Project 3

Flask-Based Student Registration Web Application deployed using Jenkins

Batch

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Title: Flask-Based Student Registration Web Application deployed using Jenkins

Objective:

Develop and deploy a Flask-based web application that allows users to register students by submitting their details via a web form. The application should store the submitted data in a backend and provide the ability to retrieve or display this information when needed.

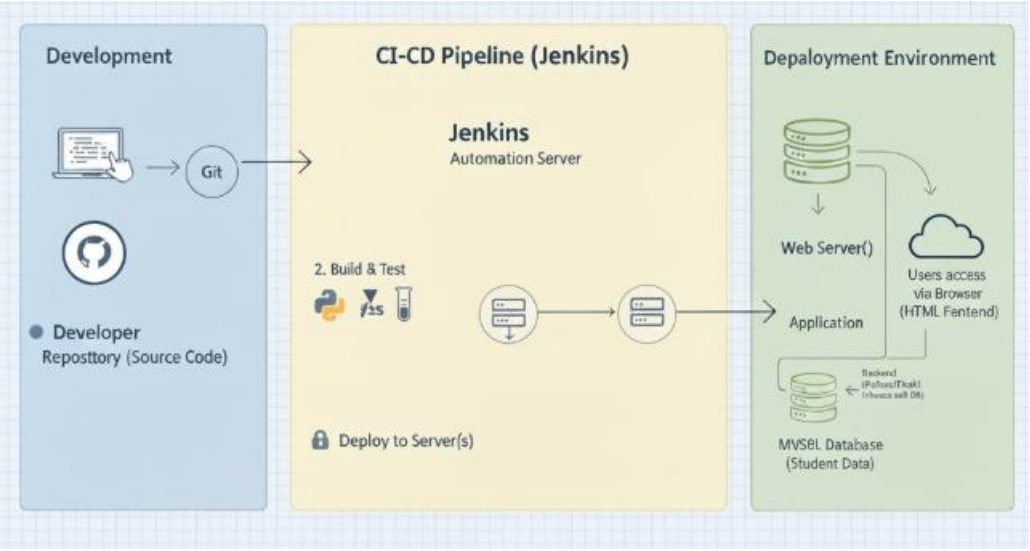
Project Overview:

This project involves designing a simple web application that mimics a student registration system. The goal is to gain hands-on experience in web development, form handling, backend logic, and data storage using Python Flask and standard frontend technologies.

Technology Stack:

- ✓ Frontend: HTML, CSS
- ✓ Backend: Python (Flask)
- ✓ Database: MySQL
- ✓ Version Control: Git & GitHub
- ✓ Deployment (Optional): EC2

Architectural diagram



Step .1: Install Python and Dependencies

1. Install Python 3: Ensure that Python 3 is installed on your system.

• Flask==2.3.2

• mysql-connector-python

```
Flask==2.3.2
mysql-connector-python
```

Step 2: Set up MySQL Database

1. Install and start MySQL Server.

2. Create a database named studentdb.

3. Create students table with fields:

• id (primary key, auto-increment)

• name, email, phone, course, address, contact

```
CREATE TABLE students (
    id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(100),
    email VARCHAR(100),
    phone VARCHAR(20),
    course VARCHAR(100),
    address VARCHAR(200),
    contact VARCHAR(100)
);
```

Step 3: Install Jenkins

1. Install Jenkins server.

2. Install Git Plugin via Manage Jenkins → Manage Plugins.

- Manage Jenkins → Manage Plugins → Available → Git Plugin
- Git
- Pipeline
- SSH Agent
- Ansible (optional)
- Python plugin

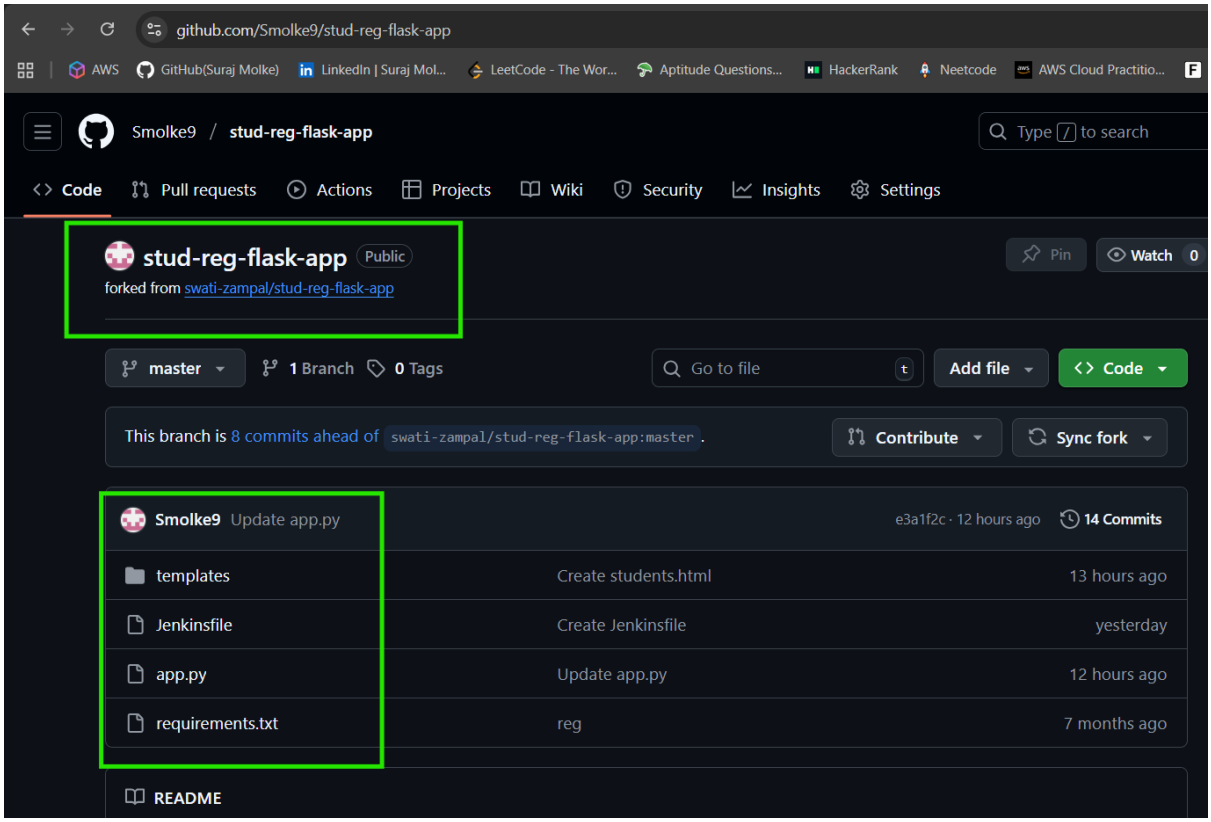
Step 4: Install socat

Install socat on Jenkins agent using:

sudo apt-get install socat

Step 5: Application File Structure From Forked Via https://github.com/swati-zampal/stud-reg-flask-app.git To My Repo https://github.com/Smolke9/stud-reg-flask-app.git

- app.py – Main Flask application logic
- requirements.txt – Python dependencies
- templates/
  - register.html
  - students.html
- Jenkinsfile – CI/CD pipeline stages



Step 6: Application Code Development

- Uses mysql.connector for database connectivity.
- '/' route displays registration form.
- '/students' displays stored student data.
- Runs on host=0.0.0.0 port=5000.

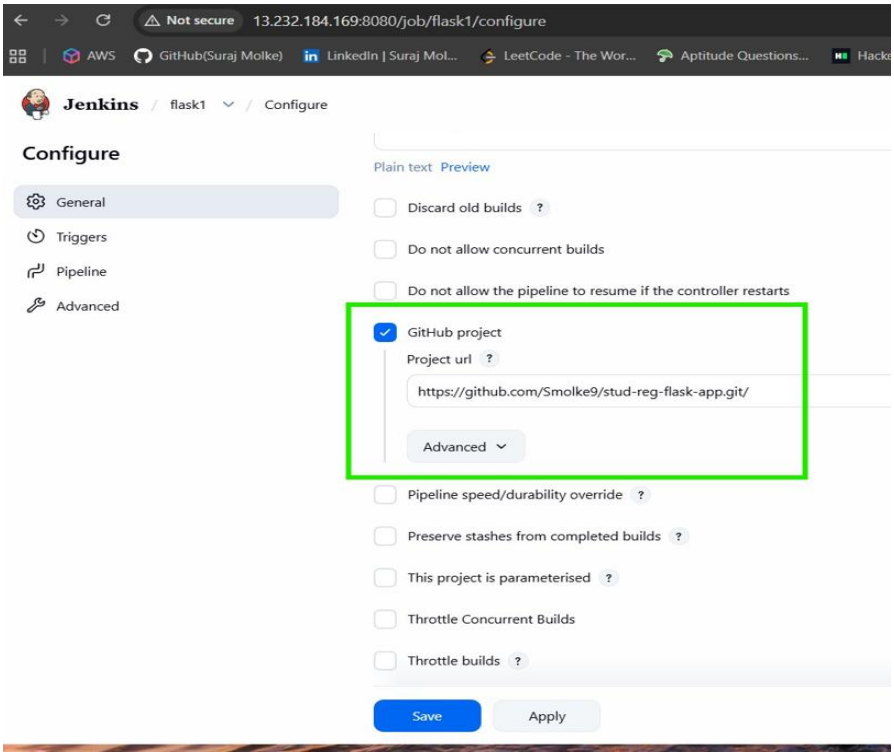
Step 7: Templates

• register.html – HTML form for user input.

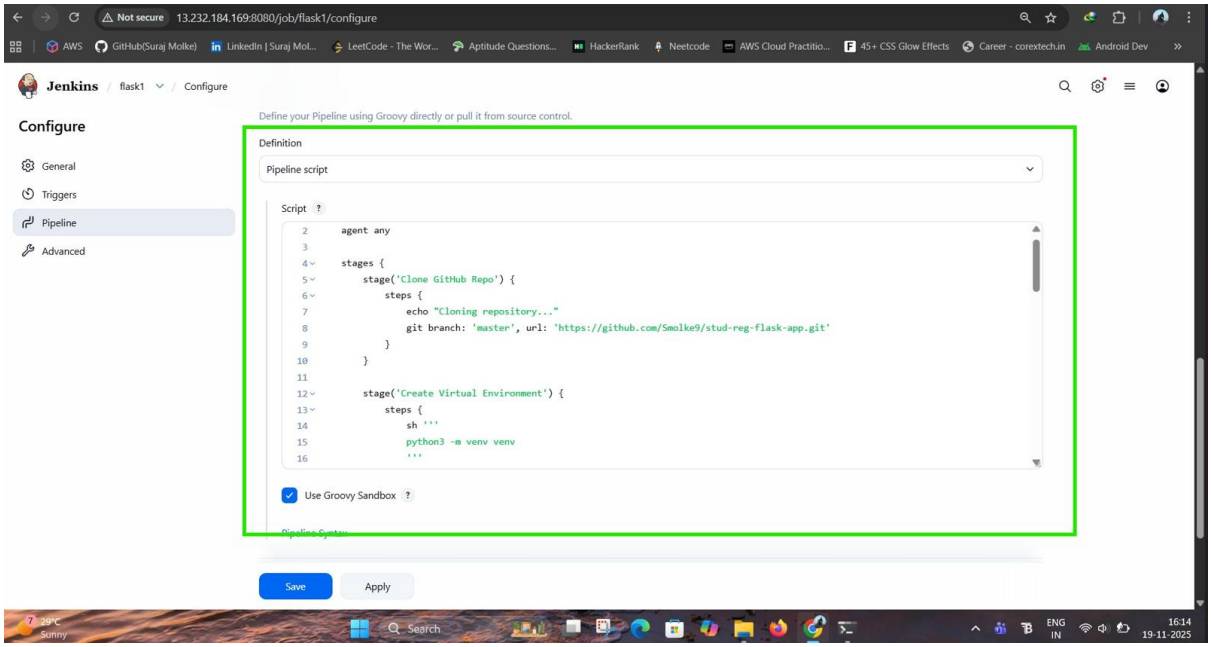
• students.html

Step 8: Jenkins Pipeline Stages

8.1 Clone GitHub Repo – pulls latest code.



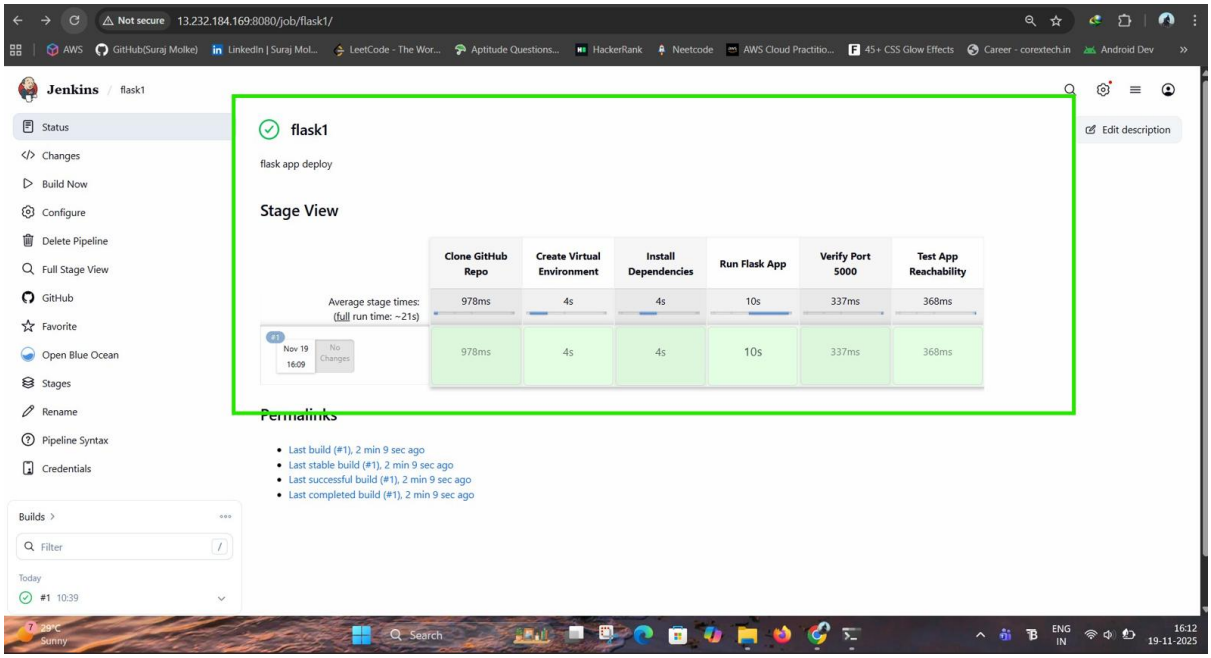
8.2 Create Virtual Environment – isolates dependencies.



8.3 Install Dependencies – Flask + MySQL connector.

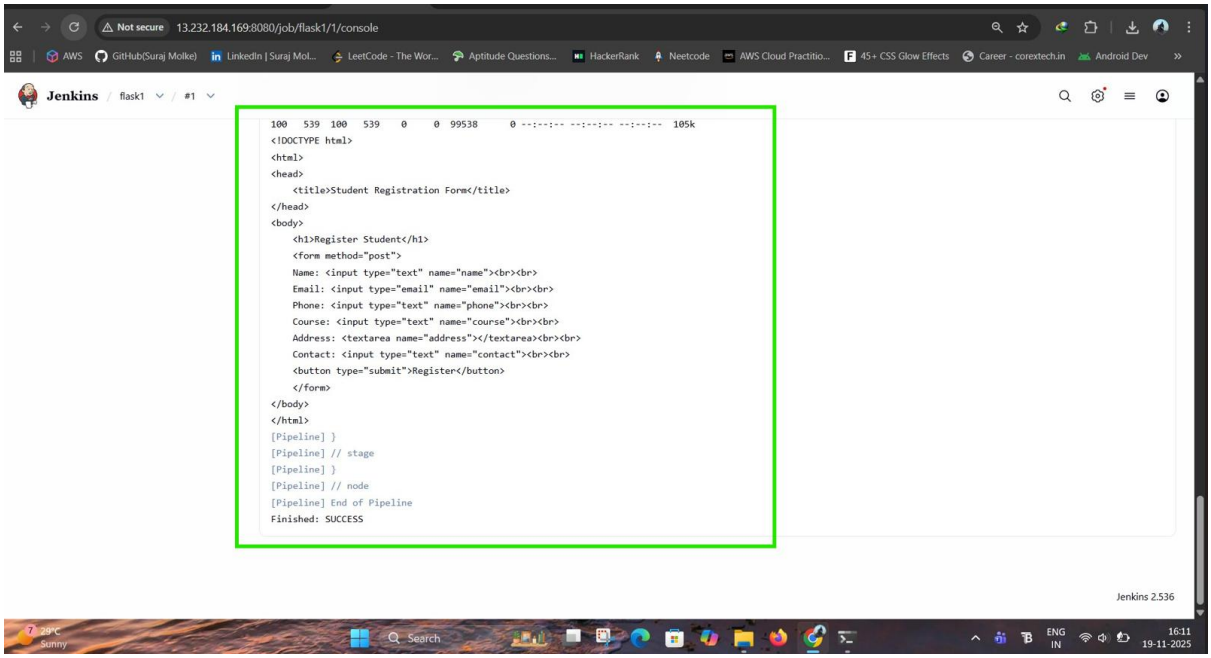
8.4 Run Flask App – starts on port 5000.

8.5 Expose Port using socat – forwards 5000 → 5050.

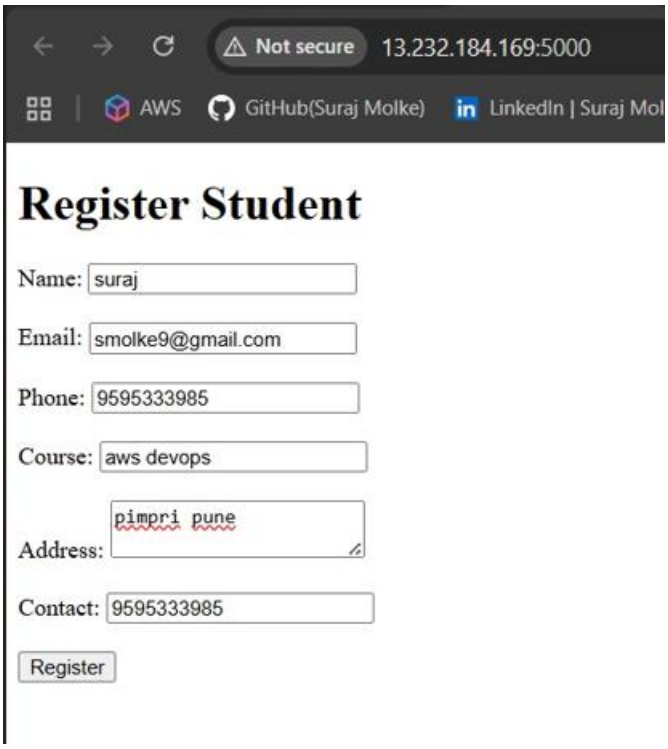


8.6 Verify Access – curl health check ensures app is running.

A curl command is executed to perform a final health check. A successful response confirms that the entire deployment chain, from the Flask app to the socat port forwarding, is working correctly



Step 9: On post 5000 page available



Finally Student data successfully registered in mysql database.

Conclusion

- **Separation of Concerns:** The frontend (HTML), backend (Flask), and database (MySQL) are distinct layers, making the application modular and easier to maintain.
- **Version Control Best Practices:** Using Git and GitHub ensures that all code changes are tracked, collaborated on effectively, and easily revertible. This is fundamental for team-based development and stable releases.
- **Automated CI/CD (DevOps):** Jenkins is at the heart of this project, automating the entire workflow from code commit to deployment. This significantly:
    - **Reduces Manual Errors:** Eliminates human mistakes in the build, test, and deployment phases.
    - **Increases Speed:** Speeds up the delivery of new features and bug fixes to users.
    - **Ensures Quality:** Automated tests (unit and integration) run with every change, catching issues early in the development cycle.
    - **Promotes Consistency:** Guarantees that deployments are consistent across environments.
- **Scalability & Maintainability:** A well-structured Flask application interacting with a robust MySQL database provides a solid foundation that can be scaled horizontally if needed and is relatively easy to debug and enhance.

In conclusion, this project provides a comprehensive and automated pipeline for building and deploying a Flask-based web application. It not only delivers a functional student registration system but also establishes a professional and efficient development and deployment process, making it a strong foundation for future enhancements and continuous delivery.