Report on Internship

at Pathao Ltd.

Authored by

Dipto Mondal

IICT, Shahjalal University of Science and

Technology

6 September, 2020

Report on Internship

Course Code: SWE 420

Submitted to:

Department of Software Engineering

Institute of Information & Communication Technology

Shahjalal University of Science & Technology, Sylhet

Submitted By:

Dipto Mondal

Registration No. 2016831016

Session: 2016-17

Performed At:

Pathao Limited

Submission Date:

1st September, 2020

LETTER OF TRANSMITTAL

September 01, 2020

Director

Institute of Information & Communication Technology

Shahjalal University of Science & Technology, Sylhet

Sir,

It's a great pleasure for me to submit this internship report as a part of my internship program (SWE420) of seventh semester. I have been working as an intern at Pathao Limited for six months time period, starting from January 07, 2020 to July 07,2020.

This report covers my overall experience with the company, which includes both the learning phase and the active involvement with the current workforce. I hope that, this document will exhibit my total experiences, gathered knowledge and outlook based on my observation and learning process. I'm looking forward to your effective feedback on my entire report.

Sincerely yours,

————————————————

Dipto Mondal

Registration No. 2016831016

Semester: 4/2 (Last semester)

Department of Software Engineering

Institute of Information & Communication Technology

Shahjalal University of Science & Technology, Sylhet

LETTER OF ENDORSEMENT

To Whom It May Concern

Subject: Approval of the Report

This letter is to certify that, all the information mentioned in this document is true and not confidential to the company. The projects mentioned here have had successful involvement of Dipto Mondal, (2016831016), Institute of Information & Communication Technology, and Shahjalal University of Science & Technology.

I wish him all the best and hope that he will lead a successful career.

Internship Supervisors

Shafqat Asif

Vice President(Engineering)

Pathao Ltd.

Md. Saddam Hossain

Senior Software Engineer

Pathao Ltd.

Acknowledgement

At first I would like to express my gratitude towards IICT officials to arrange this internship program for me. I am also grateful to the Pathao Limited for recruiting me as an intern and help me to go through this training as smoothly as possible.

I take this opportunity to express my profound gratitude and deep regards to **Shafqat Asif**, Head of Engineering at Pathao for his exemplary guidance, monitoring and constant encouragement throughout the course of this internship.

I also make this chance to express a profound sense for gratitude to **Prof Mohammad Abdullah Al Mumin** Director of IICT, SUST and **Fazle Mohammed Tawsif**, Lecturer of IICT, SUST for conducting the industry personnels and giving me the opportunity to take part in the internship such a renowned organization.

I am extremely grateful towards **Saddam Hossain**, Senior Software Engineer of Pathao and **Ahmad Ananda Anabil**, Software Engineer of Pathao for their constant support and guidence.

I am also thankful to my line manager **Rezwan kader Mishu**, Senior Software Engineer of Pathao & **Mahmudul Haque(Yamin)**, Software Engineer of Pathao for helping me to understand the technical terminologies, procedures and solving problems, which helped me in completing this task through various stages

I also take this opportunity to express a deep sense of gratitude to **Sajal Miah**, Team lead(android) & **Md. Touhidul Islam**, Senior Software Engineer of Pathao, for their cordial support and supervision.

I am obliged to all my Team members, for the valuable information provided by them in their respective fields. I am grateful for their cooperation during the period of my internship.

Executive Summary

This document highlights author's experiences and contributions towards **Pathao Limited** as an intern. It also represents the academic and non-academic acquired knowledge, achievements and challenges during the internship program.The scope of this document is to identify and describe the analysis carried out, projects completed, experience gained and focuses on the achievements as an intern.

Institute of Information and Communication Technology(IICT) of Shahjalal University of Science and Technology(SUST) offers bachelor degree on Software Engineering. According to the curriculum, an entire semester(7th) has been dedicated for internship program which carries total 18 credits.The goal of this program is to avail an opportunity for its student to experience and gain a practical knowledge of the software industry.

Being a bachelor program student of IICT, I was offered to take an internship at **Pathao Limited**, a successful local start-up which provides a number of logistics services and technological solutions for different real life problems of our locality to make people's life more easier than ever. After my joining as an intern, I was cordially welcome by **Pathao** family and assigned to a team who works on platform. After finishing a basic learning phase and assignments, I have started to get familiar with their projects and methodologies. While working on these projects, I have learned the software development processes that is followed by the team. The challenges during these projects helped me to be collaborative with other team members and colleagues. I feel really fortunate to have support and mentoring from all of my teammates and team leaders.

Moreover, after the pandemic situation has stroke in, **Pathao** has taken initiatives to provide technical facilities to all of their employees and declared 'work from home' until further notice. This new culture of remote working has also helped me to experience a new form of collaborative development. Also, the constant effort and guidance of the entire engineering team during this situation helped me to get more used to the virtual tools and regulations of software development process so that the completion of each task goes smooth.

This overall experience of working with **Pathao** team has helped me to think about real life problems and solutions. It also has boosted my confidence as a young developer to get prepared for the next phase of my carrier as a software engineer.

Contents

Chapter 1

Introduction

1.1 Preamble

Internship is a valuable opportunity for students to link-up their academic experience with industry based real life practices. It gives students an opportunity to sharpen their skills, gain expertise through work on advanced productions and be familiar with arduous real-world environment.In this period students get the opportunities to exercise their knowledge in respective field and get familiar with industry practices and cultures. It plays a significant role to build up one's career. Internship also helps to build a communication bridge between academia and industry which helps to discover the capability of potential students.

Institute of Information and Communication Technology (IICT) of Shahjalal University of Science and Technology provides a wonderful opportunity to students of Software Engineering to experience a six-month internship within their academic curriculum. IICT always give emphasis on both academic study and industry practices to keep the students up-to-date with latest technologies. Occasionally experts from industry are also invited to host seminars and workshop to share their experiences and motivate the students to plan their careers. A 6 month long internship paves a knowledgable path for the students about the industry. Being a student of Software Engineering, after completing my 6th semester successfully I was offered to take the internship program at Pathao Limited.

1.2   Objectives

This report has been prepared as a requirement of the internship program of the 4th year 1st semester. The report is intended to reflect on my experiences, learnings, project involvements and professional growth during the internship period.

1.3   Scope

This report is a summary of my experience and knowledge that I have achieved throughout the internship program. The company profile of Pathao Limited and it's work methodologies are also briefly discussed here. .

1.4   Methodology

I have presented different kinds of information in this report which I gathered during internship period. All the information has been collected from different kinds of written document from Internet or another person.

1.5   Limitations

Because of the non disclosure agreement between the author and the company, some information, such as, project details, business logic and motivations is restricted to be published This report is a summary of my experience and knowledge that I have achieved throughout the internship program. The company profile of Pathao Limited and it's work methodologies are also briefly discussed here. .

Chapter 2

About Pathao Limited

Pathao is a Bangladeshi on-demand digital platform and vehicle for hire company headquartered in Dhaka, Bangladesh.Founded in 2015, it is among the fastest growing tech startups in Asia which has dedicated itself to solve some of the country's most challenging problems in logistics and transportation.With a hope to accelerate the establishment of digital Bangladesh, Pathao provides a super app based solution through ride sharing, food delivery, e-commerce logistics services , online shop , parcel delivery service , online pharmacy and multimedia service .By harnessing the power of technology,Pathao follows a SuperApp model, providing all of its services through one app. They update their app frequently to make the overall app navigation more straightforward and more natural for all users.

As a fast paced organization, the company gives it employees an immense amount of space to grow professionally as well as take ownership of the initiatives undertaken in the organization.

Pathao has built a platform that enables employment for thousands of people and a product that millions of customers use in Bangladesh. Currently pathao has around 1200 employees.

Pathao operates in four major cities of Bangladesh: Dhaka, Chittagong, Sylhet,Gazipur, Narayanganj. In 2018, Pathao launched their ride sharing operation in Kathmandu, Nepal.This is the first time that a Bangladeshi ride-sharing platform has launched operations beyond its borders.

2.1   Services of Pathao

Pathao mobile application is the primary product of the company which is available for in both Android and iOS devices. Pathao also has individual web based services for it's courier merchants

and shop merchants.

The primary services of the Pathao are described briefly below

Pathao Bike

Pathao's most popular service to date is motorbike ride sharing service. Pathao has over 50,000 bikes registered in it's platform. It is one of the safest and cost saving transportation available. Users can select their destination on the app and a registered bike rider will arrive at the user's destination and drop them at their destination.Pathao is providing bike services in Dhaka , Narayanganj, Tongi, Gazipur, Sylhet and Chittagong metropolitan city area

Pathao Car

Pathao Car is the car ride sharing service of pathao. Users can select their destination on the app and a registered car captain will arrive at the user's destination and drop him/her at his/her destination.There are two versions for the car ride sharing service - 1. Pathao Car and 2. Pathao Car Lite . Pathao Car lite is comparatively more cost saving than the regular car ride service. Pathao is providing car services in Dhaka , Narayanganj, Tongi, Gazipur, Sylhet and Chittagong metropolitan city area

Pathao Food

Pathao Food is the online food delivery service of pathao. Users can Select the food they want from thousands of restaurants. This is one of the most trusted and widely used online food platforms in the country.

Pathao Parcel

Pathao parcel is an on demand delivery service. Users can send any item to any destination in the same city in the shortest time. Users can also track the status and location of the delivery man on the app. Pathao parcel service is available in Dhaka and Chittagong

Pathao Courier

Pathao Courier guarantees reliable delivery of product to customers , at the right location in the right time through its efficient distribution management. Pathao courier is regularly used by 3000+ businesses. Courier service basically works for the merchants that Pathao has. Via courier , pathao's registered merchants send their product to customers who have ordered from Facebook or website.

Pathao Tong

Pathao tong is the ultimate online grocery shop for users. Users can select the shop and order the products they want and can get their desired products delivered at their doorstep.

Pathao Shop

Pathao Shop is an ecommerce platform for authentic lifestyle, beauty, electronics products and more. which are delivered directly at customer's doorstep. Pathao Shop aims to provide users a pleasant experience by providing a variety of products to select from the app and deliver it within a shortest possible time.

Pathao Pharma

Pathao pharma is the online medicine delivery service of the platform. Users can order their medicine from authentic pharmacies from the Pathao app and get it delivered at their doorstep. It has been a very crucial service during this pandemic.

Multimedia Services

Pathao aims to create a super app model . As a part of this plan Pathao teamed up with Bongo BD , a streaming video-on demand company to show their contents from the pathao app. Pathao also teamed up with Goama games Bangladesh to add exciting mobile games in the pathao app

2.2 Departments of Pathao

Pathao has a very large workforce to complete their day to day goals. The daily operations of pathao takes place by following strategic methodologies combined by the participation different departments. These departments are as follows:

- Technology

- Operations

- Marketing

- Sales

- Finance

- Accounting

- Human Resources

2.3 Technology Department

Pathao's Technology department consists of the very best and brightest tech minds of the country. The amazing skillset and vision of each individuals here keeps Pathao moving towards it's goal to move Bangladesh forward.

As a student of Software Engineering, I was extremely fortunate to have been assigned here as an intern in the Platform team. This department is divided into few individual teams. These are -

- Product Team

- Design Team

- Android Team

- iOS Team

- Platform Team

- Web Team

- Quality Assurance Team

- Data Engineering Team

The friendly yet professional environment of the workplace ensures that every team works collectively to fulfill the requirements and prepare the perfect software solutions. Though each team has different type of works and methodologies, their works are interrelated with one another.

2.3.1   Product Team

The product team is responsible for implementing strategy, building the roadmap, and defining product features. These are the people who choose what gets built, promote what is new, and measure performance. Product management, improving user experience, and product analysis are the main responsibilities of this team. This team sets up and finalises the requirements after discussing with other teams and later makes sure that the right product has been developed.

2.3.2   Design Team

Design team makes the UX / UI designs for the Pathao App and other services of Pathao. This team works with the development teams and product team to establish how the UI design should be and later uses their skills and creativity to produce interesting and artistic UI designs which is later implemented by the iOS, Android and web team on the products.

2.3.3   Android Team

Android team manages the Pathao app and the Driver app for Android mobile devices. As most of Pathao's services are mobile application based and most people use Android devices, the role of this team is very crucial. Android team develops the new features, updates the app with latest technology , continuously searches for ways to improve user experience of the app. Android team works very closely with the Design, Product , Platform and Quality Assurance Team.

2.3.4   iOS Team

ios team manages the Pathao app and the Driver app for iOS mobile devices. iOS team works very closely with the Design, Product , Platform and Quality Assurance Team.

2.3.5   Platform Team

Platform team develop services that are consumed by other products. Devops team is also a part of platform team. Services which are developed by this team are directly used by the app and other services. Platform is the largest team in Pathao tech department consists of brilliant engineers. I was assigned to this team.

2.3.6   Web Team

Web team is responsible for developing various web based projects, used for both internal and external services. The team mainly manages various dashboards and panels used by the customers Pathao has partnered its business with. Web team conducts with versatile jobs including development of the internal libraries and tools, product integration and align with other teams. This team closely works with product, design, platform, sqa, android and ios teams.

2.3.7   Quality Assurance Team

QA or Quality Assurance team is responsible for testing and ensuring the quality of the software produced by the development teams. QA team scrutinizes the user app, driver app and other products for potential error and then informs the concerned team about this. QA team also ensures that the products have matched the initial requirements.

2.3.8   Data Engineering Team

Pathao always emphasizes on harnessing the power of technology. With the advancement of data science and artificial intelligence, softwares can be more efficient and produce more accurate and profitable results. Pathao has a highly experienced and skillful data engineering team that aspires to create models to handle various complex problems and make the products more efficient.

2.4   Software Development Process at Pathao

Pathao Technology Department follows the Agile software development process.Agile software development refers to software development methodologies centered round the idea of

iterative development, where requirements and solutions evolve through collaboration between self-organizing cross-functional teams. The ultimate value in Agile development is that it enables teams to deliver value faster, with greater quality and predictablity, and greater aptitude to respond to change. As multiple teams collaborate at Pathao, it is the most suitable process here Scrum and Kanban are two of the most widely used Agile methodologies. Pathao Tech team follows the Scrum methodology.

Scrum is a subset of Agile. It is a lightweight process framework for agile development, and the most widely-used one.Scrum is most often used to manage complex software and product development, using iterative and incremental practices. Scrum significantly increases productivity and reduces time to benefits relative to classic "waterfall" processes. Scrum processes enable organizations to adjust smoothly to rapidly-changing requirements, and produce a product that meets evolving business goals.

- Increase the quality of the deliverables

- Cope better with change (and expect the changes)

- Provide better estimates while spending less time creating them

- Be more in control of the project schedule and state

Another term we want to mention here is "Sprint". Sprint is one timeboxed iteration of a continuous development cycle. Within a Sprint, planned amount of work has to be completed by the team and made ready for review. As soon sprint starts after planning session, team work together to complete planned work effectively and make it ready for review by the end of that period.

2.4.1   Steps of the Development Process

As I was assigned as a member of the Pathao Platform Team, I learned and watched very closely how different services are developed and launched. The whole development cycle can be divided into individual steps-

Requirement Specification

This is the initial phase of the development workflow. In this phase, product team gathers the requirements of the features that should be implemented. Collaborative meetings are arranged with development , design and quality assurance teams to analyse the requirements. After a through analysis of the requirements , a Software Requirement Specification(SRS) document is prepared and the requirements become locked and ready to be implemented.

Design

As soon as the requirements are set up, Sprint starts. Design team starts to make the UI/ UX design of the features. The designs are then shared with other teams and they give their feedback on the designs. After a few mockups , the design is finalized and ready to be implemented by developers.

Back-end Development

Backend development starts as soon as Sprint begins. Platform team assigns one or more of their members to any specific project and project manager and they develops the necessary services for that project and communicate with other team memebers so that the work is done perfectly.

App-end Development

With the completion of the design and back-end development, the android app development starts. Developers starts working on their assigned tasks and regularly give updates on their progress. If any difficulty or problem arises, the team works collectively to solve that problem. After the feature has been successfully developed, the codebase is reviewed again by the senior engineers. They make the codebase more optimized and efficient. The codebase is then merged and set up for testing.

Testing

SQA team starts testing the app after the feature is developed. They scrutinize the app very carefully on a lot of use cases to find out errors or unprecedented behavior from the app. Once

the bugs are found, testing team publishes those on JIRA (a tool that allows bug tracking and agile project management) board.

Bug fix

Bug fixing is started after these are found by SQA team. If the bug is caused by back-end services, Back-end team starts working on it and if the problem is from app-end, Android team focuses on to fix it in the shortest possible time.

Stage check

After bug fixing is completed, the app is then launched on stage for more scrutiny. On stage, the app is run on use cases from real life scenarios. If there are any issues found at stage, they are solved by the development teams. SQA team also checks if the implemented features actually matches with initially specified requirements on SRS.

Production Deployment

After stage checking, the service or services are deployed in the production. And the version of the app is then uploaded on the play store and users can update the app from their device. Deployment marks the end of the sprint.

Retrospective

This the final stage of the development process. All the teams reflects on the entire work flow to review about the process. The goal of this stage is to find out if the work could have done more efficiently in any different way and to create methods to solve the problems arise in this sprint. Such review of the work flow helps to improve future tasks and increases productivity on a large scale.

2.4.2 Revised Development Process for COVID-19

After the outbreak of Corona Virus, Pathao took the initiatives for "Work from home". Employees started to work from their home in this process and stopped coming to workplace as it

increases the chance of being infected by the Corona virus. Following the Agile-Scrum methodology became really tough in this scenario. In order to solve this problem, Technology department adjusted to "Adhoc Software Development Process". In this process the requirements that were suggested early or the requirements with higher priority were implemented first.

2.4.3   Tools used for development and communication

As product development at pathao is a very long and elaborate process, a lot of tools are used for development and managing the project.

JIRA

Jira Software is part of a family of products designed to help teams of all types manage work. Originally, Jira was designed as a bug and issue tracker. But today, Jira has evolved into a powerful work management tool for all kinds of use cases, from requirements and test case management to agile software development.

Magic

Magic is Pathao's very own custom version control system from git lab. All projects of Pathao are maintained and managed here.

Workplace

Workplace is a social-media type platform specially developed for organizations. It is developed by facebook. Pathao has their very own domain of Workplace where employees can communicate with each other , share their ideas and important announcements and stay connected with one another on a regular basis.

Trello

Trello is a web-based Kanban-style list-making application which is a subsidiary of Atlassian.

Invision

InVision is the digital product design platform used to make the world's best customer experiences. InVisionApp, Inc.

Harbor

Harbor is an open source trusted cloud native registry project that stores, signs, and scans content.Pathao uses self hosted version of harbor

Grafana

Grafana is a multi-platform open source analytics and interactive visualization web application. It provides charts, graphs, and alerts for the web when connected to supported data sources.

Firebase

Firebase is a platform developed by Google for creating mobile and web applications.

2.5 Facilites for employees

According to two factor theory of job satisfaction, salary is just a hygiene factor.Motivation factors are important for high productivity. Pathao offers the employees several facilities.

2.5.1 Domestic Environment

A good working environment makes employees more productive.Pathao has a great environment to work.Pathao is like one big family. All the current and ex-employees are members of this Pathao family.Work is fun here. Employees consider the company to be their own responsibility.

2.5.2 Lunch and snacks

The employees are provided with lunch and evening snacks from the office. Also, there is tea, coffee and available all the time

2.5.3   Indoor and outdoor games

In Pathao there employees can enjoy both indoor and outdoor games. There is game console in the office. I used to play video games with colleagues both from my team and other teams. Pathao also participates in many sports tournament and won trophies sometimes. I also played in some football tournaments as a member of pathao team.

2.5.4   Recreation

Pathao has different ways for recreation of employee. Release parties, promotion party, outings are part of it.In spite of being an intern, I received all these facilities and consider myself lucky.

2.5.5   Miscellaneous

At Pathao every occasional day is celebrated in a colorful way.It celebrates the New Year by offering wonderful gifts to the employee.Pahela Falgun, International Women's day was also celebrated with great enthusiasm.Pathao has offered internships for the first time this year.We were warmly welcomed with lovely gifts by the Pathao family.

2.6   Office schedule

Office starts at 11:00 am and ends at 7:00 pm, from Sunday to Thursday. There is a 1 hour break from 1:30 pm for lunch and sports.Company provides a flexible working hour for its employees.Anyone can come or leave office before or after schedule time.

2.7   Coping with Covid-19 pandemic

The outbreak of coronavirus (COVID19) is causing widespread concern and economic distress for consumers, companies and communities across the globe.All the Employees of Pathao are asked to work from home (remotely) keeping in the account of the public health concerns from March 19,2020.Pathao faces a number of unique challenges when mobile appbased ridesharing services declared shut down on 26 March to prevent the transmission of Covid19.Pathao shift their efforts to home delivery of groceries and medicines to continue their business.During the

corona pandemic it launches Pathao Tong, Pathao Pharma,digital health services,remote consultation tools.After getting positive response from the customer, Pathao shop was launched successfully within Dhaka.

Chapter 3

Internship Activities

3.1 Overview

Internship is a process of making newcomer familiar with his own job field and making him adapt him with the actual industry-oriented task that will help him in future to gain a successful career. During my internship period at Pathao I have learnt many important things that will help me in future to enter into the industry. From the first day at Pathao I was cordially welcomed as a learner as well as their employee.

3.2 Training Phase

At Pathao as an intern I had to pass first two months through a training phase. During the training phase I was assigned to a mentor who guided me to learn a lot of new staffs. Every day I had to attend the scrum meeting with mentor and other team member. After finishing the learning of each topic, I was assigned an assignment on the topic. I had to finish many assignments during the training phase. The big one was a mvc blog application. And some other assignments were : dynamic json data handling, user crud app, simple database crud app, design pattern, algorithms and data structures etc.

➤ Blog App

It was CRUD MVC web application. It can be called as dummy twitter clone app. There a user can create an account then he can post something. And he can see all the list of users in the users tab and follow/unfollow the users he wants. If a user logged in he can see the

post of users he has followed. There is also a section where he can edit his own profile and set profile images and view his recent posts. The user can see other people's profile details and profile images and their recent posts on their profile and how many followers they have.

 Github Link : https://github.com/diptomondal007/blog-app-using-goLang

- – Major Learning Focus

    - ∗ Basic golang concepts

    - ∗ Database crud with golang

    - ∗ Html css template using with golang

    - ∗ Basic html/css/javascript

- – Tools

    - ∗ Golang 1.13

    - ∗ Psql Database

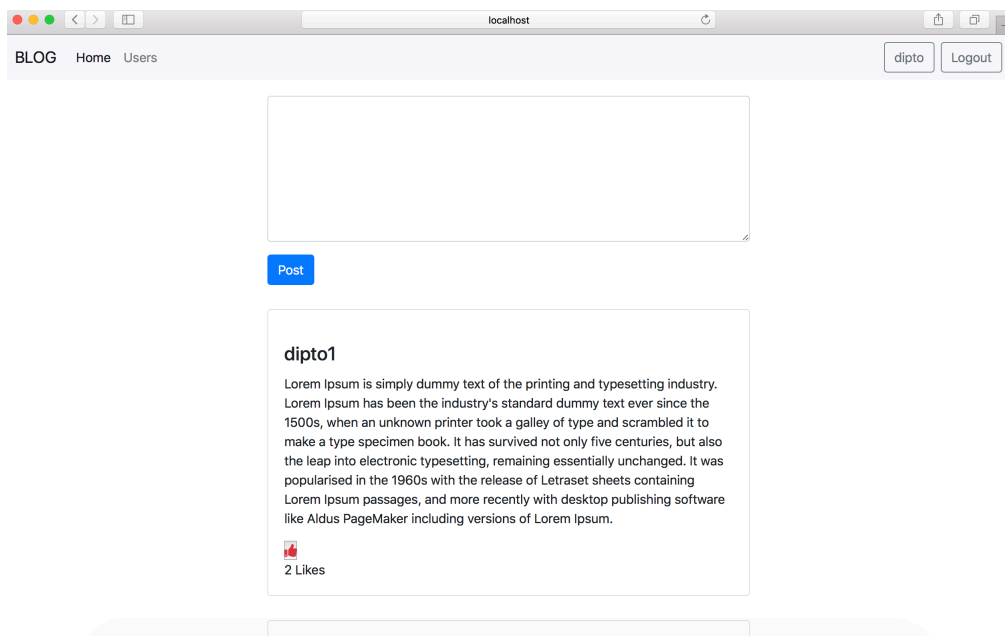   - ∗ Html, Css, Javascript, Bootstrap

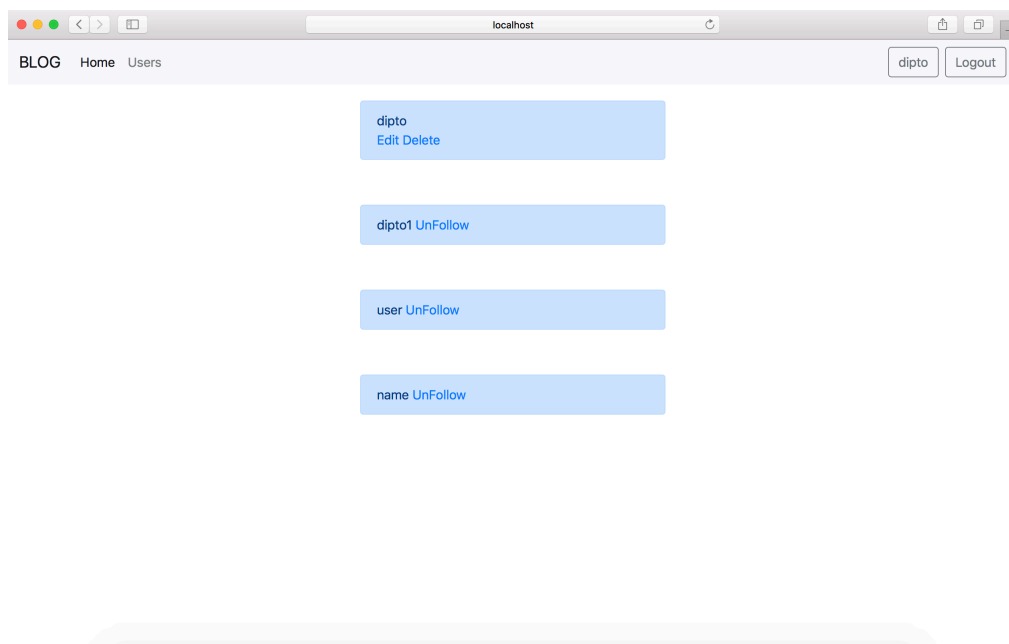Figure 3.1: Blog app home page

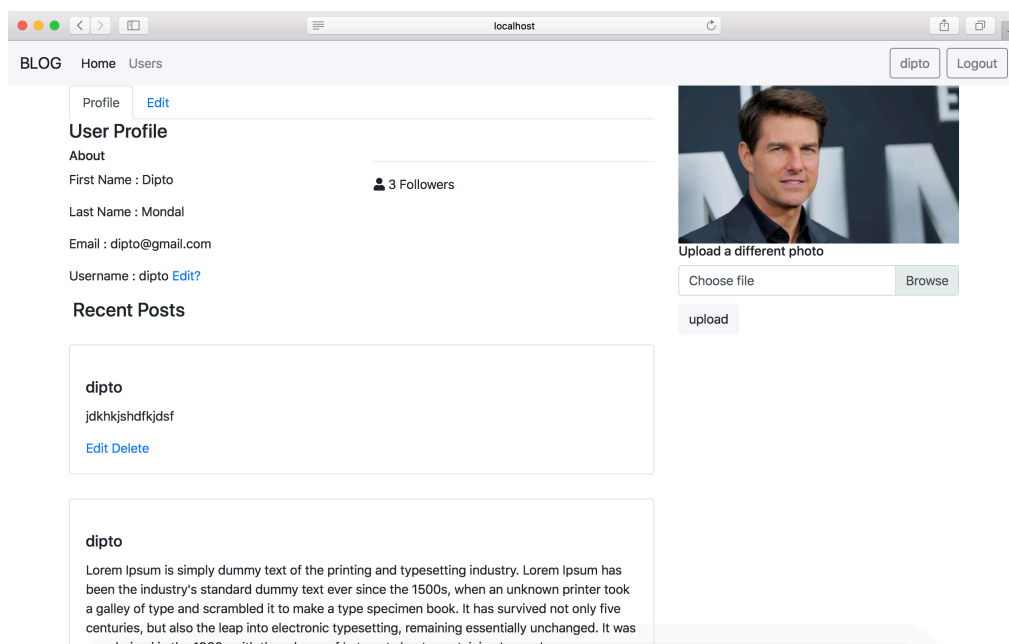Figure 3.2: Blog app all users page

Figure 3.3: Blog app user's profile page

◀ **Dictionary**

A simple dictionary library to store a word and it's definition. A word's definition can be updated and search can be performed for a word. This assignment was given to so that i can learn how a 3rd party library should be written and host in github and basic unit test in golang.

 Github Link : https://github.com/diptomondal007/Dictionary

- Major Learning Focus

  * Golang 3rd party library writing concepts

  * Map Data structure

  * Basic Unit test in golang

- Tools

  * Golang 1.13

  * Go mod

Other Assignments

I have implemented some other projects, algorithms, data structures, design patterns in go while in training phase. Source code of the assignments mentioned below can be found in this link -

 Github Link : https://github.com/diptomondal007/Assignments

- **Crud Todo Api**

A simple api with basic CRUD operations for ToDo application.

  - Major Learning Focus

    * Golang gorilla mux router

    * Restful api services

    * Golang http request

    * Golang Concurrency and concurrency safety

  - Tools
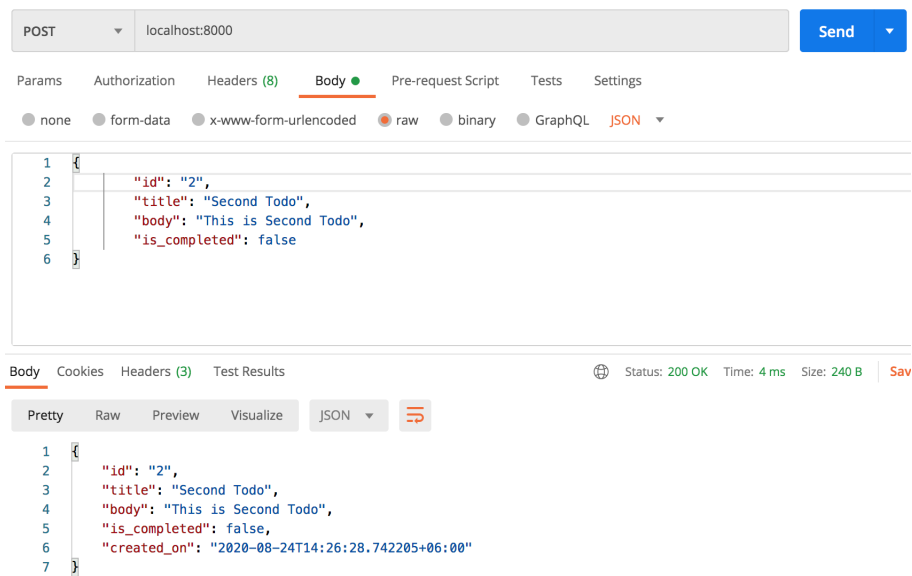
    * Golang 1.13

    * Postman

Figure 3.4: Post request in postman

- **Hacker News**

  This assignment was to consume hacker news api concurrently to get news data and serving them after some processing. I leaned caching mechanism to serve content within shortest amount of amount by doing this assignment.

  - Major Learning Focus

    * Concurrent http request

    * Caching

    * Go ticker

- **URL Shortener**

  A url shortener service written in golang. Mongodb is used as database. An URL shortener is a service that reduces the length of your URL (Uniform Resource Locator). The idea is to minimize the web page address into something that's easier to remember and track

  - Major Learning Focus

    * Hexagonal Architecture (Almost same as Clean Code)

    * Better error handling

- **Design Pattern**

  I have to practice and implement all kinds of design patterns in golang

  – Major Learning Focus

    * Design patterns with golang

- **Chat Server**

  Terminal to terminal messaging server and broadcaster. One can connect with another local ip and send and receive messages

  – Major Learning Focus

    * Bufio

    * Socket

    * Go routine

    * Go channel

- **User Crud With Mock Test**

  This assignment was to learn mock test in go

  – Major Learning Focus

    * Mock test

    * Go Sql-mock

- **User Crud**

  A user crud and to find and update user details. This assignment was to introduce me with go unit test and coverage

  – Major Learning Focus

    * Golang Unit test and Coverage

- **Go Concurrency Demo Work Queue**

  The go concurrency sub assignment was to learn about go concurrency, go routine, go channel. This go currency is important in a company like pathao where thousand of requests come every second and without concurrency it's not possible to handle. Every request is stored in the queue and processed one by one by the workers.

– Major Learning Focus

* Golang Concurrency

* Demo Job Queue

3.3 My Project Involvement

3.3.1 Confidential Anti Fraud Service

I worked in a fraud detection service project in my internship period. But I cannot mention its name or concept because I have signed non-disclosure agreement (NDA). However I am sharing the technologies I have been working on here.

Overview

The project has 3 part. Machine learning, Backend service and android part. I was assigned to do the backend part.

Team

In this project I have been directly supervised by my team member, Md. Saddam Hossain and Ahmad Ananda Anabil. They are experienced senior software engineer and I have learned many things from them. From designing software architecture to using software tools effectively, they have taught me everything. I consider myself very fortunate to work under Saddam Hossain and Ahmad Ananda Anabil.

Requirement Engineering and R&D

I have worked in a fraud detection project at Pathao in my internship period. This was my first Pathao platform project I was assigned to work on. My team lead Shafqat Asif vai asked me to do work with the data engineering team for a project. He introduced me with data engineering team lead Md. Abduallah. He and some data science engineers including me and Maksudur Rahman Munif sat for a discussion about the project then after some days we fixed the project features. Then I was asked to do some R&D about how the project can be done, which technologies can be used. after that a team mate started working on the machine learning part. and I was assigned to

do the server side work.I did some R&D about how different photo sharing platform like instagram handles so many upload requests per second.

Technologies

The technologies I have been working in this project are –

- Python

- Flask

- Celery

- Redis

- Postgres

- Postman

- Docker

- Kubernetes

- Google cloud storage

- GitKraken

- Gitlab

- CI/CD

- Pathao's self hosted docker hub

- Bash Scripting

- helm chart

- consul

Works Done and Developed Features

Some Works beside the server side coding I have done on this project are -

- CI/CD pipelining

- Deploying in kubernetes cluster

- Integrating with the ML part

■ Asynchronous Task handling

■ Uploading images to google cloud storage with signed url both from android device and
backend server

I can't mention the features as they are highly confidential.However I am sharing a basic
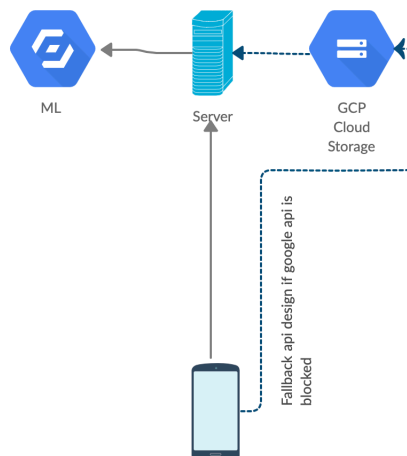flowchart of the service.

Figure 3.5: anti fraud service

Challenges

I have learned many things while working on it and at the same time faced many challenges.
The main challenge was to understand the concept and domain of the project. It was also a
challenge to learn new technologies and apply them properly. I would again like to thank my
supervisor for helping me to overcome these challenges by his guidance. Another challenge was
considering the time and latency issue. I had to decrease the server response time and handle so
many upload requests.

3.3.2   Push Notification Service

Overview

The service is a push notification service written in golang. It is used to send notification in
user or driver's device. When I was assigned, this project's v2 was completed.

Team

I was assigned to this project by my mentor Md. Saddam Hossain. He gave me instructions so that I could understand the project in short time and also assigned me the bugs to be fixed and the project needed to be refactored. Without his helpful mentoring, I could not be involved with the project successfully.

Advantages of Bug Solving and Refactoring

As intern I always ask myself which technologies or which areas I like most and want to be familiar with new technologies and new programing languages. Bug solving and refactoring is the best way which provides me the opportunity to familiar with more tools and more Technologies due to spontaneous switching from one project to another. As a result I learn more things from bug solving.

Works done -

- Ensuring v2 is doing the same job as v1

- Fixed some notification sound and body payload issue

- Removed redundant codes and made them generic

Challenges

This project was almost a complete project which I needed to understand in a short time all by myself. As I was assigned to fix bugs, I needed to have clear knowledge of the operations inside so that I could figure out the wrong logic there and correct it. It was a real challenge for me.

3.3.3 Api Gateway Service

Overview

This service is a api gateway service written in golang. When a request from pathao mobile app or internal service comes it goes through this gateway service. Here some operation like authentication, payment validation etc. happend.

Team

In this project I have been directly supervised by my team member Mahmudul Haque(Yamin). He is an experienced senior software engineer and I have learned many things from him. From designing software architecture to using software tools effectively, he has taught me everything. I consider myself very lucky to get such a team member.This service was already running in production and I was assigned to do refactor and solve some issues. He gave me a clear idea about the service and existing code and what I need to do.

Technologies

The technologies I have been working in this project are –

- Golang

- Redis

- Mysql

- Postman

- Docker

- Kubernetes

- GitKraken

- Gitlab

- CI/CD

- Sentry

- helm chart

- consul

Solved Bugs and Developed Features

As I mentioned this project was in production already. Mahmudul Haque vai assigned me to this project to remove redundant codes, make some modules generic and design a database for storing logs of different services.

- Designed a Database to store logs of services pass through the gateway

- Generic modules

- Storing logs

- Generic Validation Middleware

3.3.4 Health Service

Overview

Already a version of health service is running in Pathao's Production. But this project was initiated with different features.

3.3.5 Team

This project is under development. And I am being supervised by my team member Rezwan Kader Mishu and Rafat Bin aslam. They are experienced software engineer and I have learned how to write a better service and how to use clean code architecture to write clean and maintainable code. I have learned many things from them which gonna improve my code quality.

3.3.6 Technologies

The technologies I have been working in this project are –

- Golang

- Redis

- Mysql

- GORM

- Go-Echo

- Cobra

- Postman

- Docker

- Kubernetes

- Git Kraken

- Gitlab

- CI/CD

- Sentry

- helm chart

- consul

- zap logger

3.3.7 Major Learning Focus

- Clean Code architecture

- App level Logging

- Developing better microservice

- I setup the initial Code structure with the help of senior member of the team.

3.3.8 Challenges

This service is under development. I am involved with this service from the start. I had to explore many clean code architecture repositories to build the structure and what I read in my academic design pattern course I used that practically.

Chapter 4

Acquired Skills

4.1 Overview

An internship is the first opportunity to apply the skills and knowledge in real life field that I have learned from class room. Without the real-world experience, I am not capable to know how to translate theory into practice. Employers prefer candidates, who have experience, because it takes time to become accustomed to a professional role. It is crucial for me that I will use my internship experience to hone the career-related skills. In this section, I discuss about my improvement by leaning more professionalism from the professional people.

4.2 Technical Skills

This internship has provided me a wonderful opportunity to acquire various technological skills. Though it may take some more time to master those skills, at this moment I am confident to apply them in any of my projects. Some of the significant technical aspects that I have handled during the internship are listed below.

➤ **GO**

Go is a statically typed, compiled programming language designed at Google by Robert Griesemer, Rob Pike, and Ken Thompson. Go is syntactically similar to C, but with memory safety, garbage collection, structural typing, and CSP-style concurrency. The team where I was assigned to is manly work with golang. So from the first day my mentor started teaching

me golang and he started from very basic and done so nicely that now I love this language more than any other language.

➤ **PYTHON**

Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace.

➤ **FLASK**

Flask is a web framework that offers tools, libraries, and technologies suitable for building a web application. This web application can come in the form of web pages, blogs, or even an extensive web-based calendar app or a commercial site. Flask is one of the best micro-frameworks, as it has little to no dependencies on external libraries. You can use it to make all kinds of web apps.

➤ **RESTful web services**

RESTful web services are loosely coupled, lightweight web services that are particularly well suited for creating APIs for clients spread out across the internet. Representational State Transfer (REST) is an architectural style of client-server application centered around the transfer of representations of resources through requests and responses. In the REST architectural style, data and functionality are considered resources and are accessed using Uniform Resource Identifiers (URIs), typically links on the Web. The resources are represented by documents and are acted upon by using a set of simple, well-defined operations. As pathao's services are api driven and the pathao app needs rest api to communicate with the servers. So it is a must needed skill to work there[1] .

➤ **Caching**

In computing, a cache is a high-speed data storage layer which stores a subset of data, typically transient in nature, so that future requests for that data are served up faster than is possible by accessing the data's primary storage location. Caching allows you to efficiently reuse previously retrieved or computed data. In Pathao as thousands of requests comes every second this is very important to cache responses to serve content within shortest amount of time.

➤ **DOCKER**

Docker is a set of platform as a service products that use OS-level virtualization to deliver software in packages called containers.With Docker, you can make your application independent of the host environment. Since Pathao uses microservices architecture, you can now encapsulate each of the service in Docker containers. Docker containers are lightweight, resource isolated environments through which you can build, maintain, ship and deploy your application[2].

➤ **KUBERNETES**

Kubernetes, aka K8S, is a container orchestration system perfect for automating the management, scaling, and deployment of microservice applications. This incredibly popular framework allows you to manage hundreds or thousands of containers at production scale. In pathao as so many requests comes in and many services are needed to be monitored and scaled kubernetes is so important to automate these things[3].

➤ **CI/CD**

In software engineering, CI/CD or CICD generally refers to the combined practices of continuous integration and either continuous delivery or continuous deployment. CI/CD bridges the gaps between development and operation activities and teams by enforcing automation in building, testing and deployment of applications[4].

➤ **REDIS**

Redis, which stands for Remote Dictionary Server, is a fast, open-source, in-memory key-value data store for use as a database, cache, message broker, and queue. In almost everyservices in pathao redis is used for caching and decreasing response time and other purposes[5].

➤ **GO-ECHO**

Echo is a performance-focused, extensible, open-source Go web application framework. It is a minimalist web framework that stands between stdlib + router and a full-stack web framework. It comes with extensible middleware, central HTTP error handling, and template rendering for any template engine[6].

➤ **POSTGRESQL**

PostgreSQL is a general purpose and object-relational database management system, the most advanced open source database system. PostgreSQL is free and open source software. Its source code is available under PostgreSQL license, a liberal open source license. You are free to use, modify and distribute PostgreSQL in any form [8]. In Platform Team I Worked with postgres[7].

➤ **POSTMAN**

Postman is the complete toolchain for API developers. Postman helps you build, test, and document APIs faster. Postman provides a powerful GUI to work with API that simulates the server response on basis of user request. I used it while developing the simple Http web server. Web API to test code works correctly and give response accordingly on the basis of request [8].

➤ **Mysql**

MySQL is an open-source relational database management system. Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language.

➤ **GOOGLE CLOUD STORAGE**

Google Cloud Storage is a RESTful online file storage web service for storing and accessing data on Google Cloud Platform infrastructure. The service combines the performance and scalability of Google's cloud with advanced security and sharing capabilities.

➤ **SENTRY**

Sentry's application monitoring platform helps every developer diagnose, fix, and optimize the performance of their code.If things break, you'll know where errors are happening, how often they happen, and who is affected. Almost all the services in Pathao uses sentry to monitor bugs, error, crashes in both production and stage environment.

➤ **Celery**

I used this library in my first real life project in Pathao. Celery is a task queue implementation for Python web applications used to asynchronously execute work outside the HTTP request-response cycle. you want your WSGI server to respond to incoming requests as quickly as possible because each request ties up a worker process until the response is fin-

ished. Moving work off those workers by spinning up asynchronous jobs as tasks in a queue is a straightforward way to improve WSGI server response times.

➤ **Helm Chart**

Helm uses a packaging format called charts. A chart is a collection of files that describe a related set of Kubernetes resources. A single chart might be used to deploy something simple, like a memcached pod, or something complex, like a full web app stack with HTTP servers, databases, caches, and so on.

4.3   Non-Technical Skills

Although technical learning is important, professional learning is the sole purpose of an internship. Pathao is an excellent place to learn professionalism.

➤ **Communication Skills**

If someone has a good communication skill, she/he will have a better chance to succeed. For the students, internships provide the best chance of improving their communication skills. I had my chance and I had tried my best to enhance my communication skills. I always talk with senior software engineers about different technologies even with the software engineers from other teams which helped me to learn a lot about different technologies and Pathao's Engineering. For having a good communication skill I become familiar with most of the engineers in Pathao. I also gave presentation at Pathao for my first project. Thus, through these kinds of task I have improved my communication skill.

➤ **Team Work Skills**

In Pathao I worked with a team. So, I also achieved teamwork skills. My team members are also very helpful and friendly. By working with team, I was able to know how to plan and manage a task, how to manage time, and how to run a meeting. I was able to share my idea and receive feedback from my teammates. Teamwork helped me to communicate well with all team members.

➤ **Learning ability**

I am constantly earnest to take in the important tools and new technologies that were needed to overcome the implementation challenges and complete the allot undertakings.

As an intern, I have learned countless number of new thing and new technologies which were begun a lots of background study. I got heaps of experience by working on my assigning works which were entirely unexpected for me. Working on real life project I have learnt how to take sense just reading the requirements specifications.

➤ **Punctuality**

Punctuality is an important component of dependability in the workplace. I always tried to maintain the office time very strictly. Every day I used to go office at just time and left the office after finishing time. Whenever there was any possibility of late or absence then I have informed it to my team with a formal mail or phone call.

➤ **Quality of work**

Pathao follows a great standard of pure software engineering and their product quality is very high. Time to time code is reviewed so that better quality software is developed. I tried to maintain the standard of work from my side.

Chapter 5

Conclusion

Internship Program gives the students an opportunity to prove their knowledge and confidence; however the time limits are a key problem to face the real world challenge for the first time. The short time Internship was really a pleasant and thrilling experience. This experience surely will be a cherished momentum at the beginning of building a carrier.

The internship program helped me to gain important knowledge on software industry, their culture, work environment and all about software development. Participating in weekly team meeting with CTO, Project manager and other team members and discussing on the threats of the projects helped me attain the faith to develop a never give up attitude. At the same time it helped me learning the software life cycle used in software industry and inspired me to be striver, responsible and confident. The internship program has increased my team work capabilities as well as respect to the team mate's ideas and suggestions. Team discussions like brain storming sessions helped me identify and solve numerous problem issues which would have been impossible to solve otherwise.

This author sincerely hopes that the hard work and dedication that he has given to this project is appreciated and rewarded by all concerned and any shortcomings on his part will be decently overlooked. Lastly, the outcome of internship project is not just a product or report it is more than that. Here how to work in professional environment with challenges in the real development world, how to improve coding and design techniques and how to cope with different working situations were learned. Throughout the whole development process, this author got the chance to implement his theoretical knowledge of computer science he learnt over last 3 years into practice. Not only that, through report writing this author got to know how to compose professional

and formal reports for any project or research works. These will help him a lot in future not only while working in industries but also in higher studies. Lastly, again this author is grateful to **IICT, SUST** for giving him this prospect to conduct his internship.

I would like to convey my thanks to Dept. of Software Engineering, SUST for providing me an opportunity to gain idea of the competitive environment in the professional field. It has certainly lifted my software development skills in terms of design and coding. I now look forward to facing the upcoming challenges of the world.

References

[1] RESTFul api services. `https://en.wikipedia.org/wiki/Representational_state_transfer`. Accessed: 2020-08-30.

[2] Docker. `https://opensource.com/resources/what-docker`. Accessed: 2020-08-30.

[3] Kubernetes. `https://kubernetes.io/docs/concepts/overview/what-is-kubernetes/`. Accessed: 2020-08-30.

[4] CI/CD. `https://www.infoworld.com/article/3271126/what-is-cicd-continuous-integration-and-continuous-delivery-explained.html`. Accessed: 2020-08-30.

[5] Redis. `https://en.wikipedia.org/wiki/Redis`. Accessed: 2020-08-30.

[6] GO ECHO. `https://medium.com/cuddle-ai/building-microservice-using-golang-echo-framework-ff10ba06d508`. Accessed: 2020-08-30.

[7] Postgresql. `https://www.postgresqltutorial.com/what-is-postgresql/`. Accessed: 2020-08-30.

[8] Postman. `www.digitalcrafts.com/blog/student-blog-what-postman-and-why-use-it`. Accessed: 2020-08-30.