



DEVOPS OPTIMIZED NAVIGATION: BUILDING A DEVOPS CI/CD PIPELINE

**M. Priyanka¹, K. Sindhuja², V. Madhuvani³, K. Prasoona Sowpthika⁴,
K. Kranthi Kumar⁵**

^{1,2,3,4}Students, ⁵Associate Professor

¹Department of Information Technology

¹Vasireddy Venkatadri Institute of Technology, Guntur, India.

Article DOI: <https://doi.org/10.36713/epra16292>

DOI No: 10.36713/epra16292

ABSTRACT

DevOps Optimized Navigation: Building a DevOps CI/CD pipeline aims to implement devops practices via building campus navigation for our college. The application displays different blocks of our college where the user can navigate. This system will be useful especially for new comers and people those who are unfamiliar with the campus layout. People equipped with any mobile phone can easily scan the QR Code to open the website and select the destination for navigation. The optimal path is visible via google maps. For DevOps, we have used Amazon Web Services(AWS) .GitHub is used as version control platform. A tool called Jenkins is used for continuous integration and continuous deployment which is a open source tool. Our Project is a flask application which is deployed using Docker container. Our project provides a solution that not only simplifies the navigation but also ensures responsiveness to different screen sizes and global accessibility to provide user friendly experience.

KEYWORDS – DevOps, GitHub, AWS Cloud, Jenkins, Docker, Flask, Navigation

I. INTRODUCTION

The indoor navigation system can be built for different purposes like college, hospitals, malls etc for new comers or those who are unfamiliar with the navigation system. Based on the user selection for destination, path will be shown from source to destination using google maps. It provides cost-effective and efficient indoor navigation without the need for additional sensor devices.[1]

In order to overcome the shortcomings of interior navigation, the study describes a web-based navigation system named "Campus Routing Using QR Code". It suggests an alternative to installing mobile apps that uses QR codes for both indoor and outdoor routing. By combining pre-made maps from a database with frontend and backend development, users may access navigation routes by scanning QR codes, which improves navigation efficiency—especially in settings like testing centres.[2]

The review paper explores the paradigm shift in software development brought about by the DevOps technique, highlighting its fundamental ideas of sharing, automation, collaboration, and measurement. It addresses the benefits of DevOps, such as faster implementation times, higher output, and better system quality, while also addressing any drawbacks like the requirement for specialized knowledge and security issues. The article highlights successful DevOps deployments with case studies from organizations like Facebook and DocuSign. It also examines the future implications of DevOps, including its role in automation, AI integration, and platform-as-a-service offerings. All things considered, it comes to the conclusion that DevOps is a revolutionary strategy that improves software delivery speed and stability while opening the door for ongoing industry improvement.[3]

The goal of the study is to improve CI/CD procedures by utilizing Jenkins, an open-source automation server. Jenkins can help improve productivity and reliability in the development pipeline by automating operations like code integration, testing, and deployment. Jenkins helps development teams to adopt continuous delivery strategies by providing real-time notifications and performance analysis tools. This allows for quicker iterations and more seamless team collaboration. Generally speaking, Jenkins is essential to CI/CD process implementation and pipeline optimization for software delivery.[4]

In this research paper, we introduce a technological advancement to our college: indoor navigation with global accessibility and scalability for future adaptations. Employing DevOps practices, we utilize various tools including GitHub for version control. AWS (Amazon Web Services) is chosen for its superior availability, extensive services, and high demand. The study further investigates

the utilization of AWS EC2 instances to host Jenkins servers, ensuring scalable and reliable infrastructure for CI/CD automation. Additionally, Docker is employed to containerize Flask applications, ensuring consistent development and deployment environments while improving scalability and portability.

II. OBJECTIVES

- Enhance campus navigation for newcomers or individuals unfamiliar with the campus layout, thereby improving their overall experience.
- Utilize AWS (Amazon Web Services) as a cloud service to ensure global accessibility of the navigation.
- Incorporate DevOps practices to enable continuous integration and continuous deployment (CI/CD) by leveraging various tools such as GitHub, Jenkins, and Docker.

III. METHODOLOGY

A. Proposed System Architecture

The QR Code to our application will be available at the entrance of the college such that the user can scan the QR Code via mobile phone to open our website. It contains different blocks of our college where user can visit. After selecting path for destination, a path will be displayed from source to destination.

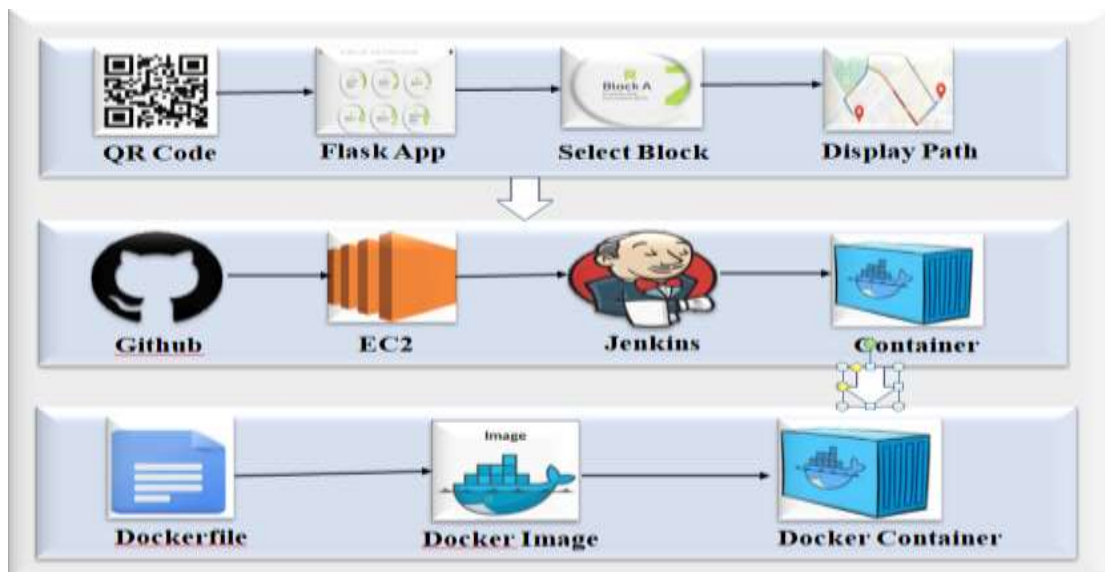


Fig.1: Proposed System Architecture

B. Implementaion of DevOps

1. AWS EC2 Instance – Demo Server

In order to initiate devops lifecycle, firstly push the entire code into github public repository. We will create an aws free tier account. From services , we will make use of EC2 and create an instance called Demo Server. Change the Instance state to running and you will get the output as shown in figure[2].

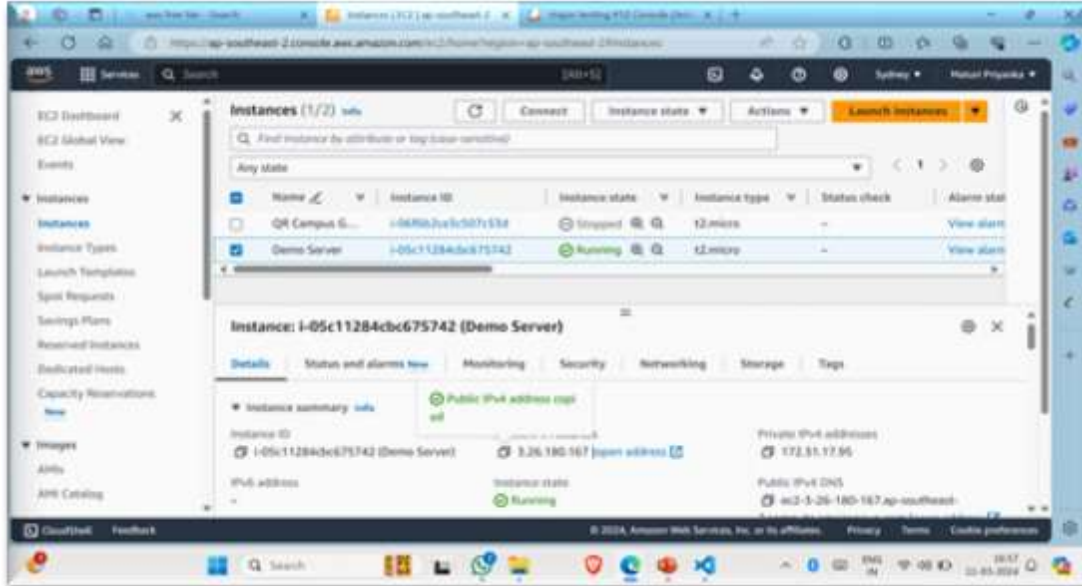


Fig.2:AWS EC2 Instance – Demo Server

2. Jenkins Dashboard

Use SSH for connecting the instance with the os terminal and install Jenkins in Demo Server instance. Jenkins can be accessed using Public IP Address of the instance and followed by port number(3.26.180.167:8080).

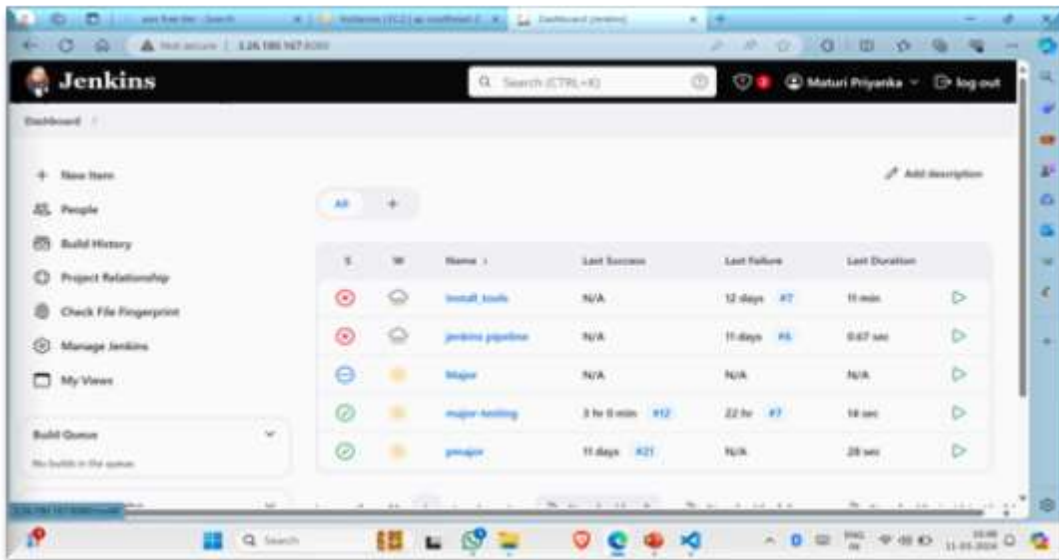


Fig.3: Jenkins Dashboard



3. Github Repo Structure for Docker Container

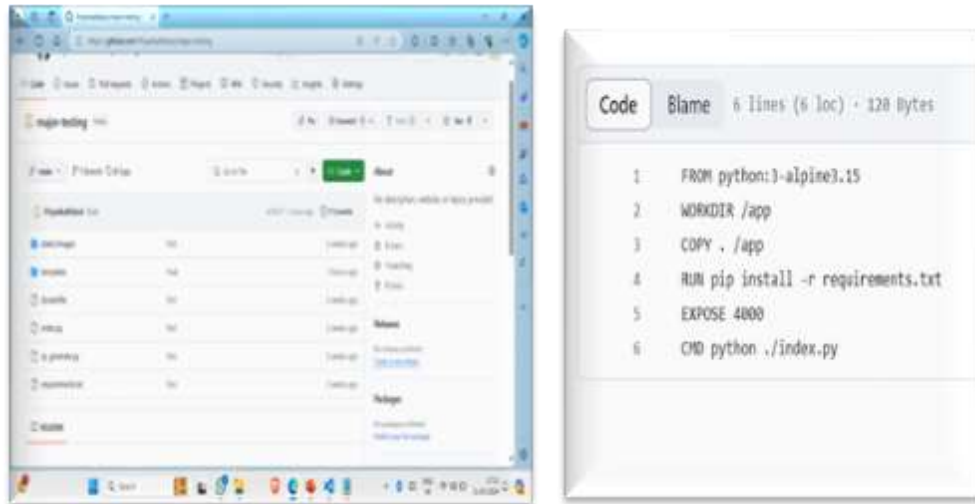


Fig 4 : Github Repo Structure for Docker Container

For docker container , the github repo must have dockerfile, index.html and requirements.txt. index.html is entry point for container. requirements.txt has all necessary packages that has to be installed like flask in case of our application. Dockerfile contains set of instructions to build docker image.

4. Connect Jenkins with Github:

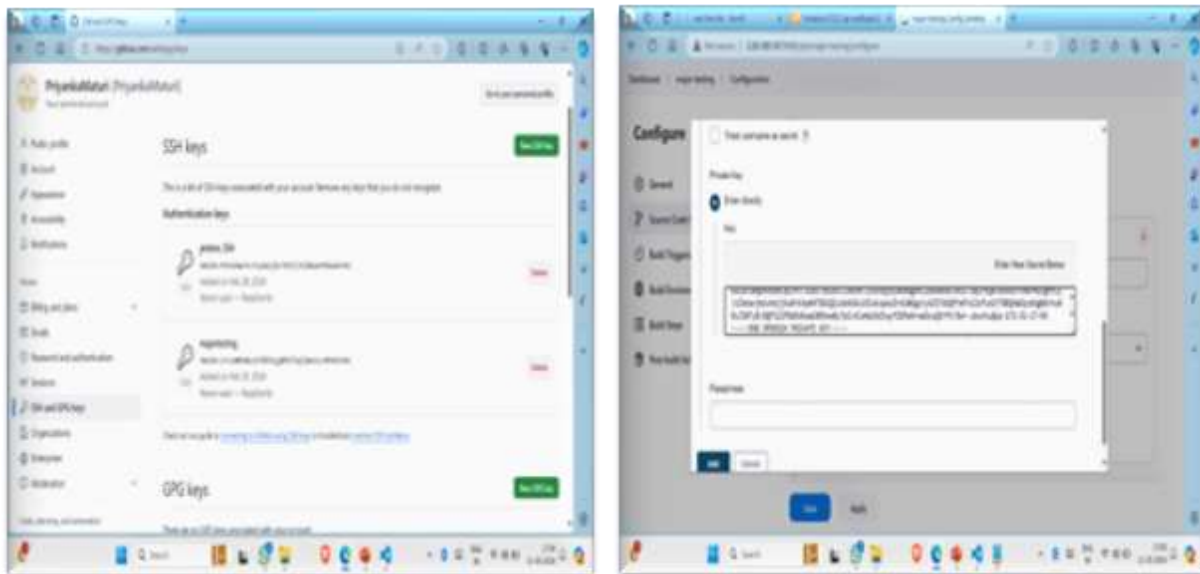


Fig 5 : Connect Jenkins with Github

Create public and private key for integrating github and jenkins using ss-keygen command in ssh terminal. Use the public key in github ssh keys and create a new item called major-testing in jenkins dashboard. Add Github project url and private key.

5. Successfully Deployed

In Jenkins Dashboard, select major-testing item. Click build now . After successful deployment you will get as shown in figure

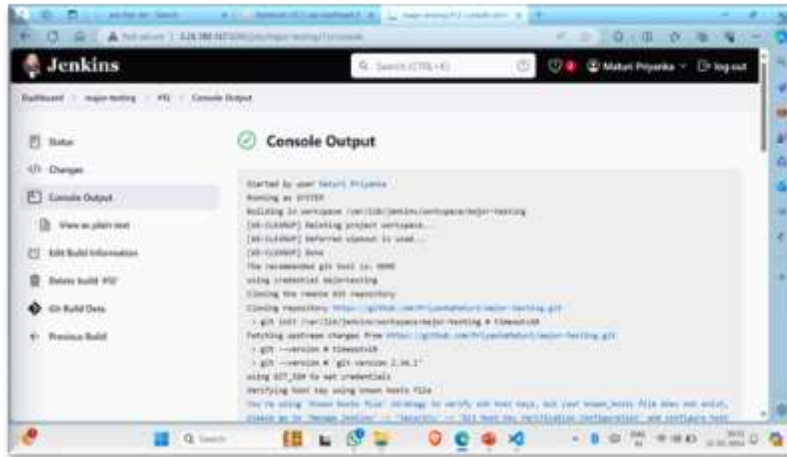
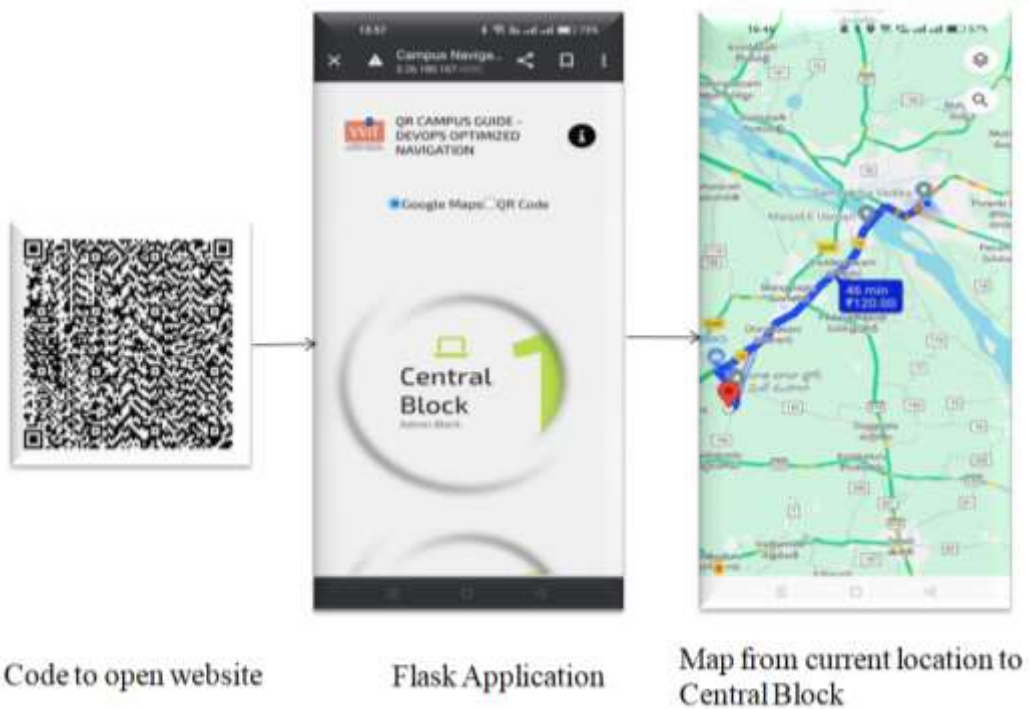


Fig 6 : Deployment

IV. RESULTS





A. Desktop/Laptop Version



B. Mobile Version



V. SUGGESTIONS

- Cloud Service Providers: We have used AWS Cloud because of its huge contribution in market. We can compare the performance of our application in different cloud services like google, Azure, Alibaba, Oracle, IBM etc.
- Orchestration platform: Kubernetes is an open-source container orchestration platform that are usually used for more complex tasks in distributed environment. One can try making use of Kubernetes instead of Docker..

VI. CONCLUSION

In conclusion, the “DevOps Optimized Navigation : Building a DevOps CI/CD pipeline” project revolutionizes campus navigation



by offering an intuitive and efficient solution tailored to the needs of both newcomers and those unfamiliar with the campus layout. Through its user-friendly interface and integration of DevOps practices, it not only simplifies navigation but also sets a precedent for modern software development practices in enhancing user experiences.

VII. REFERENCES

1. Sushma, S Ambareesh (2017), "Indoor Navigation using QR Code Based on Google Maps for Ios ", IEEE : This research paper provided the foundational concepts and principles on which the project is based.
2. M Padmaja (2022), "Campus Routing Using QR Code", RAEEUCCI , IOP publications : paper provided the foundational concepts and principles on which the project is based.
3. Aadil Hasan (2020), "DevOps Methodology" International Journal of Creative Research Thoughts (IJCRT),SSN : 2320-2882.
4. Rismanda Tyas Kusumadewi, Ronald Adrian, "Performance Analysis of Devops Practice Implementation Of CI/CD Using Jenkins" ISSN : 2477-2550(e) (Journal of Computer Science and Information Technology)
5. Dhaya Sindhu Battina, "Devops, A New Approach To Cloud Development & Testing" ,JETIR(Journal of Emerging Technologies and Innovative Research) , ISSN : 2349-5162.
6. S. Mysari and V. Bejgam, "Continuous Integration and Continuous Deployment Pipeline Automation Using Jenkins Ansible," Feb. 2020. doi: 10.1109/ic-ETITE47903.2020.239.
7. J. Benjamin and J. Mathew, "Enhancing the efficiency of continuous integration environment in DevOps," IOP Conference Series: Materials Science and Engineering, vol. 1085, no. 1, p. 012025, Feb. 2021, doi: 10.1088/1757- 899x/1085/1/012025.
8. Danur Wijayanto, Arizona Firdonsyah , "Implementation of Continuous Delivery using Jenkins And Kubernetes with Docker Local Images", Sinkron : Jurnal dan Penelitian Teknik Informatika Volume 8, Number 4, October 2023 DOI : <https://doi.org/10.33395/sinkron.v8i4.12624>