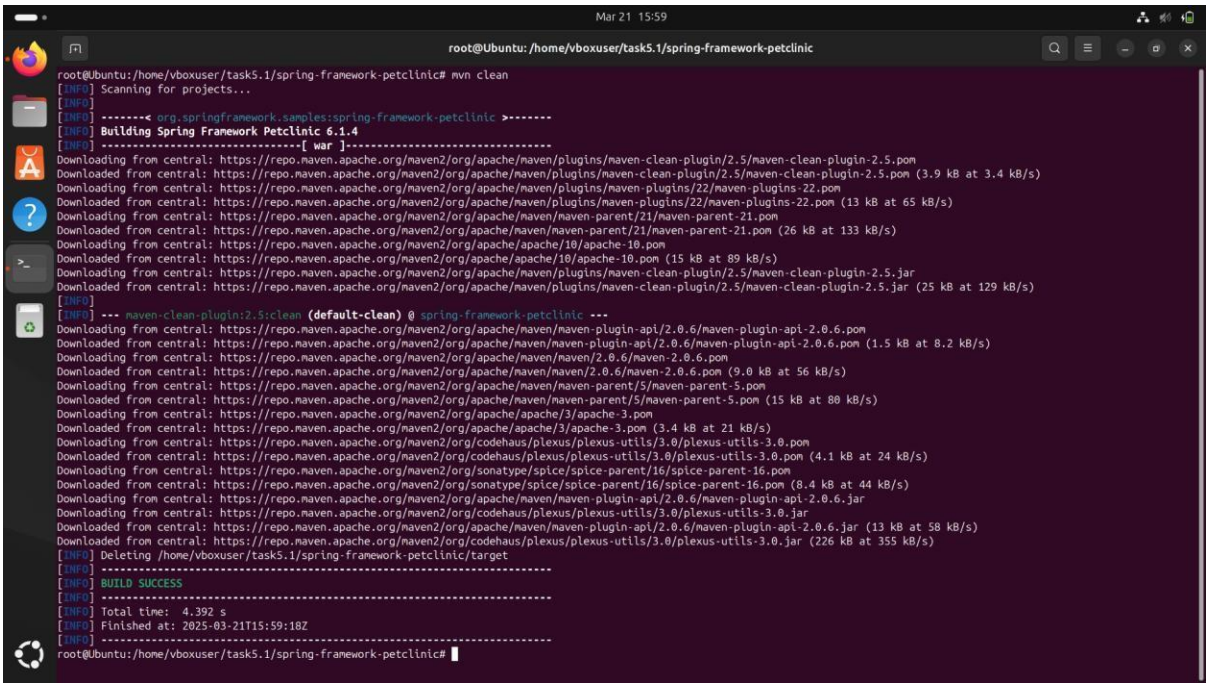
7. Clean and Build the Application

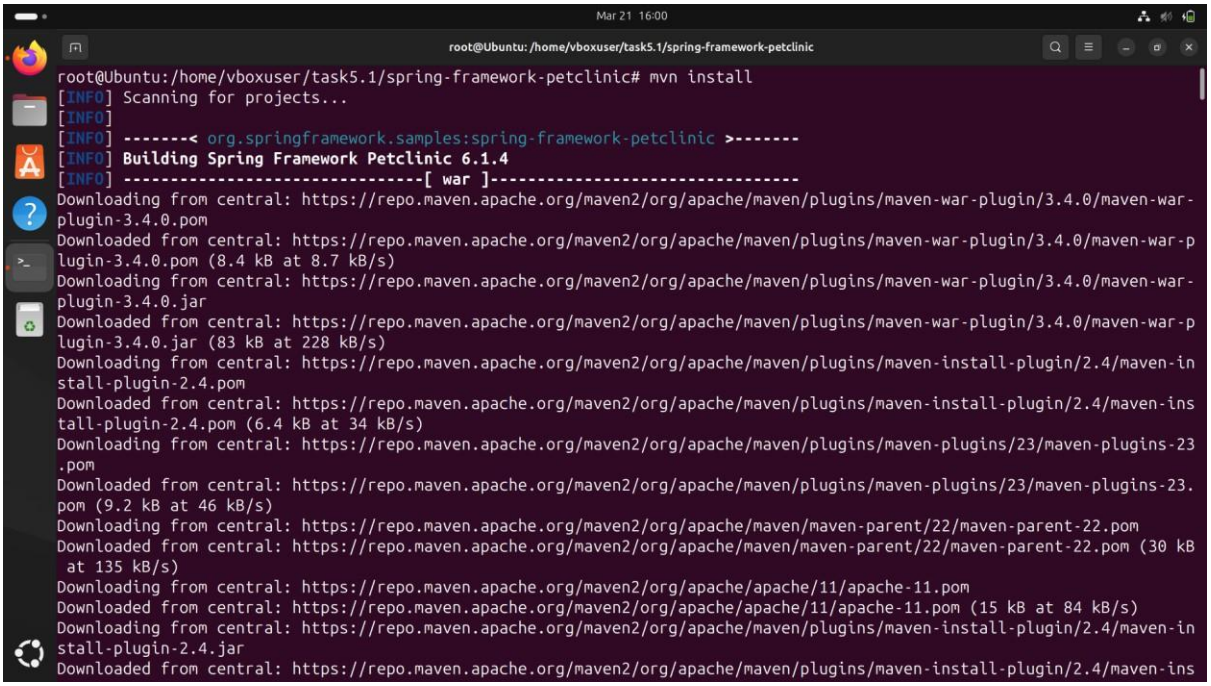
`mvn clean`: Cleans previous builds.
`mvn install`: Compiles and packages the application.
`mvn package`: Generates the final JAR/WAR file in the `target/` directory.

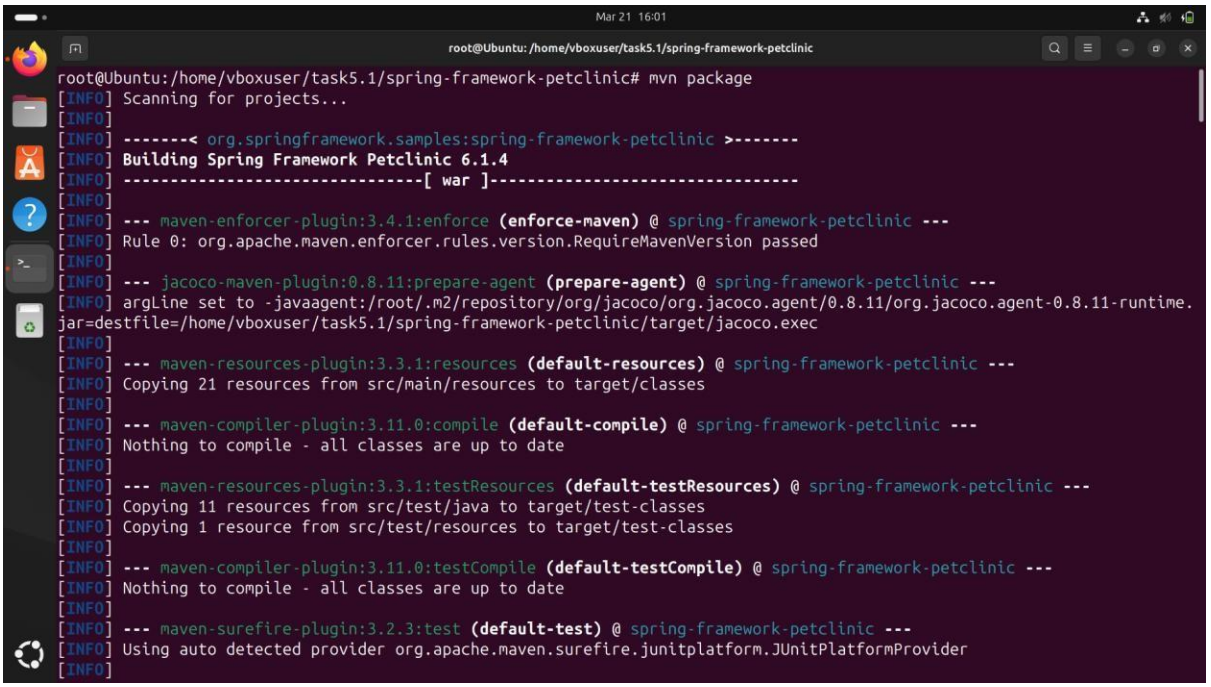
Code:

mvn clean
mvn install
mvn package

Screenshot:


Mar 21 15:59
root@Ubuntu: /home/vboxuser/task5.1/spring-framework-petclinic
root@Ubuntu:/home/vboxuser/task5.1/spring-framework-petclinic# mvn clean
[INFO] Scanning for projects...
[INFO]
[INFO] -------< org.springframework.samples:spring-framework-petclinic >-------
[INFO] Building Spring Framework Petclinic 6.1.4
[INFO] --------------------------------[war]---------------------------------
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.pom (3.9 kB at 3.4 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/22/maven-plugins-22.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/22/maven-plugins-22.pom (13 kB at 65 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-parent/21/maven-parent-21.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-parent/21/maven-parent-21.pom (26 kB at 133 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/apache/10/apache-10.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/apache/10/apache-10.pom (15 kB at 89 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.jar (25 kB at 129 kB/s)
[INFO]
[INFO] --- maven-clean-plugin:2.5:clean (default-clean) @ spring-framework-petclinic ---
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-plugin-api/2.0.6/maven-plugin-api-2.0.6.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-plugin-api/2.0.6/maven-plugin-api-2.0.6.pom (1.5 kB at 8.2 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven/2.0.6/maven-2.0.6.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven/2.0.6/maven-2.0.6.pom (9.0 kB at 56 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-parent/5/maven-parent-5.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-parent/5/maven-parent-5.pom (15 kB at 80 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/apache/3/apache-3.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/apache/3/apache-3.pom (3.4 kB at 21 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.pom (4.1 kB at 24 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/sonatype/spice/spice-parent/16/spice-parent-16.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/sonatype/spice/spice-parent/16/spice-parent-16.pom (8.4 kB at 44 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-plugin-api/2.0.6/maven-plugin-api-2.0.6.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-plugin-api/2.0.6/maven-plugin-api-2.0.6.jar (13 kB at 58 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-utils/3.0/plexus-utils-3.0.jar (226 kB at 355 kB/s)
[INFO] Deleting /home/vboxuser/task5.1/spring-framework-petclinic/target
[INFO] --
[INFO] BUILD SUCCESS
[INFO] --
[INFO] Total time: 4.392 s
[INFO] Finished at: 2025-03-21T15:59:18Z
[INFO] --
root@Ubuntu:/home/vboxuser/task5.1/spring-framework-petclinic#


Mar 21 16:00
root@Ubuntu: /home/vboxuser/task5.1/spring-framework-petclinic
root@Ubuntu:/home/vboxuser/task5.1/spring-framework-petclinic# mvn install
[INFO] Scanning for projects...
[INFO]
[INFO] -------< org.springframework.samples:spring-framework-petclinic >-------
[INFO] Building Spring Framework Petclinic 6.1.4
[INFO] --------------------------------[war]---------------------------------
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.4.0/maven-war-plugin-3.4.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.4.0/maven-war-plugin-3.4.0.pom (8.4 kB at 8.7 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.4.0/maven-war-plugin-3.4.0.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.4.0/maven-war-plugin-3.4.0.jar (83 kB at 228 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-install-plugin/2.4/maven-install-plugin-2.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-install-plugin/2.4/maven-install-plugin-2.4.pom (6.4 kB at 34 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/23/maven-plugins-23.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/23/maven-plugins-23.pom (9.2 kB at 46 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-parent/22/maven-parent-22.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/maven-parent/22/maven-parent-22.pom (30 kB at 135 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/apache/11/apache-11.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/apache/11/apache-11.pom (15 kB at 84 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-install-plugin/2.4/maven-install-plugin-2.4.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-install-plugin/2.4/maven-ins



8. Verify the Built Application

Navigates to the `target` folder where the compiled application is stored.

Code:

```
cd target
ls
cd ..
```

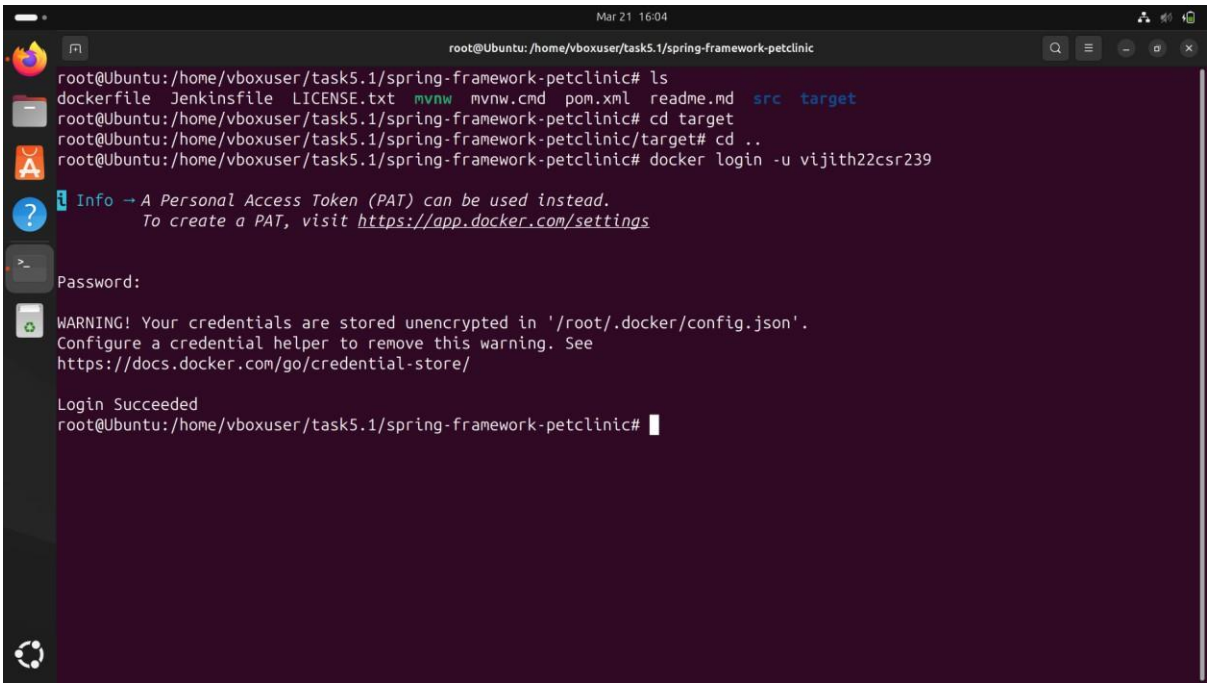
9. Login to Docker

Logs into Docker Hub to push container images.

Code:

docker login -u vijith22csr239

Screenshot:



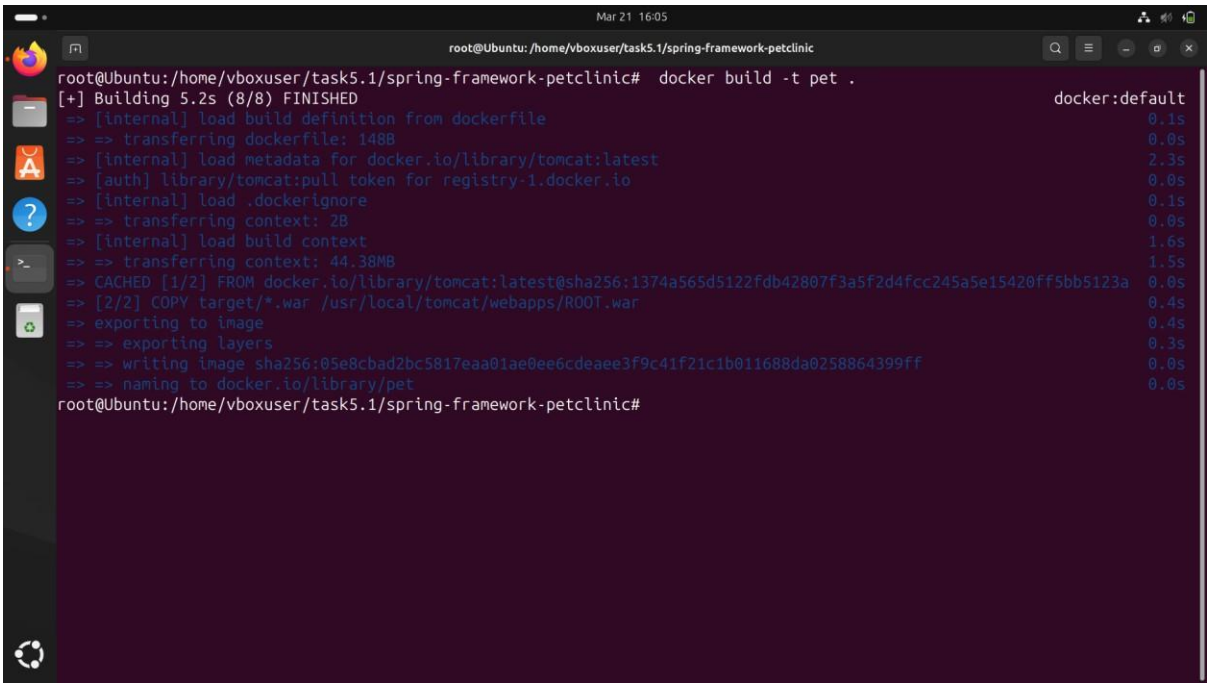
10. Build Docker Image

Builds a Docker image with the tag `pet` from the project directory.

Code:

docker build -t pet .

Screenshot:

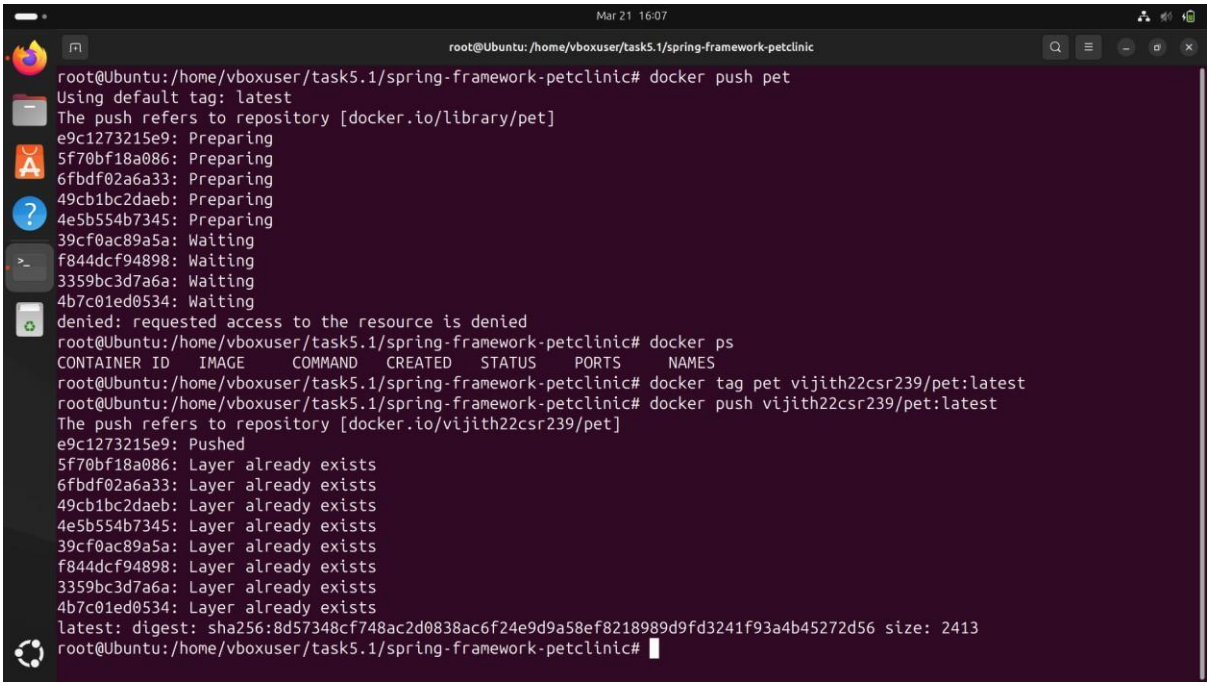


11. Tag and Push Image to Docker Hub

Tags the image for Docker Hub.
Pushes the image to your Docker Hub repository.
Code:

docker tag pet vijith22csr239/pet:latest
docker push vijith22csr239/pet:latest

Screenshot:



12. Start Minikube

Starts a Minikube cluster for Kubernetes.

Checks if Minikube is running properly.

Code:

minikube start

minikube status

13. Verify Kubernetes Nodes

Lists available Kubernetes nodes.

Code:

kubectl get nodes

ScreenShot:

14. Deploy the Application on Kubernetes & Expose the Application

Creates a Kubernetes deployment using your Docker image.

Exposes the deployment as a service, making it accessible via Minikube.

Lists all running pods to verify the deployment is successful.

Code:

kubectl create deployment pet --image=vijith22csr239/pet --port=8080

kubectl expose deployment pet --port=8080 --type=NodePort

kubectl get pods

Screenshot:

16. Access the Application

Opens the application in the browser via Minikube.

Code:

minikube service pet

Screenshot: