TRIBHUVAN UNIVERSITY

Institute of Science and Technology

AN INTERNSHIP REPORT

On

DEVOPS

AT

NAXA PVT. LTD.

An Internship Report Submitted in Partial Fulfilment of the Requirement of

Bachelor of Science in Computer Science & Information Technology

Submitted To:

Department of Computer Science and Information Technology

College of Applied Business and Technology

Submitted by:

Anil Raj Rimal [23554/076]

Reg. No: 5-2-360-4-2019

July, 2024

COLLEGE OF APPLIED BUSINESS AND TECHNOLOGY

Chabahil, Kathmandu, Nepal

Final Year Internship Report

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LETTER OF RECOMMENDATION

I hereby state and verify that this internship carried out by **Mr. Anil Raj Rimal** entitled **"An internship Report on DevOps at NAXA Pvt. Ltd."** In partial fulfilment of the requirements for the degree of B.Sc. in Computer Science and information Technology. I recommend this for further evaluation.

_____

Mr. Santosh Sharma

Supervisor

Department of Computer Science and IT

College of Applied Business and Technology

LETTER OF APPROVAL

This is to certify that this internship report prepared by **Mr. Anil Raj Rimal** entitled **"An internship Report on DevOps at NAXA Pvt. Ltd."** In partial fulfilment of the requirements for the degree of B.Sc. in Computer Science and Information Technology has been well studied. In our opinion it is satisfactory in the scope and quality as an internship for the required degree.

_____ _____

Mr. Ramesh Pandey

Principal

Mr. Santosh Sharma

Supervisor

_____ _____

Mr. Santosh Sharma

Program coordinator

External Examiner

ACKNOWLEDGEMENT

First and foremost, I would like to express my sincere thanks to my supervisor, **Mr. Santosh Sharma**, for his constant support and supervision throughout my internship period.

I am highly indebted to my mentors, **Mr. Maheshwor Dhakal (System Architect)** and **Mr. Nischal Shrestha (DevOps Engineer) at NAXA Pvt. Ltd**, Baluwatar, Kathmandu, who guided and supported me during my internship and provided me with a great opportunity to work on this role. Their mentorship during my internship will always be a valuable asset in my career.

Finally, I feel very thankful to Tribhuvan University, Faculty of Science, for designing this internship program course. Lastly, I am grateful to my college staff and to each and every one whose guidance, suggestions, and support drove me on. Their cooperation, help, and support are sincerely acknowledged.

ABSTRACT

This report covers my role and experiences as a DevOps intern at NAXA Pvt. Ltd. During my internship, I worked on various tasks that helped me learn and improve my skills in DevOps. My responsibilities included setting up project environments, automating deployment processes, and managing continuous integration and continuous deployment (CI/CD) pipelines. I used tools like Docker, Kubernetes, GitHub Actions, and n8n to make the deployment processes more efficient. I also helped configure and manage server infrastructure, monitor application performance, and ensure the systems were reliable and scalable. This internship gave me valuable hands-on experience and increased my knowledge of modern DevOps practices, preparing me for a successful career in the field.

Keywords: DevOps, CI/CD, GitHub Actions, n8n, Kubernetes, Automation

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
APA	Institute of Electrical and Electronics Engineers
API	Application Programming Interface
AWS	Amazon Web Service
CEO	Chief Executive Officer
CI/CD	Continuous Integration/ Continuous Delivery, Continuous Deployment
CLI	Command Line Interface
DB	Database
EC2	Elastic Compute Cloud
ECR	Elastic Container Registry
GIS	Geographic information system
ICT	Information and Communications Technology
IT	Information Technology
N8N	Nodemation
OS	Operating System
PDF	Portable Document Format
QA	Quality Assurance
RDS	Relational Database Service
SQL	Structured Query Language
SSL	Secure Socket Layer
VM	Virtual Machine

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CHAPTER 1 : INTRODUCTION

1.1 Introduction

During my internship at NAXA Pvt. Ltd., I worked on multiple projects centered around the deployment and management of Django-based applications. These projects involved deploying applications across various environments such as Development, Staging, and Production environments. My main responsibilities included setting up infrastructures, deploying applications, implementing Continuous Integration/Continuous Deployment (CI/CD) pipelines for staging and development environments, and creating backup scripts for production deployments.

Throughout the internship, I gained hands-on experience with essential DevOps tools and technologies. This included working with Linux Ubuntu 22.04 as the operating system, configuring web servers like Nginx, managing databases such as MongoDB and PostgreSQL, utilizing Docker for containerization, scripting with Bash, and deploying on Amazon Web Services (AWS). Additionally, I used GitHub Actions extensively as a CI/CD tool to automate deployment pipelines and streamline the development process.

This report aims to document my internship journey, detailing the practical application of DevOps principles within the context of Django-based deployments and management. It reflects on the challenges faced, lessons learned, and contributions made during my tenure at NAXA Pvt. Ltd.

1.2 Problem Statement

The deployment and management of Django-based applications across different environments, including Development, Staging, and Production, pose significant challenges at NAXA Pvt. Ltd. Key challenges include ensuring consistent deployment processes, integrating (CI/CD) pipelines effectively using tools like GitHub Action, and implementing robust backup and recovery strategies for live deployments on AWS.

Managing AWS services involves optimizing performance, scalability, and cost-efficiency, essential for delivering reliable geo-ICT solutions to clients in disaster risk reduction, infrastructure development, and governance sectors. Addressing these challenges is critical to enhancing operational efficiency and minimizing downtime, thereby supporting NAXA's mission of leveraging technology for impactful societal solutions.

1.3 Objectives

The main objectives of this internship were:

- To deploy Django-based applications across Development, Staging, and Production environments.
- To implement CI/CD pipelines using GitHub Actions for automated build and deployment.
- To develop and implement backup and recovery strategies for projects.
- To collaborate with teams to optimize overall processes and support geo-ICT solutions in various sectors.

1.4 Scope and Limitation

The scope of my internship at NAXA Pvt. Ltd. focused on improving how Django-based applications are developed and deployed on AWS. This involved using DevOps practices to make sure changes to applications are delivered quickly and on time to clients. By setting up CI/CD pipelines with tools like GitHub Actions, the aim was to make the workflow smoother and improve efficiency in delivering geo-ICT solutions for different project stages like Development, Staging, and Production.

The different limitations were:

- Making project workflows more complicated because of new tools and methods.
- Some teams finding it hard to switch from traditional software delivery methods to DevOps.
- Possible slower start as teams gets used to new workflows and tools.
- Ensuring consistency and smooth connections between different stages of the CI/CD process.

1.5 Report Organization

The report has been prepared following the guidelines provided by Tribhuvan University. The report is separated into different chapters. Each chapter consists of various sub chapters with its contents. The preliminary section of the report consists of Title Page, Acknowledgement, Abstract, Table of Contents, List of Abbreviations, List of Figures, and List of Tables.

The main report is divided into four chapters, which includes:

Chapter 1: Introduction

It includes the general overview of the internship as. Also, the Problem Statement, Objectives, and Scope/Limitations for the internship I've completed.

Chapter 2: Organization Details and Literature Review

It includes the introduction, organizational hierarchy, how and what domain does the organization works on, overall description of the internship department, and also some other studies on the topic of my internship.

Chapter 3: Internship Activities

This chapter includes all the roles and responsibilities I acquire as a DevOps Intern. Tables for weekly logs I've maintained, Description of some Projects I was assigned on, and some tasks I've carried out during my internship period.

Chapter 4: Conclusion and Learning Outcome

This portion concludes my overall internship report and also contains the learning experience and knowledge I've gathered during my internship period.

The final part of the report consists of References and Appendices. The references are listed in accordance to the APA referencing standards and the Appendices include the screenshots of the some of my projects, tasks etc.

CHAPTER 2 : ORGANIZATION DETAILS AND LITERATURE REVIEW

2.1 Introduction to Organization

NAXA Pvt. Ltd. is a pioneering Geo-ICT technology consulting firm established in 2014 by Geomatics Engineers from Kathmandu University. Dedicated to advancing geospatial technologies, NAXA aims to elevate Nepal's digital mapping sector by addressing contemporary global challenges. With over seven years of experience, NAXA has successfully executed more than 300 projects, collaborating with national and local governments, UN agencies, private sectors, and civil society organizations. These projects span disaster risk reduction, infrastructure development, healthcare, education, and governance sectors.

NAXA's journey began with their victory in the "NASA International Space Apps Challenge" in 2014, where they developed "CLEAN KTM," a crowdsourcing platform for waste management in Kathmandu Valley. Inspired by this success, the founders established NAXA to further develop technology-driven solutions for local challenges, mobilizing Nepali youth and forging partnerships to enhance operational efficiencies. Beyond geoinformatics, NAXA envisions empowering global decision-making with Geo-Intelligence Solutions, leveraging data expertise to drive positive societal impact and innovate for a sustainable future. [6]

Table 2.1: Organization Details

Organization Name	NAXA Pvt. Ltd.
CEO	Upendra Oli
Address	Do Cha Marg, Maharajgunj-3, Kathmandu, Nepal
Contact No.	14516543
Email	info@naxa.com.np
Website	https://naxa.com.np/
Working Days	Monday-Friday (9AM-6PM)

2.2 Organizational Hierarchy

Organizational hierarchy refers to the structured arrangement of roles and responsibilities within a company, typically featuring a clear chain of command from top executives to

individual employees. This structure is crucial as it streamlines operations, facilitates effective communication, and ensures everyone understands their specific roles and responsibilities. By defining levels of authority and accountability, organizational hierarchy enables quick decision-making and fosters accountability, while also supporting career development by providing clear paths for advancement. Overall, it maintains order and efficiency in the company's operations.

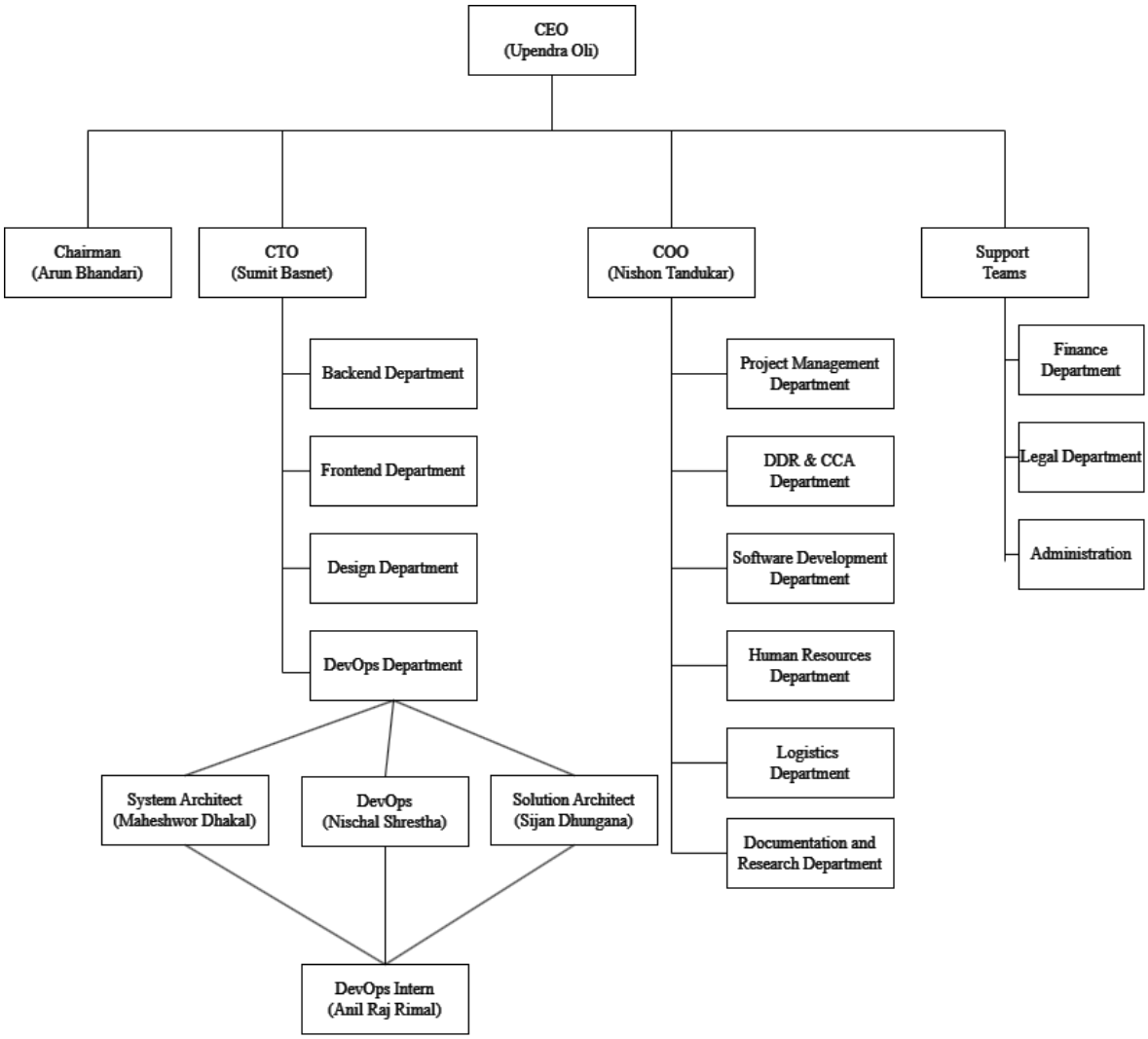

Figure 2.1: Organizational Hierarchy of NAXA Pvt. Ltd

2.3 Working Domains of Organization

NAXA focuses on harnessing innovative ideas to solve complex challenges. They collaborate to generate, explore, build, and validate ideas, adapting global innovations to address local issues effectively.

- **GIS Mapping & Analysis**: NAXA specializes in creating accurate digital maps for desktop, web, and mobile platforms. They manage geographic data, analyze spatial information, and develop online GIS applications.
- **Software & Apps Development**: NAXA develops custom Android and iOS applications, web applications, and tools. They handle the entire software development process, ensuring smooth performance and user-friendly experiences across different devices.
- **Data Collection & Visualization**: NAXA utilizes location data to create interactive map-based applications for visualizing and sharing data effectively. They develop software systems for thematic mapping and interactive digital maps.
- **Frontier Technologies (Drones, VR)**: NAXA pioneers the use of advanced technologies like drones and virtual reality for surveying, mapping, and interactive navigation. They specialize in drone-based data collection, image processing, and virtual reality applications.
- **Training & Capacity Building (GIS and Web GIS)**: NAXA offers tailored training in GIS Mapping, OpenStreetMap, and Web GIS for students, researchers, and government officials. They advocate for geospatial literacy and the adoption of advanced mapping technologies.
- **Creative Graphic Design**: In addition to their core services, NAXA excels in creative graphic design, enhancing digital mapping outputs with visually appealing designs that improve data understanding.

2.4 Description of Intern Department

At NAXA Pvt. Ltd., the Intern Department is a team where enthusiastic individuals learn and contribute to innovative projects. Each intern is guided by their respective mentors specialized in software development, GIS mapping, DevOps, and other fields. Interns gain hands-on experience and work closely with their teams to develop practical skills. This approach supports NAXA's mission of using technology for impactful solutions. Interns quickly integrate into company projects once they acquire hands-on knowledge in their respective fields. While this can be challenging, it fosters significant growth and learning opportunities for interns.

2.5 Literature Review/ Related Studies

During my internship, conducting a DevOps project involved extensive reading from various official documentation sites of the tools used. The initial step in the project was installing Docker Engine. Docker's official site offers a properly explained documentation for installing and setting up docker engine (Docker, Inc.). [1]

In configuring Nginx as the primary web server and setting it up as a reverse proxy for application containers, I consulted Nginx's official documentation. This resource provided step-by-step tutorials for creating configuration files and integrating SSL certificates (Nginx; Haynes, 2023). [3]

AWS played a critical role in provisioning and managing cloud resources. Leveraging various AWS services such as EC2 for virtual servers, S3 for storage, and RDS for managed databases, I followed detailed tutorials and best practices from AWS documentation to ensure a scalable and reliable infrastructure (Amazon Web Services, Inc.). [4]

For object storage, MinIO was employed due to its high-performance, S3-compatible storage system. MinIO's documentation provided comprehensive guides on deploying and managing storage solutions, enabling efficient handling of large datasets within the project (MinIO, Inc.). [2]

CHAPTER 3 : INTERNSHIP ACTIVITIES

3.1 Role and Responsibilities

During my internship at NAXA Pvt. Ltd., I was assigned as DevOps intern. Some of the major responsibilities during my internship period were.

- Managing VCS repositories and CI/CD pipelines for automated software delivery.
- Supporting and optimizing Jenkins, Circles, and GitHub Actions workflows.
- Troubleshooting application and server issues promptly.
- Facilitating communication between developers, QA, and project managers.
- Documenting infrastructure setups and CI/CD workflows for clarity and reference.

3.2 Weekly Logs

Table 3.1: Internship Logs Week-1

Date	Day	Detailed Description of Tasks
Mar 18, 2024	Monday	Getting started with Docker-Compose. Viewed Concepts of volumes, networks, ports, images etc.
Mar 19, 2024	Tuesday	Created a docker-compose.yml file having two services; mysql with port 3000 and phpMyAdmin with port 8000 flashed. Use volume for db as well.
Mar 20, 2024	Wednesday	Tried to deploy the TM locally. https://github.com/hotosm/tasking-manager.git The compose build was failed multiple time basic understanding of nginx, installation and setup
Mar 21, 2024	Thursday	Installation and Setup of Ubuntu OS on Laptop Installation and Setup of Docker Engine & Compose
Mar 22, 2024	Friday	Successfully setting up Tasking Manager Deployed it on local server Tested Login feature of Tasking Manager

Table 3.2: Internship Logs Week-2

Date	Day	Detailed Description of Tasks
Mar 25, 2024	Monday	Dockerize simple FastAPI based web app Successfully deployed python-based app - https://github.com/aws-samples/python-fastapi-demo-docker
Mar 26, 2024	Tuesday	Setup NGINX to use reverse proxy server Created a new React frontend project and host it to localhost:3000 to previous Python based app Running previous app at localhost:8000 and Frontend at localhost:3000
Mar 27, 2024	Wednesday	Added Two services on docker-compose.yaml; Frontend & nginx then used reverse proxy to make frontend accessible at frontend.demo.local and the previous fastapi app accessible at fastapi.demo.local
Mar 28, 2024	Thursday	Changed nameserver of my personal domain (anilrajrimal.com.np) from dream host to Cloudflare. Forked aws-fastapi-book-sample and write an Action workflow to deploy on every push.
Mar 29, 2024	Friday	Cloned and setup official kobo-toolkit on local system Cloned and setup kobo-naxa as well

Table 3.3: Internship Logs Week-3

Date	Day	Detailed Description of Tasks
Apr 1, 2024	Monday	Added an Actions workflow file to NAXA-Weather Frontend & dvsphase2 that triggers on push and can be triggered manually as well.

Apr 2, 2024	Tuesday	Added a workflow file to dvs-v3-backend to build and deploy it on AWS.
Apr 3, 2024	Wednesday	Cloned and setup KOBO-NAXA on local system. Fixed error getting on docker network, Radis image etc.
Apr 4, 2024	Thursday	Getting dump from Postgres, baking it up and restore Created a Docker Hub account and pushed first demo image.
Apr 5, 2024	Friday	Getting started with minio, setting it up on local and tried some commands to copy, create bucket, delete etc using minio client and CLI.

Table 3.4: Internship Logs Week-4

Date	**Day**	**Detailed Description of Tasks**
Apr 8, 2024	Monday	understanding minio for boilerplate. loading boilerplate static files using minio instead of Django default
Apr 9, 2024	Tuesday	Took Leave for final year project defence
Apr 10, 2024	Wednesday	Rewritten GitHub Actions workflow for Build and Deploy of the naxa-backend-boilerplate
Apr 11, 2024	Thursday	Created three subdomains & configured Nginx to listen on these subdomains; boilerplate.anilrajrimal.com.np & fastapi.anilrajrimal.com.np & minio.anilrajrimal.com.np
Apr 12, 2024	Friday	Created a workflow to Deploy DVS Backend

Table 3.5: Internship Logs Week-5

Date	Day	Detailed Description of Tasks
Apr 15, 2024	Monday	Tried to fix the problem of automatically restarting container on a server but not fixed
Apr 16, 2024	Tuesday	Tried to deploy fix the problem. got the same situation of restarting container, tried with aws cli, configured new keys but not be able to fix
Apr 17, 2024	Wednesday	Deployed NAXA-BACKEND-BOILERPLATE on my local machine to observe and learn how to use minio with successful a configuration to load static files from minio
Apr 18, 2024	Thursday	Getting Started Monitoring Prometheus & Grafana
Apr 19, 2024	Friday	Installation and setup of Node Exporter, Prometheus & Grafana on local machine as a service; and in an AWS instance using docker compose.

Table 3.6: Internship Logs Week-6

Date	Day	Detailed Description of Tasks
Apr 22, 2024	Monday	Setup monitoring using Grafana, Prometheus, Node Exporter, Blackbox Exporter and also setup Alerts on Slack.
Apr 23, 2024	Tuesday	Started learning python core.
Apr 24, 2024	Wednesday	Continued Learning Python
Apr 25, 2024	Thursday	Understanding the Django framework, not hard coding everything but understanding the setting/config files, aws s3 bucket config etc
Apr 26, 2024	Friday	Setting up and using JMeter for load testing, API testing, stress testing & Database/Query testing

Table 3.7: Internship Logs Week-7

Date	Day	Detailed Description of Tasks
Apr 29, 2024	Monday	Learned Django concepts of Databases, CORS, CSRF etc Solved a problem related to DVS frontend redirecting to nginx 404 page while getting into any path.
Apr 30, 2024	Tuesday	Dockerizing Simple FastAPI app, creating image publishing it on Docker Hub Pushing code+Dockerfile in GitHub repo Writing Action Workflow and Deploying it to a VM (build and tag :<git Hash>) Writing single service compose file
May 1, 2024	Wednesday	Creating another Compose file for Monitoring using Prometheus Stack Revising Concept of Docker Networks Understanding Node Exporter, Blackbox Exporter Basic PromQL, Prometheus, Grafana etc
May 2, 2024	Thursday	Fixed error occurred during Monitoring (Used Blackbox Exporter instead of Node Exporter for http)
May 3, 2024	Friday	Started understanding deployment with Docker stack

Table 3.8: Internship Logs Week-8

Date	Day	Detailed Description of Tasks
May 6, 2024	Monday	Understanding structre and concept of Docker Swarm. Created 3 VMs using multipass to try to implement the concepts of docker swarm.
May 7, 2024	Tuesday	Studied concepts of Cloud Computing. Backing up and restoring database containers.

May 8, 2024	Wednesday	Getting started with n8n, deploying it using single container but failed to create workflows after login.
May 9, 2024	Thursday	Hosted n8n by self on n8n.anilrajrmal.com.np
May 10, 2024	Friday	Created basic automation workflows with n8n like sending slack notifications, Backing up entire workflows in GitHub Repository etc.

Table 3.9: Internship Logs Week-9

Date	Day	Detailed Description of Tasks
May 13, 2024	Monday	Understanding creation of various workflows like slack alerts on push to a specific repo, alert while creating the PR etc.
May 14, 2024	Tuesday	Started creating a workflow that automates the initial frontend deployment; used ssh nodes, exec commands (node is based on sh shell, which is not familiar to me so i replaced it with ssh nodes)
May 15, 2024	Wednesday	Added search and replace to. env, form trigger that ask for GitHub repo link, node version
May 16, 2024	Thursday	Reduced form input to GitHub repo link, branch and node version only added condition for notification on slack
May 17, 2024	Friday	started creating workflow for backend deployment Stuck on the ECR Repository actions and copying env from AWS s3 bucket

Table 3.10: Internship Logs Week-10

Date	Day	Detailed Description of Tasks
May 20, 2024	Monday	Creating Backend deployment workflow with n8n used personal docker hub repository rather than using ECR for now
May 21, 2024	Tuesday	Failed to properly automate the workflow. Issues with dependencies creation for both GIS and non-GIS projects.
May 22, 2024	Wednesday	Working workflow for Backend Deployment is created and tested.
May 23, 2024	Thursday	Added Slack notification system and slips for better readability

May 24, 2024	Friday	Storing dist Artifacts of workflows in aws than saving it in action itself removed ssh key generation and its permission steps from workflow and used Appleboy scp instead.

Table 3.11: Internship Logs Week-11

Date	Day	Detailed Description of Tasks
May 27, 2024	Monday	Created bash script that takes backup from Postgres, mongodb and media files of dastaa-project.
May 28, 2024	Tuesday	Then the backup folder is compressed and uploaded to aws s3 bucket. Then this script is automated using n8n.
May 29, 2024	Wednesday	Created Action workflow file for dvs-v3-frontend
May 30, 2024	Thursday	Started learning Kubernetes. Watched some conceptual videos on YouTube by Abhishek Veeramalla.
May 31, 2024	Friday	Setting up local Kubernetes cluster with minikube and kubectl;

Table 3.12: Internship Logs Week-12

Date	Day	Detailed Description of Tasks
Jun 3, 2024	Monday	Setup deployment for my fastapi python app Tried to implement services like Cluster IP, Node Port and Load Balancer
Jun 4, 2024	Tuesday	Backing of mysql database from Nishon-wordpress Project, zipping it and uploading to s3. Automated using n8n.
Jun 5, 2024	Wednesday	Victory-Backend(mongo+Postgres)-Backup, upload to s3 and automated using n8n.
Jun 6, 2024	Thursday	Continued learning Minukube
Jun 7, 2024	Friday	wordpress-geovation-167 project backup, uploaded to s3 and automated using n8n.

3.3 Description of The Projects Involved During Internship

Project: Deployment of dvs-backend, dvs-phase2, dvs-v3-frontend etc.

During my internship at NAXA Pvt. Ltd., I was involved in creating GitHub Action workflows to automate the deployment of various projects including dvs-backend, dvs-phase2, and dvs-v3-frontend. These workflows were designed to streamline the deployment process, ensuring efficient and consistent deployment of applications across different environments. By configuring GitHub Actions, I implemented CI/CD pipelines that integrated seamlessly with the development workflow, facilitating faster delivery and improved collaboration among team members. This project enabled me to gain hands-on experience in DevOps practices and enhance my skills in automated software deployment using modern CI/CD tools.

Project: Creation of n8n workflows

As part of my internship at NAXA Pvt. Ltd., I undertook the creation of n8n workflows to automate various tasks and processes within the organization. n8n, an open-source workflow automation tool, was utilized to orchestrate workflows that integrated different services and systems. I've created various workflows in which the major are dvs backend initial deployment workflow, and frontend initial deployment workflow.

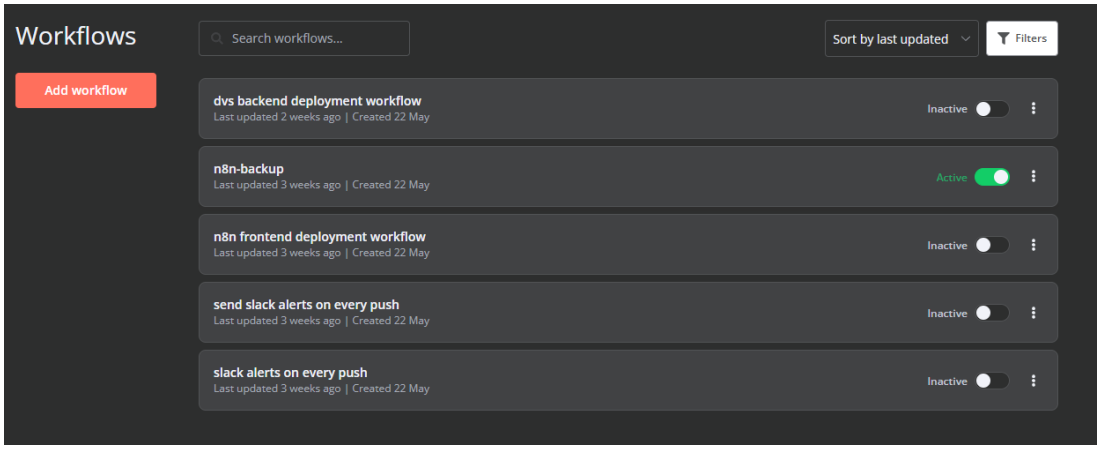

Figure 3.1: n8n workflows list

Project: Writing Bash scripts to backup up Databases, Directories; compressing it, uploading to s2 bucket. And creating n8n workflows for automation.

During my internship at NAXA Pvt. Ltd., I developed Bash scripts to automate database and directory backups. These scripts compressed the backups and uploaded them securely

to an Amazon S3 bucket. Additionally, I created n8n workflows to schedule and execute these backups automatically. This project enhanced my skills in Bash scripting for automation and utilizing n8n for workflow orchestration, improving data management and operational efficiency.

3.4 Tasks Performed

As an Intern, I am not authorised to share private projects and tasks I've performed in the organization. But I can definitely share some of them.

Task 1: Created n8n workflow for deploying frontend Projects.

In this task, at first a form is set as a trigger which accepts data like GitHub Repo URL, Domain Name, Branch, and node version for the frontend-project. The default directory for cloning repo from GitHub is set to /srv/Projects by default.

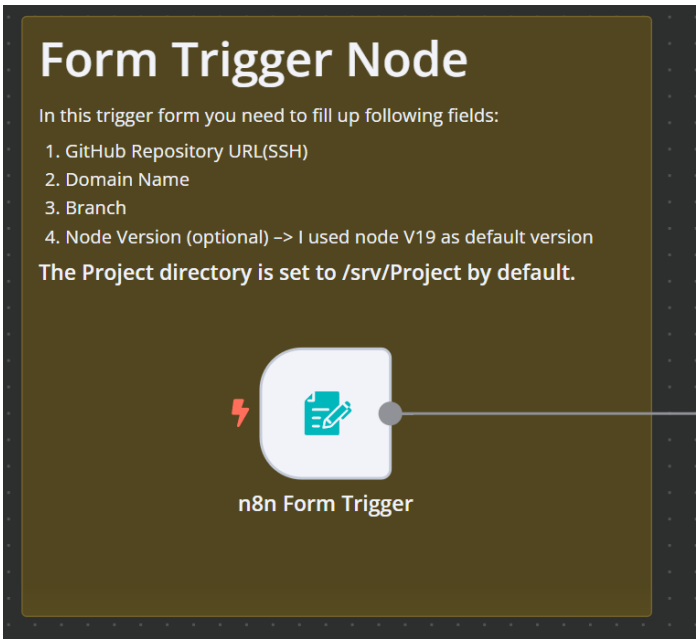

Figure 3.2: n8n form trigger

After filling the form, the Project name is executed from the repo url, and the project is cloned to the default directory. The branch is also pulled as per added in form data.

Command to get repo_name from URL:

```
url={{ $('n8n Form Trigger').item.json.repo_url_ssh }};
repo_name=$(basename "${url%.git}");
echo "$repo_name"
```

Command to clone from Repo

git clone -b {{ $('n8n Form Trigger').item.json.branch }} {{ $('n8n Form Trigger').item.json.repo_url_ssh }} {{ $json.stdout }}-{{ $('n8n Form Trigger').item.json.branch }} || git clone -b master {{ $('n8n Form Trigger').item.json.repo_url_ssh }} {{ $json.stdout }}-master

Command to pull from branch

git pull origin {{ $('n8n Form Trigger').item.json.branch }} || git pull origin master

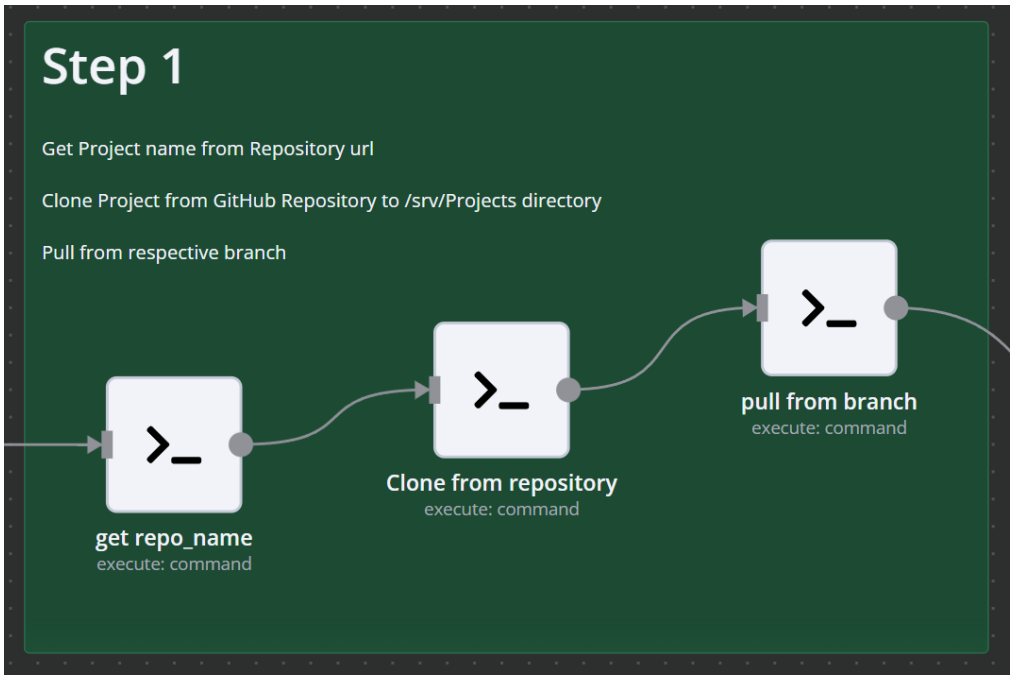

Figure 3.3: n8n frontend workflow step 1

Then in the second step, the .env file from the cloned directory is edited. I've used find and replace method using bash command. The node version manager is then refreshed and the respective node.js is downloaded as per version given in the form and yarn is also installed.

Command to copy .env

sed 's/admin.naxa.com.np/{{ $('n8n Form Trigger').item.json.domain_name }}/g' .env.example > .env

Command to export and load nvm

export NVM_DIR="$HOME/.nvm"[-s "$NVM_DIR/nvm.sh"] && \. "$NVM_DIR/nvm.sh"[-s "$NVM_DIR/bash_completion"] && \. "$NVM_DIR/bash_completion"

Command to install node & yarn

source ~/.nvm/nvm.sh && nvm use {{ $('n8n Form Trigger').item.json.node_version }} || nvm use 19 && sudo npm install -g yarn

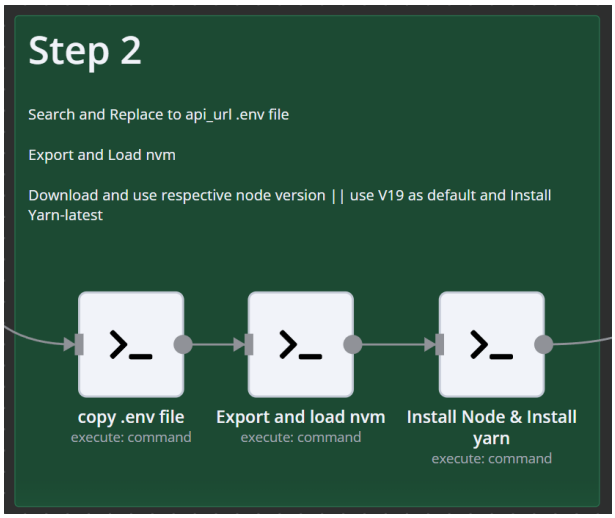

Figure 3.4: n8n frontend workflow step 2

After that the packages in frontend project are downloaded and installed. I am talking about installing from package.json using yarn command. And the static files were also built in this particular step. The yarn build command creates a dist directory with static files.

Command to installing yarn packages

source ~/.nvm/nvm.sh && yarn cache clean && yarn install

Command to build project

source ~/.nvm/nvm.sh && yarn build

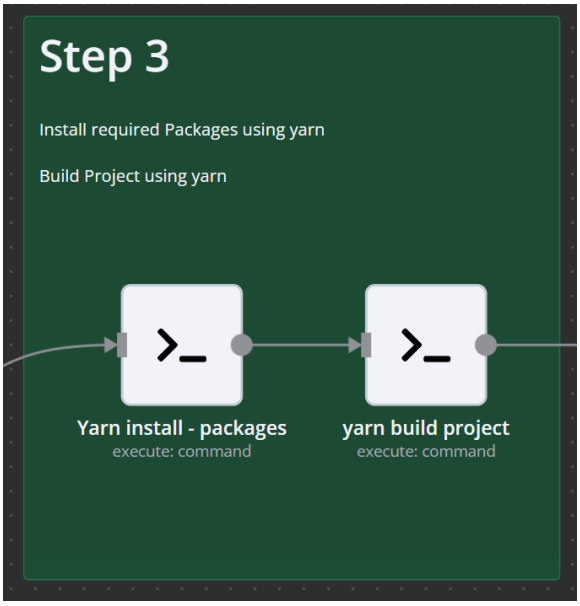

Figure 3.5: n8n frontend workflow step 3

After that I’ve added a nginx config in which the domain name & and the location are updated according to the form filled data. And the nginx config is tested and reloaded in this step.

Command to create nginx config file

```
sudo bash -c "echo ' server {
   listen 80;
   server_name {{ $('n8n Form Trigger').item.json["domain_name"] }};    # domain name to respond to
   access_log /var/log/nginx/{{ $('n8n Form Trigger').item.json["domain_name"] }}.access;
   error_log /var/log/nginx/{{ $('n8n Form Trigger').item.json["domain_name"] }}.error;

   client_max_body_size 500M;           # Allow uploads/transper to 100MB.
   client_body_buffer_size 128k;

   gzip on;           # Allows compression; can be CPU intensive
   gzip_min_length 150;
   gzip_types    text/plain text/css application/javascript application/x-javascript text/javascript image/x-icon image/svg+xml image/png application/json ;

           root /srv/Projects/{{ $('get repo_name').item.json["stdout"] }}-{{ $('n8n Form Trigger').item.json["branch"] }}/dist;
           index  index.html index.htm;
    location / {
           add_header Access-Control-Allow-Origin *;
           try_files \$uri /index.html;           # if no endpoint found try index.html
          }

}' > /etc/nginx/sites-enabled/{{ $('n8n Form Trigger').item.json["domain_name"] }}.conf"
```

Command to test and reload nginx

```
sudo nginx -t && sudo nginx -s reload
```

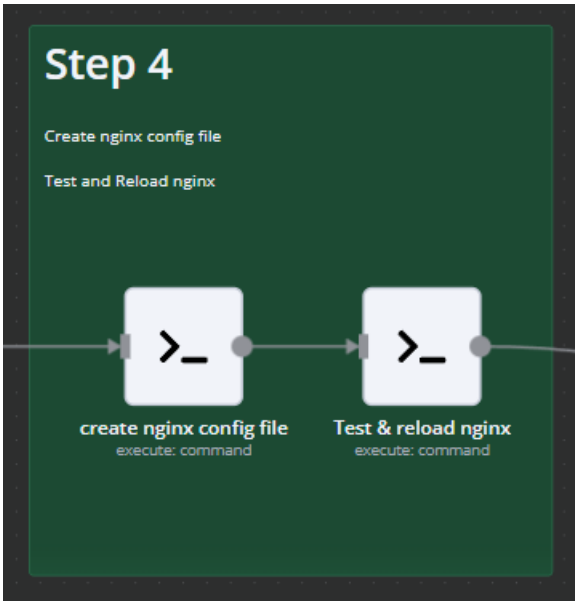

Figure 3.6: n8n frontend workflow step 4

At the last step the domain status is checked using curl command. If the status is active (i.e http_code=200) then the success notification is sent to Slack channel. And if its not active, then the notification is sent saying the site is not active.

Command to check domain status

curl -LI https://{{ $('n8n Form Trigger').item.json["domain_name"] }} -o /dev/null -w '%{http_code}\n' -s

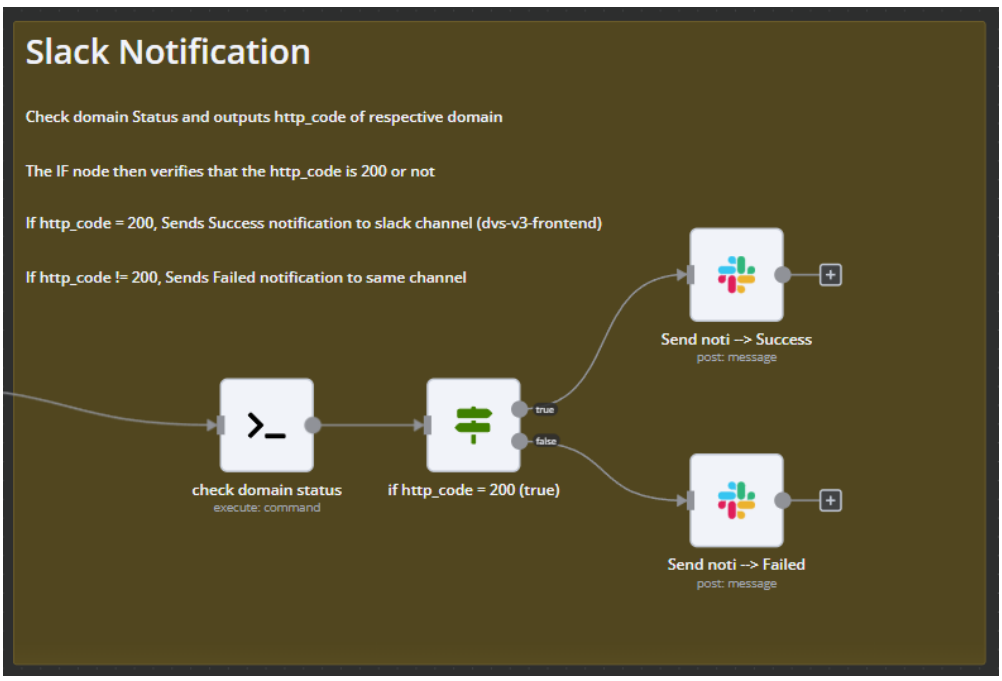

Figure 3.7: n8n frontend workflow step 5

Task 2: Created a bash script to take backup and upload it to AWS s3 bucket

```
#!/bin/bash
set -e
TODAY=$(date +'%Y-%m-%d_%H-%M')
PROJECT_NAME=dastaa_kobo-docker-Backup
BACKUP_DIR=/home/ubuntu/Scripts/Backups/$PROJECT_NAME-$TODAY
LOG_FILE=$BACKUP_DIR/backup.log
#AWS
AWSPROFILE=default
UPLOADTOS3=true
S3_BASE=s3://naxa-developers/backups/projects-backups/dastaa-kobo/
GZIP_FILE=$BACKUP_DIR".tar.gz"
MEDIA_SOURCE_DIR=/home/ubuntu/srv/kobo-docker/.vols/
MEDIA_BACKUP_DIR=$BACKUP_DIR/Media/
# Create backup directories
mkdir -p $BACKUP_DIR/MongoDatabase
mkdir -p $BACKUP_DIR/Database
mkdir -p $MEDIA_BACKUP_DIR
# Function to log and exit on error
handle_error() {
   echo "Error on line $1"
   echo "Check $LOG_FILE for details." | tee -a $LOG_FILE
   exit 1
}
# Trap errors and log them
trap 'handle_error $LINENO' ERR
# Backup MongoDB
{
   docker exec dastaa-kobobe-mongo-1 mongodump --host mongo.naxa.com.private --
port 27017 --db formhub -u kobo -p JHb8prCmCDgQ6WvmwDYM --
authenticationDatabase formhub --gzip --archive >
$BACKUP_DIR/MongoDatabase/mongo.$TODAY.formhub.gz
   echo "MongoDB backup completed at $(date)"
} 2>> $LOG_FILE
# Postgres koboform
{
   docker exec dastaa-kobobe-postgres-1 pg_dump -bvxOW --
dbname=postgresql://kobo:8JAjrdVmq8TNyetLLUco@postgres.naxa.com.private:5432/k
oboform -Z 5 > $BACKUP_DIR/Database/koboform.$TODAY.gz
   echo "PostgreSQL koboform backup completed at $(date)"
} 2>> $LOG_FILE
# Postgres kobocat
{
   docker exec dastaa-kobobe-postgres-1 pg_dump -bvxOW --
dbname=postgresql://kobo:8JAjrdVmq8TNyetLLUco@postgres.naxa.com.private:5432/k
obocat -Z 5 > $BACKUP_DIR/Database/kobocat.$TODAY.gz
```

```
    echo "PostgreSQL kobocat backup completed at $(date)"
} 2>> $LOG_FILE

# Backup media uploads
{
    tar -cf - $MEDIA_SOURCE_DIR/kobocat_media_uploads | gzip >
$MEDIA_BACKUP_DIR/kobocat_media_uploads.tar.gz
    tar -cf - $MEDIA_SOURCE_DIR/kpi_blank_media | gzip >
$MEDIA_BACKUP_DIR/kpi_blank_media.tar.gz
    tar -cf - $MEDIA_SOURCE_DIR/kpi_custom_media | gzip >
$MEDIA_BACKUP_DIR/kpi_custom_media.tar.gz
    tar -cf - $MEDIA_SOURCE_DIR/kpi_media | gzip >
$MEDIA_BACKUP_DIR/kpi_media.tar.gz
    echo "Media files backup completed at $(date)"
} 2>> $LOG_FILE

# Change permissions and ownership
{
    sudo chmod 777 $BACKUP_DIR
    sudo chmod -R 777 $BACKUP_DIR/*
    sudo chown $USER:$USER $BACKUP_DIR
    sudo chown -R $USER:$USER $BACKUP_DIR/*
    echo "Permissions and ownership changed at $(date)"
} 2>> $LOG_FILE

# GZIP compression for a Backup Directory
{
     GZIP=-9 tar -zcvpf $GZIP_FILE $BACKUP_DIR
     echo "Backup directory zip created at $(date)"
 } 2>> $LOG_FILE

# Upload the zip file to S3
 {
     aws s3 cp $GZIP_FILE $S3_BASE
     echo "Backup zip uploaded to S3 at $(date)"
 } 2>> $LOG_FILE

# Cleanup
 {
     rm -r $BACKUP_DIR
     rm $GZIP_FILE
     echo "zip file deleted at $(date)"
 } 2>> $LOG_FILE
```

CHAPTER 4 : CONCLUSION AND LEARNING OUTCOMES

4.1 Conclusion

My internship at NAXA Pvt. Ltd. has been an invaluable experience, allowing me to apply theoretical knowledge to real-world projects and develop essential skills in the DevOps domain. Through creating GitHub Action workflows, developing n8n workflows, and automating backups with Bash scripts, I gained hands-on experience with CI/CD pipelines, workflow automation, and data management. Collaborating with skilled professionals enhanced my troubleshooting, communication, and documentation abilities. This internship has significantly contributed to my professional growth, and I am grateful for the mentorship and support I received at NAXA Pvt. Ltd.

4.2 Learning Outcomes

During my internship at NAXA Pvt. Ltd., I significantly enhanced my technical skills by working on various DevOps projects, including CI/CD pipelines, n8n workflows, and Bash scripting for backups. This experience improved my understanding of workflow automation, containerization with Docker, and infrastructure management using AWS. Additionally, I developed strong troubleshooting abilities, collaboration and communication skills, and effective documentation practices. The internship also taught me valuable lessons in time management and adaptability to new tools and technologies.

Key Learning Outcomes:

- Practical experience with CI/CD pipelines and workflow automation.
- Proficiency in Docker and AWS for infrastructure management.
- Enhanced troubleshooting and problem-solving skills.
- Improved collaboration, communication, and documentation practices.
- Effective time management and adaptability to new technologies.

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APPENDICES

SNAPSHOTS

Figure A.1 Company's Website Homepage

Figure A.2 Company's logo

DNS management for **anilrajrimal.com.np**

Review, add, and edit DNS records. Edits will go into effect once saved.

DNS Setup: Full ⓘ Import and Export Dashboard Display Settings

Search DNS Records

Add filter | Search | Add record

Type	Name	Content	Proxy status	TTL	Actions
A	dvs-dev	13.234.118.198	Proxied	Auto	Edit
A	dvs-master	13.234.118.198	Proxied	Auto	Edit
A	fastapi	13.234.118.198	Proxied	Auto	Edit
A	grafana	13.234.118.198	Proxied	Auto	Edit
A	java	13.234.118.198	Proxied	Auto	Edit
A	n8n	13.234.118.198	Proxied	Auto	Edit
A	prometheus	13.234.118.198	Proxied	Auto	Edit
A	www	185.199.109.153	Proxied	Auto	Edit
A	www	185.199.110.153	Proxied	Auto	Edit
A	www	185.199.111.153	Proxied	Auto	Edit
A	www	185.199.108.153	Proxied	Auto	Edit
CNAME	anilrajrimal.com.np	www.anilrajrimal.com.np	Proxied	Auto	Edit

Figure A.3 Sub-Domain Records Cloudflare

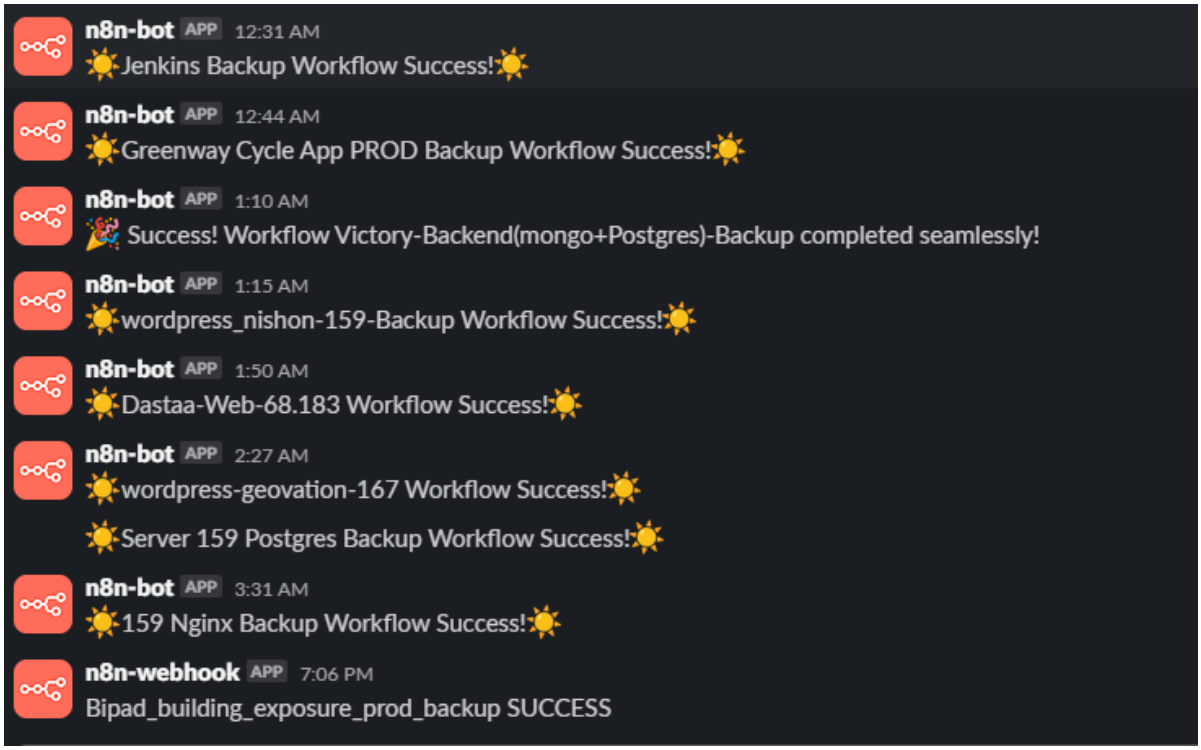

Figure A.4 Backup notification on Slack by n8n

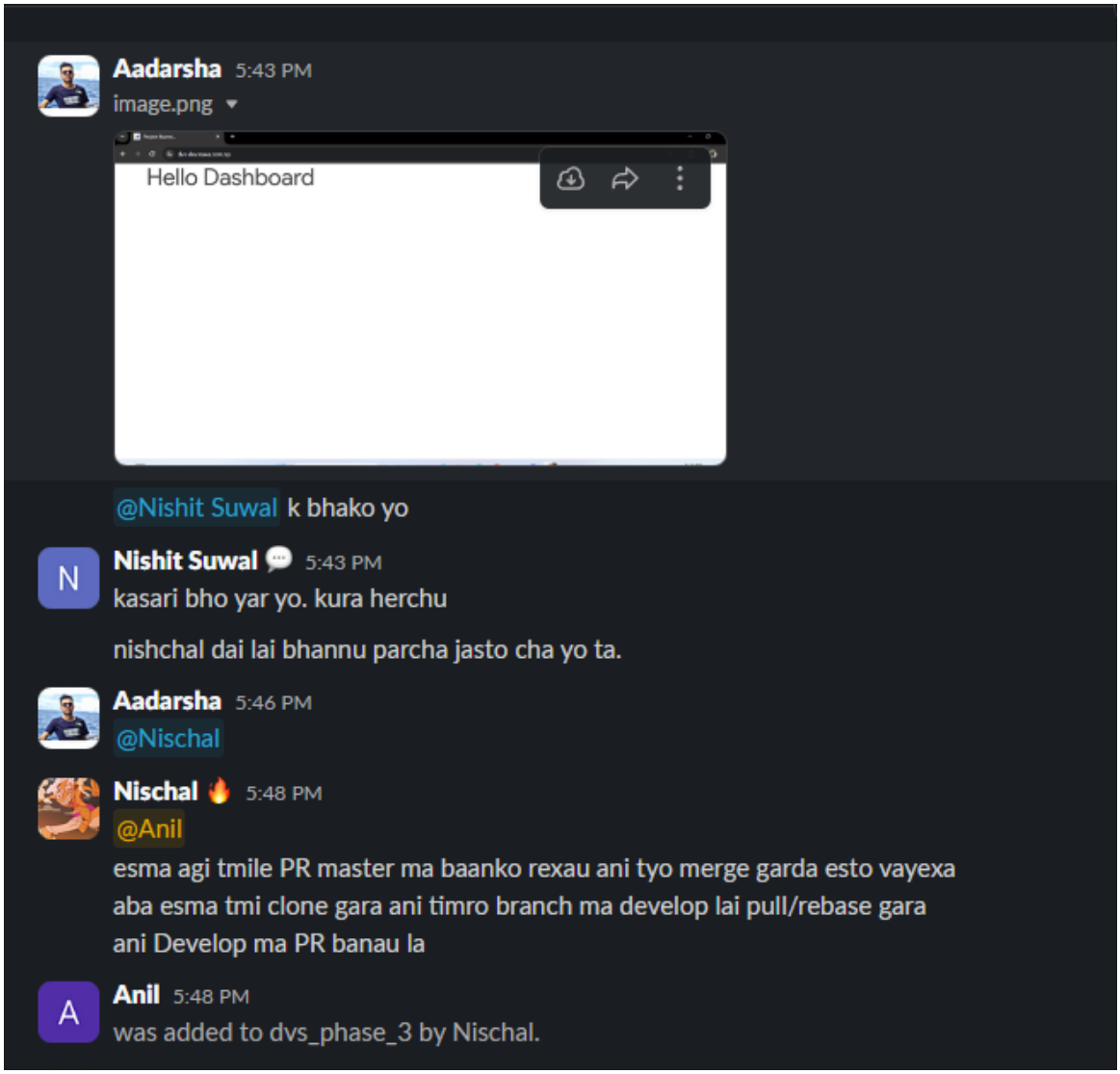

Figure A.5 dvs_phase_3 deployment issue fix