**Day-2 Prasath S**

**step-by-step guide to setting up a simple Python "Hello, Docker!" Flask application using Docker and Docker Compose.**

**1. Install Docker**

First, install Docker to get the Docker engine running on your system:

sudo apt install -y docker.io

* **Explanation:** Installs Docker on your system using the apt package manager. The -y flag auto-confirms any prompts.

**2. Start and Enable Docker Service**

Start the Docker service and enable it to start automatically at boot time:

sudo systemctl start docker

sudo systemctl enable docker

* **Explanation:** The start command starts the Docker daemon, and enable ensures Docker runs on startup.

**3. Verify Docker Installation**

Verify that Docker was installed correctly by checking its version:

docker --version

* **Explanation:** Displays the installed Docker version to confirm the installation.

**4. Install Docker Compose**

Now, install Docker Compose, a tool to define and manage multi-container Docker applications:

sudo curl -L "https://github.com/docker/compose/releases/latest/download/docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose

sudo chmod +x /usr/local/bin/docker-compose

* **Explanation:** The first command downloads the latest Docker Compose binary, and the second command makes it executable.

**5. Verify Docker Compose Installation**

Check the installed version of Docker Compose:

docker-compose --version

* **Explanation:** Displays the installed Docker Compose version to verify the installation.

**6. Create Project Directory**

Create a directory for your project and navigate into it:

mkdir ~/docker-python-app

cd ~/docker-python-app

* **Explanation:** Creates a directory for your project and navigates into it.

**7. Create the app.py file**

Create a Python file app.py for the Flask application:

nano app.py

Paste the following Flask application code:

from flask import Flask

app = Flask(\_\_name\_\_)

@app.route('/')

def hello\_world():

return 'Hello, world Running inside the docker!'

if \_\_name\_\_ == '\_\_main\_\_':

app.run(host='0.0.0.0', port=5000)

* **Explanation:** A simple Flask app with one route (/) that returns a greeting message. The Flask server listens on all interfaces (0.0.0.0) and port 5000.

**8. Create requirements.txt**

Create a requirements.txt file to list Python dependencies:

nano requirements.txt

Add the following content:

flask

* **Explanation:** Lists the Flask library as the required dependency for your project.

**9. Install pip (if not already installed)**

Ensure pip is installed to handle Python package installations:

sudo apt update

sudo apt install python3-pip

* **Explanation:** Updates the package list and installs pip to handle Python packages.

**10. Create Dockerfile**

Create a Dockerfile that defines how the Docker image should be built:

nano Dockerfile

Add the following content:

# Use the official Python image from Docker Hub

FROM python:3.9-slim

# Set the working directory inside the container

WORKDIR /app

# Copy the current directory contents into the container at /app

COPY . /app

# Install any needed packages specified in requirements.txt

RUN pip install --no-cache-dir -r requirements.txt

# Make port 5000 available to the world outside the container

EXPOSE 5000

# Define the environment variable for Flask to run in production mode

ENV FLASK\_ENV=production

# Run app.py when the container launches

CMD ["python", "app.py"]

* **Explanation:** This Dockerfile defines the Python environment, installs dependencies, exposes port 5000, and starts the Flask app inside the container.

**11. Create docker-compose.yml**

Create a docker-compose.yml file to manage the application’s services:

nano docker-compose.yml

Add the following content:

version: '3.8'

services:

web:

build: .

ports:

- "5000:5000"

environment:

- FLASK\_ENV=development

volumes:

- .:/app

restart: always

* **Explanation:** This Compose file:
  + Defines the web service.
  + Builds the image from the current directory.
  + Maps port 5000 from the host to the container.
  + Mounts the current directory (.) into the container to enable live code reloading.
  + Restarts the container if it crashes.

**12. Add User to Docker Group (if needed)**

To avoid using sudo with Docker commands, add your user to the Docker group:

sudo usermod -aG docker $USER

newgrp docker

* **Explanation:** The first command adds your user to the Docker group, and the second command applies the changes to your current session.

**13. Build and Run the Application**

Now, you can build and start the Flask app container using Docker Compose:

docker-compose up --build

* **Explanation:** This command builds the Docker image and starts the container based on the docker-compose.yml configuration. The --build flag forces a rebuild of the Docker image.

**14. Access the Application**

Once the container is running, open your browser and navigate to:

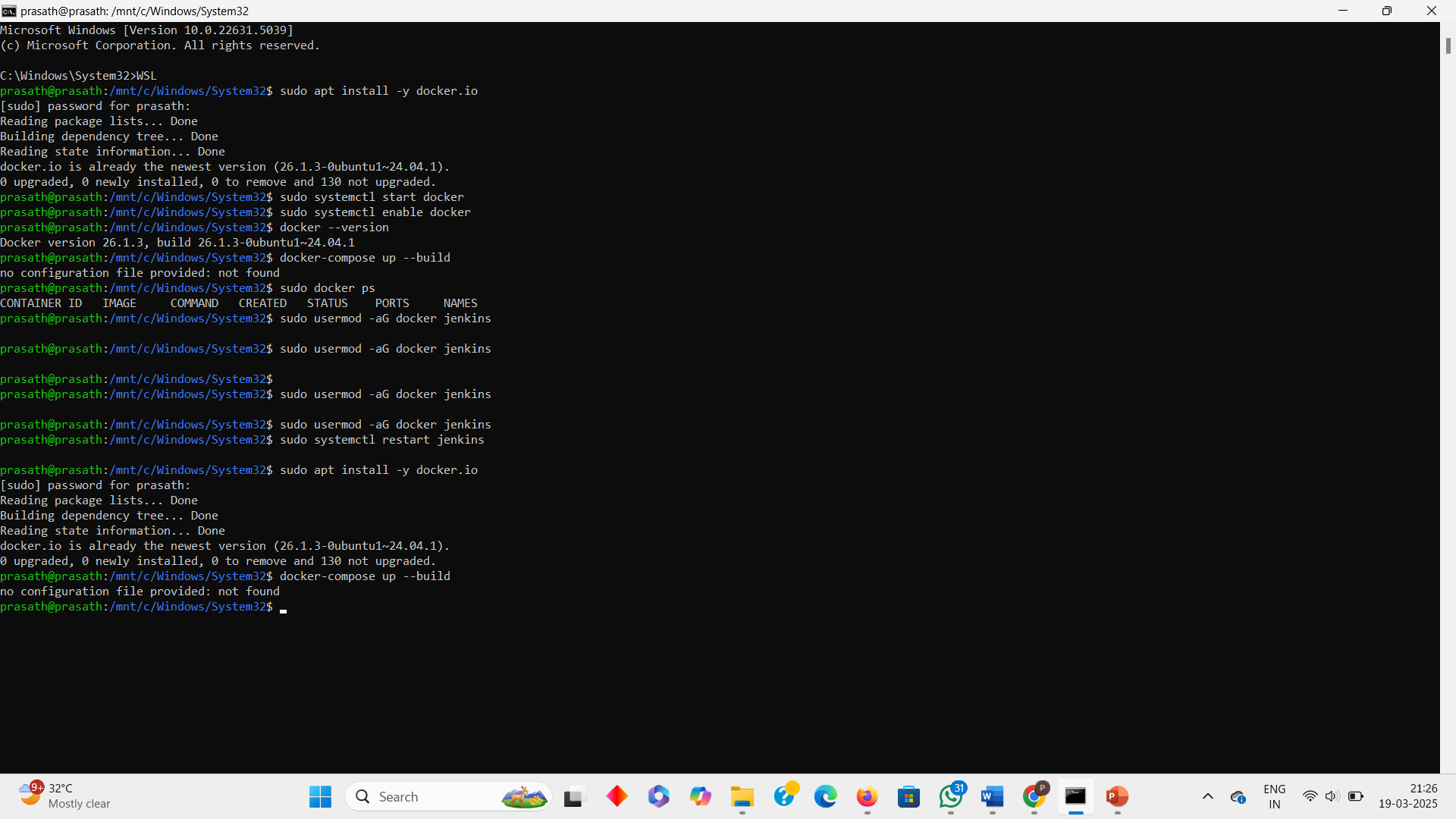
http://localhost:5000

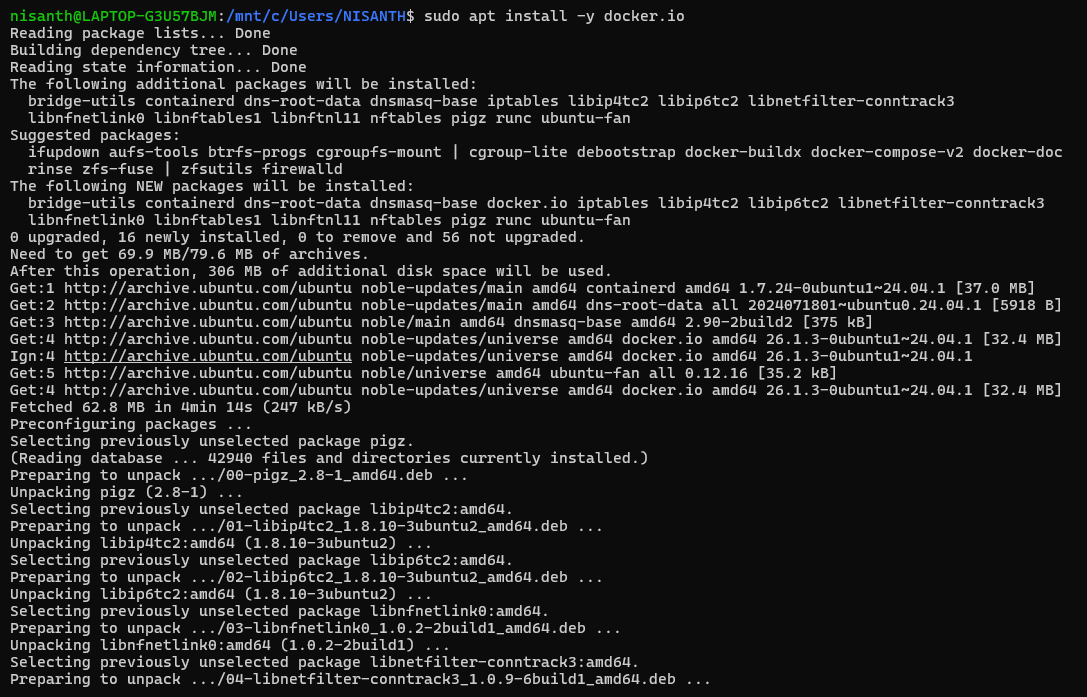
You should see the message: **"Hello, Docker Python App!"**

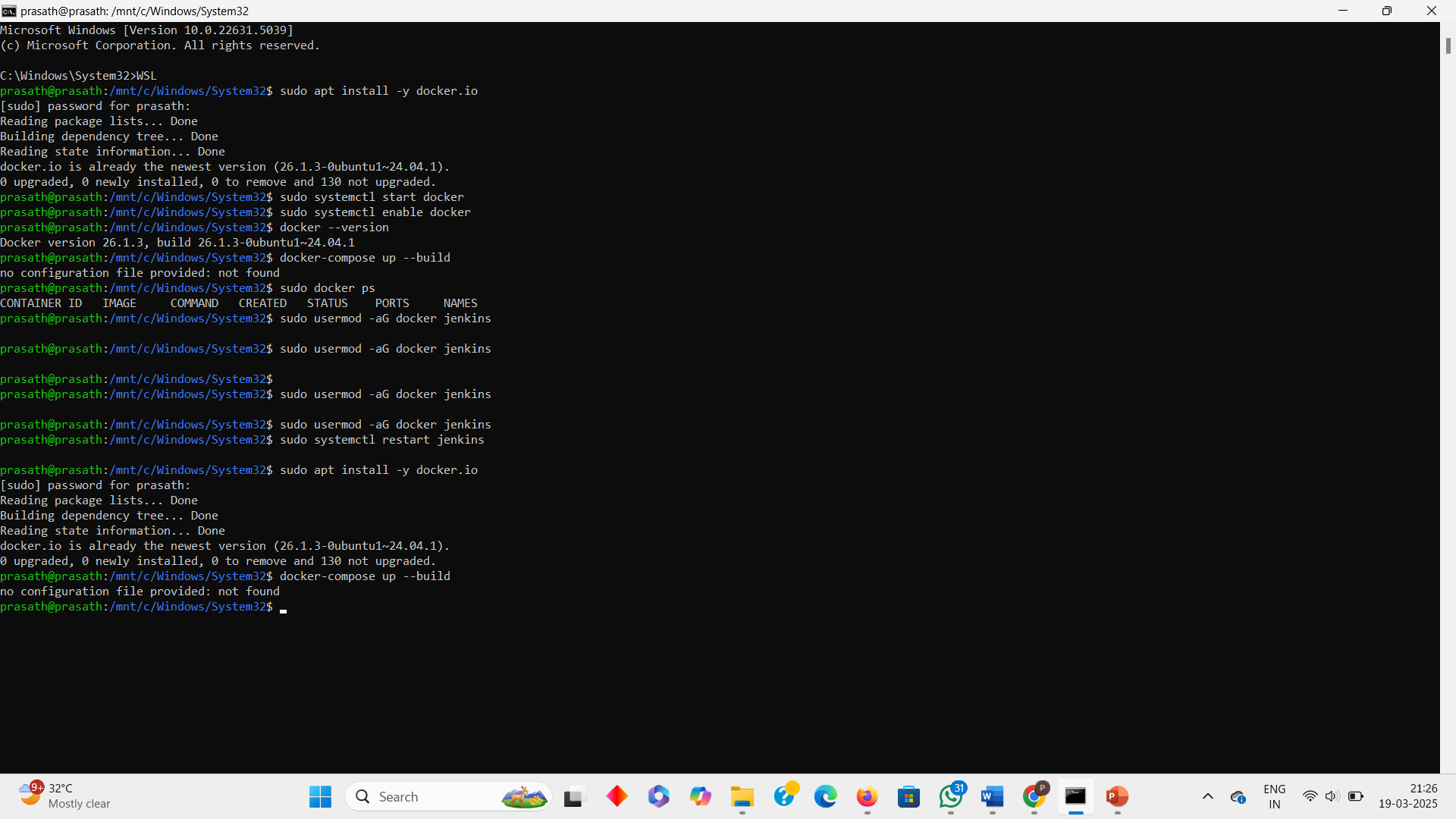
**Summary of Commands**

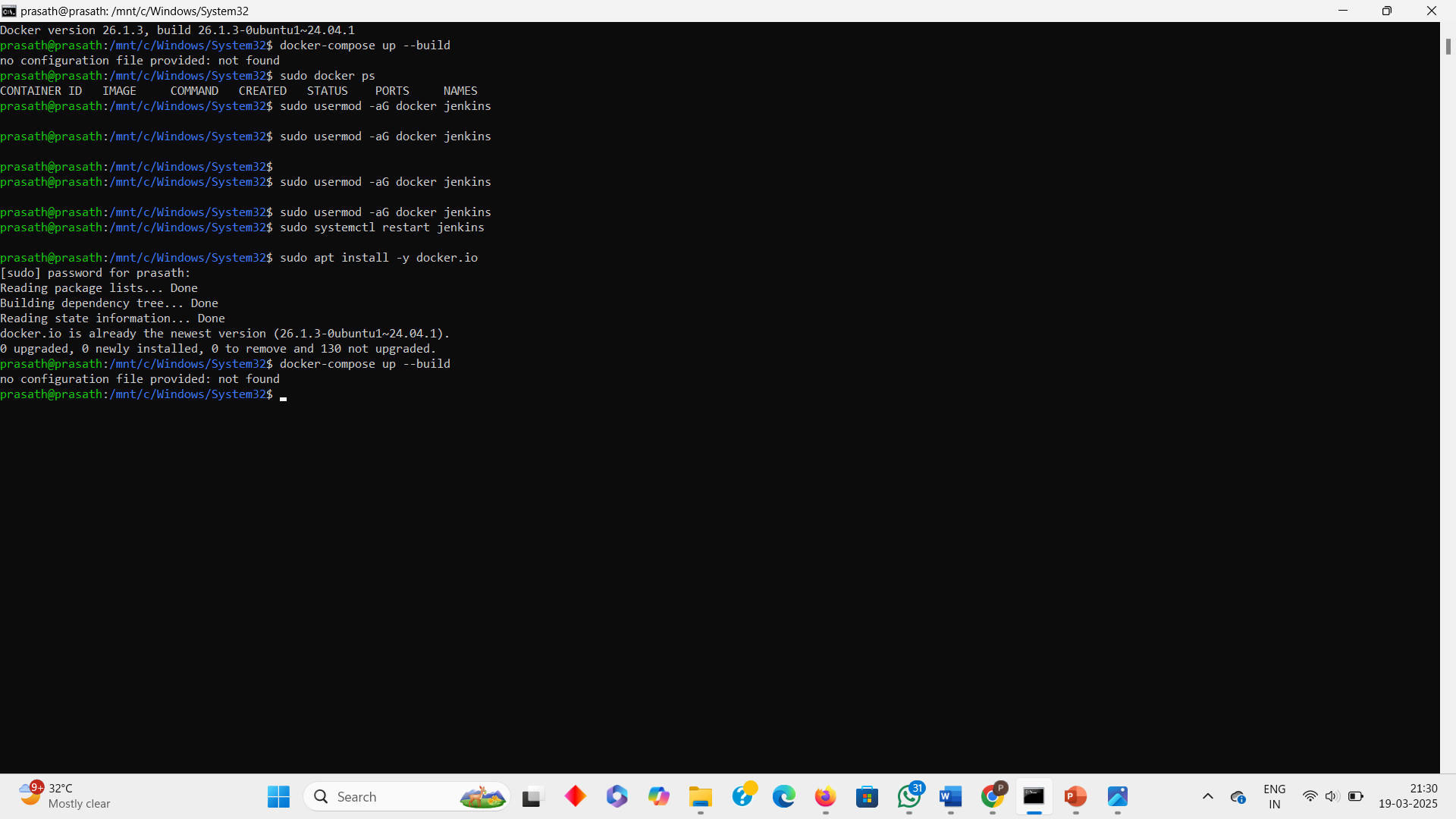
1. Install Docker:
2. sudo apt install -y docker.io
3. Start and enable Docker service:
4. sudo systemctl start docker
5. sudo systemctl enable docker
6. Install Docker Compose:
7. sudo curl -L "https://github.com/docker/compose/releases/latest/download/docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
8. sudo chmod +x /usr/local/bin/docker-compose
9. Create project directory:
10. mkdir ~/docker-python-app
11. cd ~/docker-python-app
12. Create app.py with Flask code.
13. Create requirements.txt with flask.
14. Install pip (if needed):
15. sudo apt update
16. sudo apt install python3-pip
17. Create Dockerfile with the configuration.
18. Create docker-compose.yml with service definition.
19. Add your user to the Docker group (if necessary):
20. sudo usermod -aG docker $USER
21. newgrp docker
22. Build and run the app:
23. docker-compose up --build

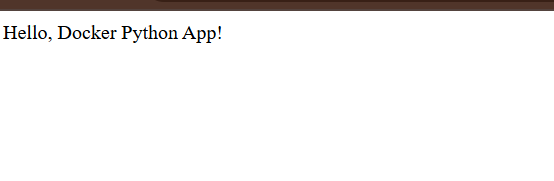
Now your "Hello, Docker!" Flask app should be running inside a Docker container, accessible at <http://localhost:5000>.



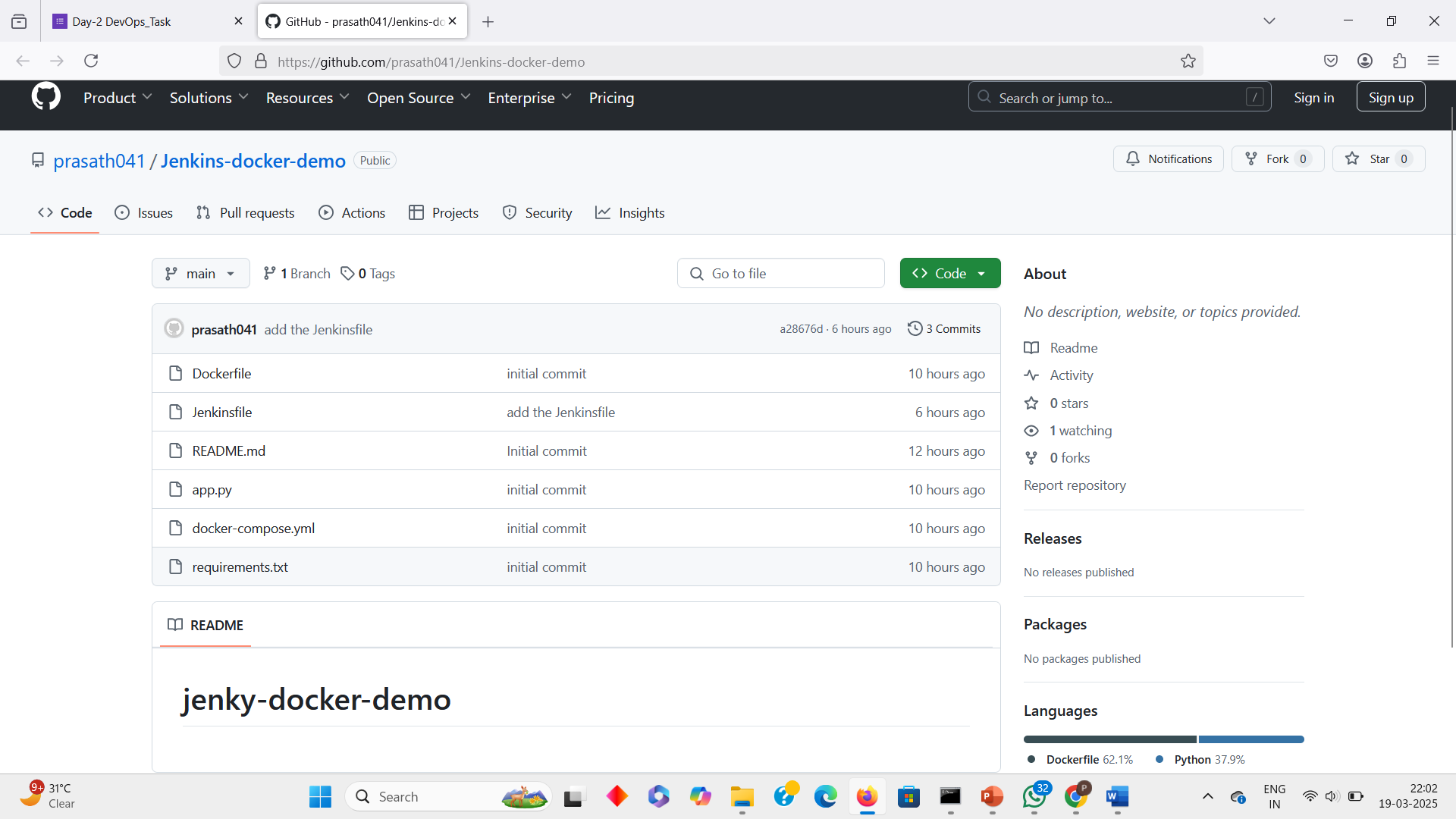








Jenkins Pipeline Through Git Token - Setup Procedure



**Step 1: Generate a Git Personal Access Token**

Before configuring the Jenkins pipeline, you need to generate a **Personal Access Token (PAT)** from your Git service.

**GitHub (Example)**

1. **Log in to GitHub** and navigate to your profile.
2. Go to **Settings** > **Developer Settings** > **Personal Access Tokens**.
3. Click **Generate New Token**.
4. Select the necessary permissions for the token. For example, to clone repositories, select:
   * repo (full control of private repositories)
   * read:org (for organization repository access)
5. Generate the token and **copy it**. This token will act as the password when Jenkins connects to GitHub.

**GitLab (Example)**

1. **Log in to GitLab** and go to **Profile Settings** > **Access Tokens**.
2. Generate a new token with appropriate scopes (e.g., read\_repository).
3. **Save the token** to use in Jenkins.

**Bitbucket (Example)**

1. **Log in to Bitbucket** and go to **Personal Settings** > **App Passwords**.
2. Create an app password with necessary permissions (like repository read).
3. **Save the password** to use in Jenkins.

**Step 2: Store Git Token in Jenkins Credentials**

Once you've generated the Git token, the next step is to store it securely in Jenkins.

1. **Log in to Jenkins** and navigate to the Jenkins dashboard.
2. In the left menu, click on **Manage Jenkins**.
3. Click on **Manage Credentials**.
4. Select the appropriate **scope** (e.g., (Global)).
5. Click on **Add Credentials**.
6. In the **Kind** dropdown, select **Username with password**.
7. In the **Username** field, enter your Git username (e.g., your-username for GitHub).
8. In the **Password** field, paste the **Git token** you generated.
9. Optionally, give it an ID (e.g., git-token-jenkins).
10. Click **OK** to save the credentials.

**Step 3: Configure Jenkins Pipeline**

Now that the Git token is securely stored in Jenkins, you can configure a Jenkins pipeline to use it for Git interactions.

**Example Pipeline Script (Declarative Pipeline)**

You’ll now set up a pipeline that uses Git for the source code. Here’s an example using a declarative pipeline.

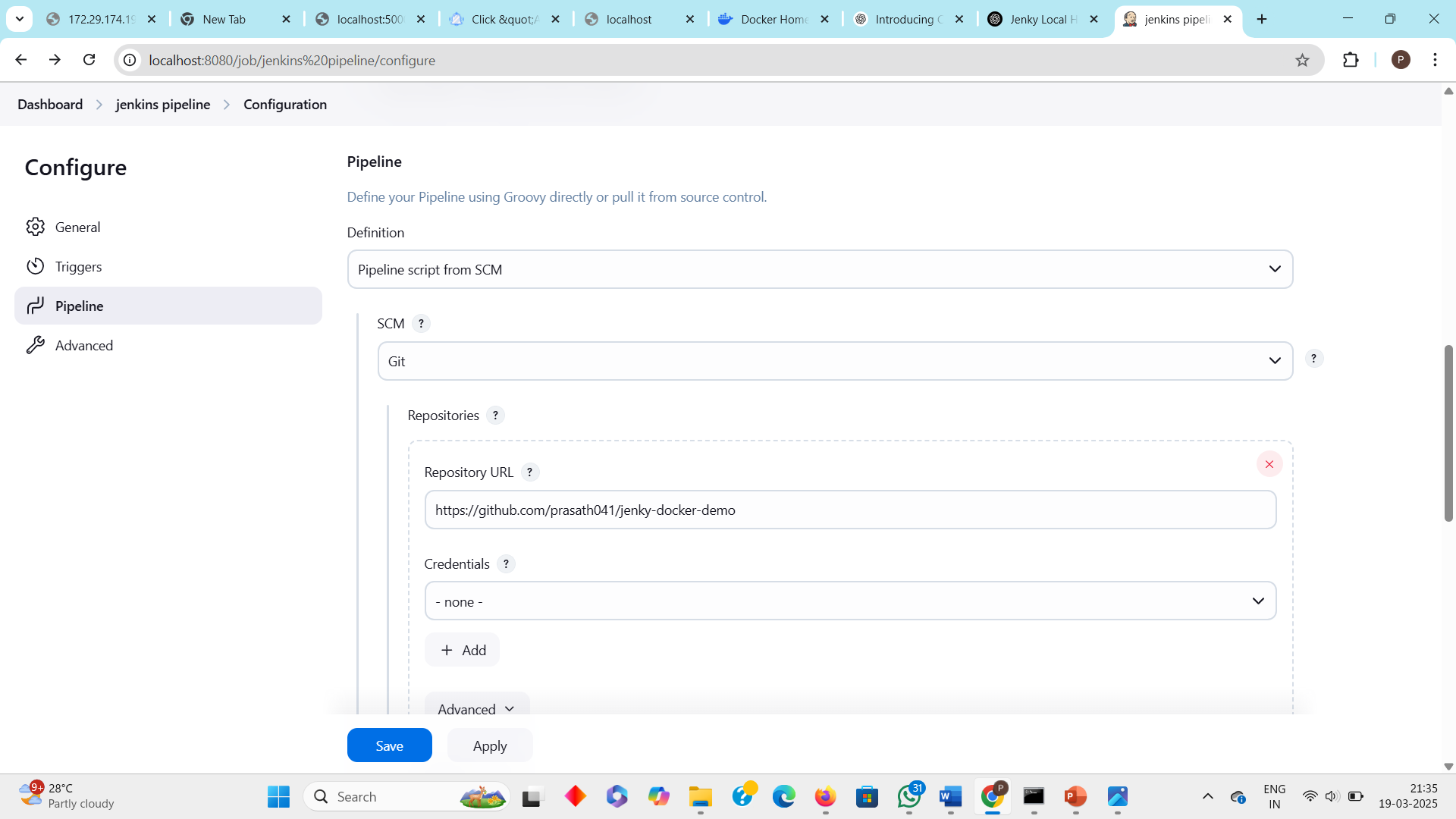
1. **Create a New Pipeline Job**:
   * Go to Jenkins Dashboard.
   * Click **New Item**, select **Pipeline**, and name your pipeline (e.g., Git-Pipeline).
   * Click **OK**.
2. **Configure the Pipeline**:
   * In the pipeline configuration, scroll to the **Pipeline** section.
   * Choose **Pipeline script from SCM**.
   * Set the **SCM** dropdown to **Git**.
   * In the **Repository URL** field, enter your repository URL (e.g., https://github.com/yourusername/your-repository.git).
   * Select **Credentials**. Choose the credentials you created earlier (e.g., git-token-jenkins).

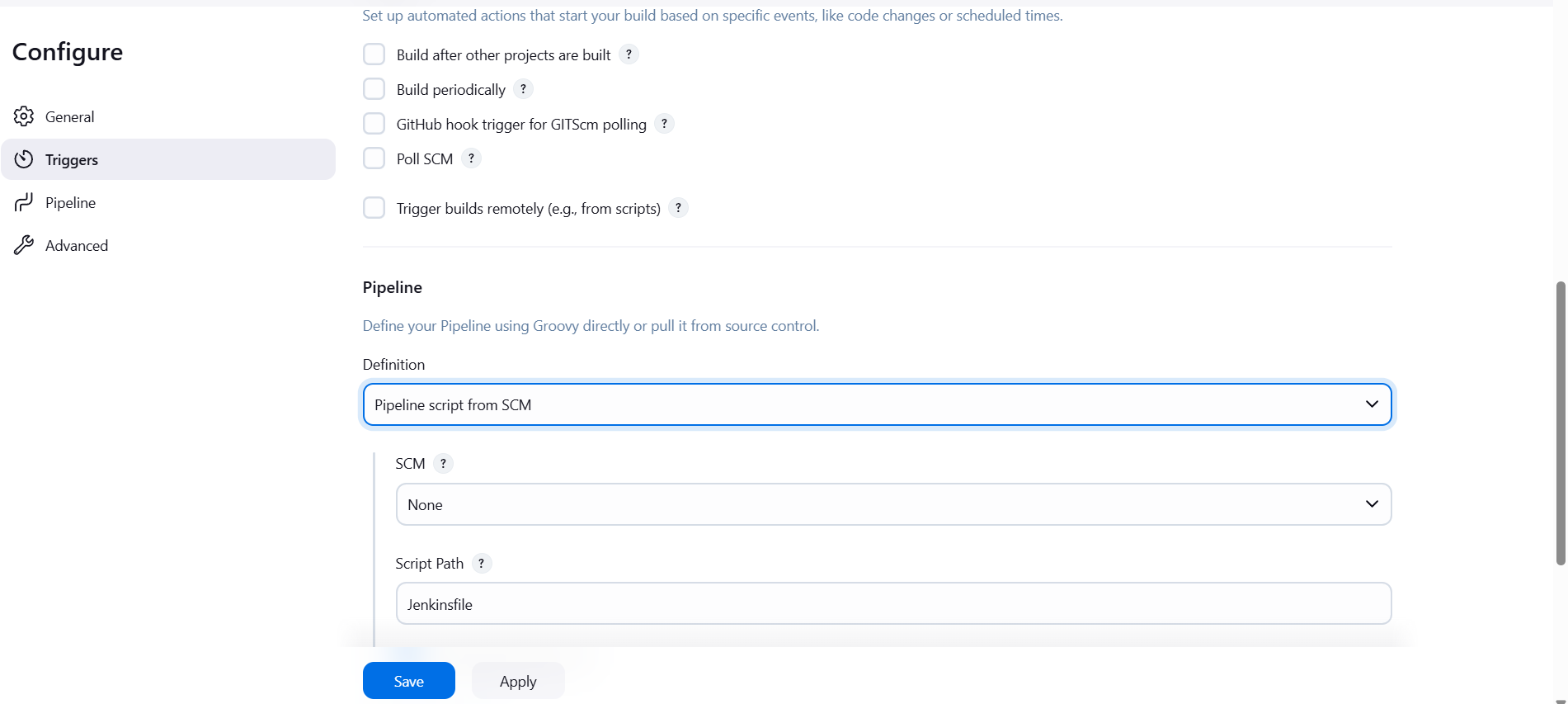
**Step 4: Run the Jenkins Pipeline**

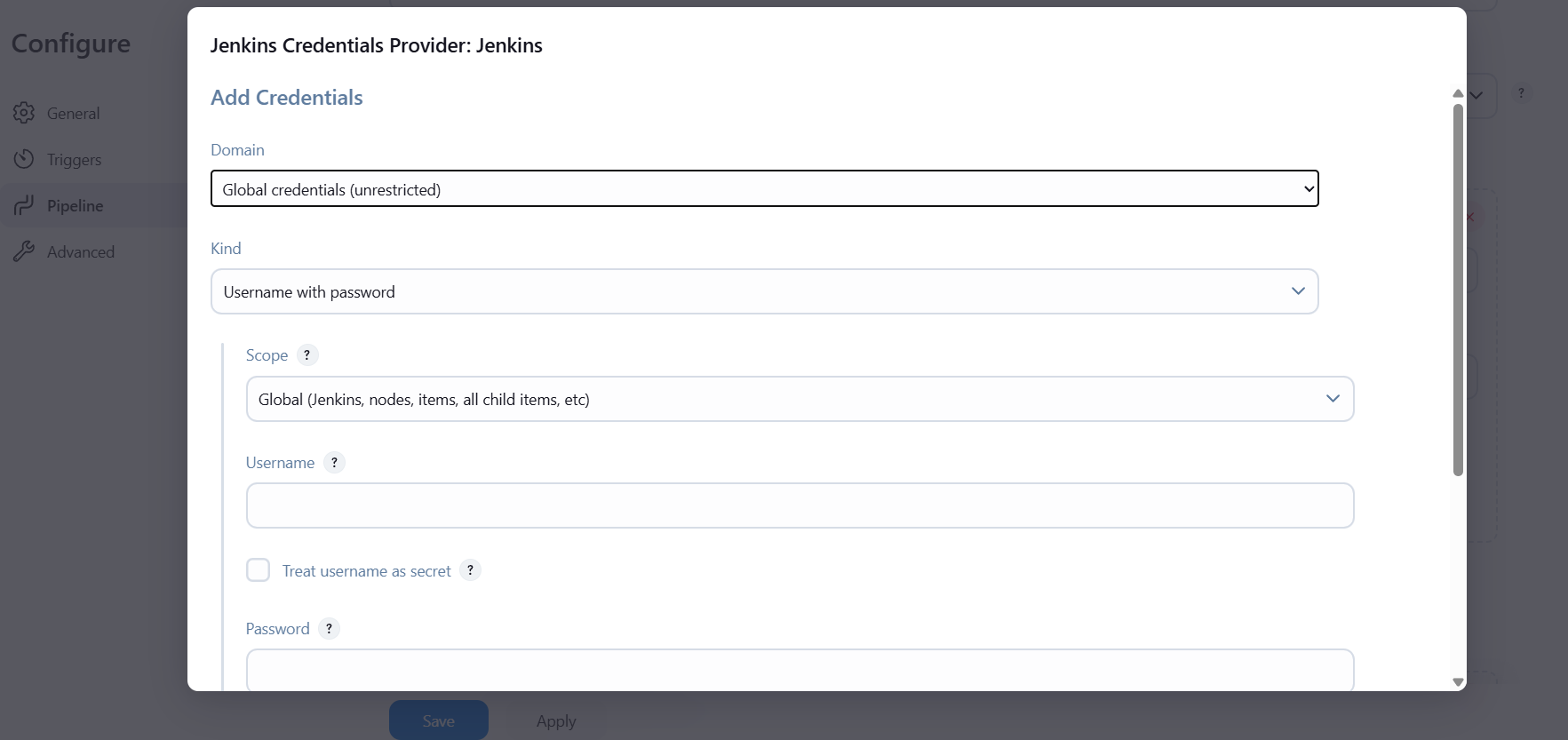
* After configuring the pipeline, click **Save** and then **Build Now** to run the pipeline.
* Jenkins will use the credentials you provided to authenticate with Git, clone the repository, and run the pipeline steps.

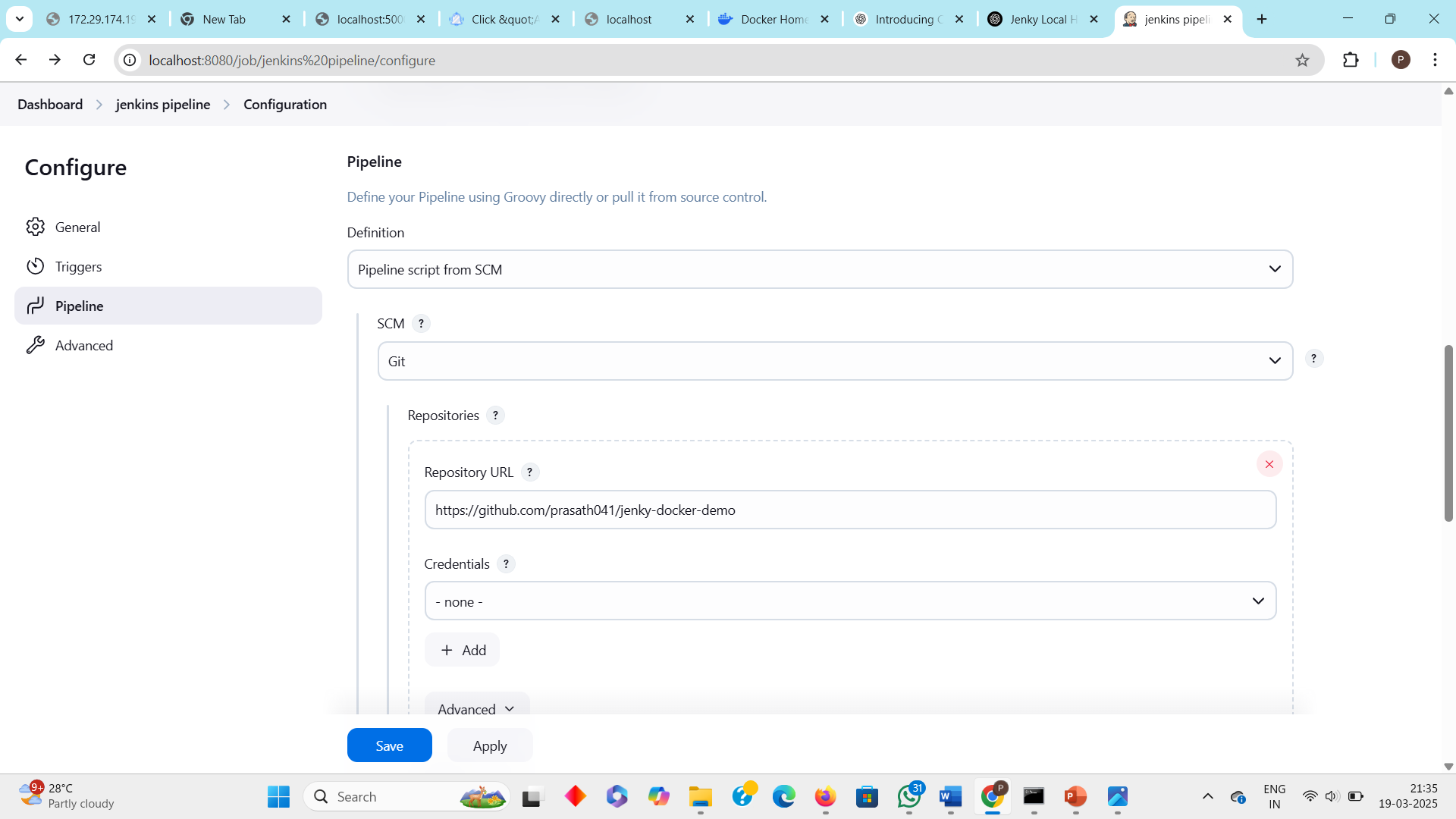
**Step 5: Monitor and Troubleshoot**

* If the pipeline fails, check the Jenkins job's **Console Output** for debugging information. Common issues can be due to incorrect credentials, Git URL, or permission issues.









**Jenkins Pipeline for Dockerized Application Deployment**

This document provides a step-by-step guide on how the Jenkins pipeline automates the process of fetching the code from GitHub, building a Docker image, pushing it to a container registry, and deploying the application in a running Docker container.

**Pipeline Overview**

The pipeline follows these key steps:

1. **Checkout Code** - Fetch the latest code from the GitHub repository.
2. **Build Docker Image** - Create a Docker image for the application.
3. **Login to Docker Registry** - Authenticate to the container registry.
4. **Push to Container Registry** - Upload the built image to a Docker registry.
5. **Stop & Remove Existing Container** - Stop and remove any existing container with the same name.
6. **Run Docker Container** - Deploy a new container with the updated image.
7. **Post Actions** - Handle success or failure messages.

**Step-by-Step Execution**

**1. Checkout Code**

* Uses Jenkins credentials to authenticate and fetch the latest code from GitHub.
* Ensures secure access using stored credentials instead of exposing raw tokens.

**Implementation:**

stage('Checkout Code') {

steps {

withCredentials([usernamePassword(credentialsId: 'github-nisanthg1010', usernameVariable: 'GIT\_USER', passwordVariable: 'GIT\_TOKEN')]) {

git url: "https://$GIT\_USER:$GIT\_TOKEN@github.com/nisanthg1010/Devops\_Nisanth.git", branch: 'main'

}

}

}

**2. Build Docker Image**

* Builds the Docker image using the Dockerfile present in the repository.
* Tags the image with the latest version.

**Implementation:**

stage('Build Docker Image') {

steps {

sh 'docker build -t $DOCKER\_IMAGE .'

}

}

**3. Login to Docker Registry**

* Uses stored Jenkins credentials to log in securely to the Docker registry.
* Prevents exposing login credentials in the script.

**Implementation:**

stage('Login to Docker Registry') {

steps {

withCredentials([usernamePassword(credentialsId: 'docker\_nisanth', usernameVariable: 'DOCKER\_USER', passwordVariable: 'DOCKER\_PASS')]) {

sh 'echo $DOCKER\_PASS | docker login -u $DOCKER\_USER --password-stdin'

}

}

}

**4. Push to Container Registry**

* Pushes the newly built Docker image to the specified container registry.
* Ensures the latest version of the application is stored and accessible.

**Implementation:**

stage('Push to Container Registry') {

steps {

sh 'docker push $DOCKER\_IMAGE'

}

}

**5. Stop & Remove Existing Container**

* Stops and removes the running container if it exists.
* Prevents conflicts when deploying the new version.

**Implementation:**

stage('Stop & Remove Existing Container') {

steps {

script {

sh '''

if [ "$(docker ps -aq -f name=$CONTAINER\_NAME)" ]; then

docker stop $CONTAINER\_NAME || true

docker rm $CONTAINER\_NAME || true

fi

'''

}

}

}

**6. Run Docker Container**

* Starts a new Docker container with the updated image.
* Maps the internal application port 5000 to 5001 on the host machine.

**Implementation:**

stage('Run Docker Container') {

steps {

sh 'docker run -d -p 5001:5000 --name $CONTAINER\_NAME $DOCKER\_IMAGE'

}

}

**7. Post Actions**

* If successful, displays a success message.
* If failed, displays an error message.

**Implementation:**

post {

success {

echo "Build, push, and container execution successful!"

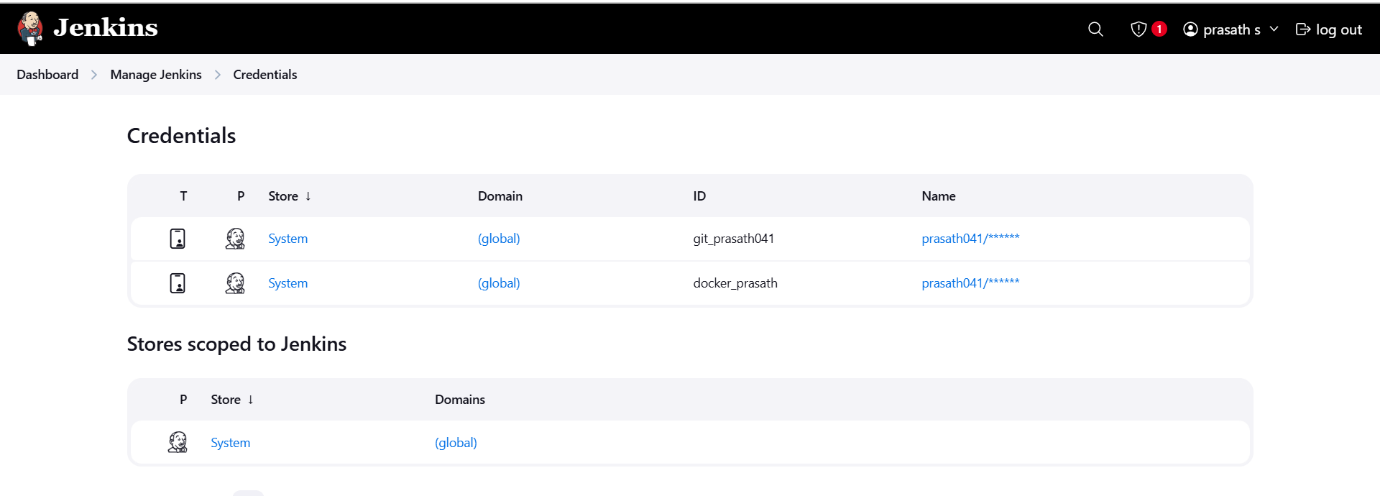
}

failure {

echo "Build or container execution failed."

}

}



**Conclusion**

This Jenkins pipeline automates the entire process of fetching the code, building a Docker image, pushing it to a registry, and deploying the container. It ensures a seamless CI/CD workflow, making application updates smooth and efficient. 🚀

