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Flutter Development at Dorao

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Flutter Development at Dorao

By

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Summer, 2022

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September 13, 2022

Dissertation submitted in partial fulfillment for the degree of Bachelor of Science in Computer Science

Department of Computer Science & Engineering

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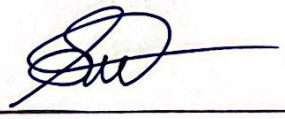
Attestation

This is to certify that this report is completed by me, Nibrash Kazi Subah (1720158), submitted in partial fulfillment of the requirement for the degree of Computer Science and Engineering from Independent University, Bangladesh (IUB). It has been completed under the guidance of Md. Asif Bin Khaled (Supervisor). I also certify that all of my work is original which I have learned during my internship including all the sources of information used in this project and report.



14/09/2022

Signature Date

Nibrash Kazi Subah

Name

Acknowledgement

Firstly, I would like to thank God, for his grace in accomplishing my internship project and report timely. I would also like to extend my gratitude to the Faculty of Computer Science and Engineering department for taking each course with such meticulous detail and for giving the students an opportunity to learn about the practical application of their studies. I would like to thank specially and wholeheartedly my supervisor, Mr. Md. Asif Bin Khaled, Department of Computer Science and Engineering, Independent University, Bangladesh, who encouraged and directed me with his continuous guidance, instructions, suggestions and thoughtful advice while pursuing this internship and preparing this report. I am also thankful to my supervisor Mr. Kazi Abrar Islam and our Sr. Developer Mr. Kaykobad Reza from the core of my heart for their kind support, guidance, constructive supervision, instructions and advice as well as for motivating me to be dedicated to my work at Dorao. I feel proud and gratified that I was always held under the supervision of not one but two teams; the Mobile Application Development team and the Design Team. Being able to not only work with them but also in some cases take lead in parts of the project, thanks to my pre-existing background in design and UI/UX had proven to be vital for my growth in the company and in self-confidence. Getting leadership advice directly from our CEO/Founder and my supervisor Kazi Abrar Islam also helped immensely with my progression. Here, regular reporting practices along with mental and professional support enhanced my experience in the internship. I am also indebted to the employees of the Dorao Team, especially my colleagues for their technical and emotional support while working at Dorao. Moreover, for helping me prepare this report and other documentation regarding my Internship at Dorao I would also like to show my appreciation to all the members of Dorao team. I must also mention the wonderful working environment and group commitment at this organization that has enabled me to deal with a lot of things with ease. And even though we didn't get a chance to work together physically under the same office roof and had to work remotely they never failed to make me feel part of a team and family. Last but not the least, I would like to thank my parents and other family members for their eternal and unconditional support for me.

Letter of Transmittal

Md. Asif Bin Khaled
Lecturer
Department of Computer Science and Engineering
School of Engineering and Computer Science
Independent University, Bangladesh
Subject: Submission of Internship Report for the completion of Graduation.

Dear Sir,

I am submitting my Internship Report, which is a part of the Bachelor Program in Computer Science and Engineering curriculum. It is a great learning opportunity to work under your active supervision. This report is on, "Flutter Development at Dorao". I have had the opportunity to work at Dorao for 9 months, under the supervision of Kazi Abrar Islam, CEO/Founder, Dorao along with the guidance of Kaykobad Reza, Sr. Developer, Dorao. This internship has given me both academic and practical exposure. It has also given me the opportunity to develop a network with people of similar interests and has inspired me to learn more. I tried to make this report as much informative as possible with the experience I have gained during my internship period. In order to prepare a well-organized internship report, I have followed the guidelines and described the required fields with sufficient details. I sincerely believe that this report will serve the purpose of my internship program and this course. I would highly appreciate it if you would be kind enough to receive this report and provide your valuable feedback. It would be my pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely,
Nibrash Kazi Subah
ID- 1720158
Department of Computer Science and Engineering
Independent University, Bangladesh

Evaluation Committee

Asif Bin Khaled

Signature

Md. Asif Bin Khaled

Name

University Supervisor

Supervisor

Signature

~~MOHAMMAD~~ NOOR NABI

Name

Panel Member

Internal Examiner

Signature

Kazi Abrar Islam

Name

Organizational Supervisor

External Examiner

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Dr. Mahady Hasan

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Head of CSE Department

Convener

Dr. Mahady Hasan
Head, Department of CSE
School of Engineering & Computer Science
Independent University, Bangladesh (IUB)

Executive Summary

This report outlines the duties of a 9 month **internship** at **Dorao** in Dhaka, Bangladesh. Along with that the report's purpose is to give a detailed insight into a modern firm trying to bring innovative and creative tech solutions into an infant **Health and Fitness** industry of a swiftly urbanising and developing country such as Bangladesh. When I first applied for a job at Dorao it was mainly focused on the **UI/UX design and engineering** sector of the mobile application based firm. However, it later went on to branch out to a much more comprehensive learning experience for me which required me to get first hand software development experience along side the UI/UX design and engineering work, allowing me to apply a lot of my knowledge gained from my CSE degree thus far. My work assignment during the intership started from Janurary 2022 with designing the new UI and engineering the UX for the Dorao app **v2.0.2** which completely overhauled the old app UI/UX while also integrating the new features of the app had to offer. After having done the initial **system analysis** and UI/UX design and engineering work for v2.0.2 I was transferred to the mobile development team and reassigned as a Jr. developer position during March 2022. That was when I started my journey to work on the IOS version of the mobile application with **Flutter** and **Firebase**. This report covers the whole project, the research and development process that went behind it and my experiences working for a fitness focused firm throughout my internship period.

Keywords— Dorao, Health and Fitness, UI/UX design and engineering, v2.0.2, System Analysis, Flutter, Firebase

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Chapter 1

Introduction

1.1 Overview of the Work

Being an intern, the main challenge was to translate the theoretical concepts into a working application. I started my Internship as a UI/UX designer and engineer on the 16th of January, 2022 and later was reassigned as Jr. Developer at Dorao during March 2022. The Dorao mobile app is a fitness focused app that incentivizes its user to stay fit by providing exclusive offers and discount coupon codes if walking/running challenges are completed by them. This not only is an attractive platform for users but also clients who partner with Dorao, since they can use the app for marketing their products via the walking/running challenges and to push their own health and fitness agenda. The app uses the geolocator.dart plugin to strictly track all walking/running from any IOS/Android smartphone. I was given the opportunity to work on the entire UI/UX design and engineering work for v2.0 of the Dorao app and was also allowed to work with the software development team on the flutter based IOS version of the app. Dorao v2.0.2 was to be released on both IOS and Android after its previous version (v1.45.0) performed well on the playstore android platform. Along with new UI v2.0.2 would also bring forth a whole set of new features to the app such as a social feed section for users to compete and share their fitness achievements in groups they have created in the app with friends and family. After the completion and publication of the app I was assigned to one final project which was the main website for Dorao. And since Flutter framework can make web applications as well in order to keep the codebase same the website was made on flutter as well. With some backend capabilities the website does have a few dynamic features with a little SEO made for better reach.

1.2 Objectives

Project objectives are what we plan to achieve by the end of our project. Objective of a project is specific, measurable and must meet time, budget and most importantly meet the company's requirements. The main objectives of this application are described below:

- UI Design overhaul work for v2.0

- UX Design and Engineering overhaul work for v2.0
- IOS version Implementation on flutter which includes AppleID login, anonymous login and account deletion option.
- Group feature implementation with sorting catergories in the Feed section. Feed section also must include post report option for other members and ability to delete your own post in the feed.
- In-app Admin panel for group section for group admins to go through reported posts.
- Django (python) based API and Database (Digital Ocean) implemention for the group feed section.
- Option to take selfie or any photo with the camera and post it in a group feed of your choice (only applies to groups you're in) after completing a challenge or run
- Dorao Admin Portal updates and changes especially for the group section (option to verify partner created groups).

1.3 Scopes

The mobile app is already live on Google Playstore and also under review for publication in the Apple Appstore. With more than 10,000 downloads and a consistent rating of 4.5 stars on Playstore the app has proven to perform well in the market. The con-current active users is at 3,000 on Playstore. The Dorao app tracks the user's physical activity through multiple built-in sensors in their phone in order to maintain an accurate knowledge of the user's geographic location. The activity tracker also ensures that the user is either walking or running and has several contingencies in place to prevent illegal activities such as using a cycle/car/rickshaw or any other vehicle in that matter by tracking movement speed. After opening the app for the first time users are greeted with a Login/Signup page from which they are sent through a recently installed mobile number verification OTP system. Users can Login/Signup with their Google/Facebook/AppleID/Email, but all of them require the user to verify their account with their mobile number. This is to avoid any malpractice or fraud from the users since there is offer/coupon code access involved. If the user has already been logged in and mobile number verified they are sent straight to the home page where they can choose to just time and track their walk/run or they can choose to complete one of the set challenges in the "Challenges" section of the app. After completing a walk/run users have the option to post a selfie or a snapshot of the route taken by the user on any group they have joined or created in the group section. Other features the app provides is keeping track of all the users completed challenges are run history. Also in the group section there is a leaderboard section that allows members of the group to compete over who can cover the most total distance with the app. With other admin side features such as sending push notifications as an alternative to using google ads for passive monetization. After completing challenges users can accept rewards in the form of coupon codes for exclusive deals with their favourite brands and services.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

Knowledge and skills gained from undergraduate courses have helped me in the development of the "Dorao App" project. It would have proven more difficult if these courses were not covered before working on this project. These courses include, **Data Structures:** This course was about teaching how to handle and manipulate complex arrays, objects, classes, array of objects, objects of array, nested arrays, nested objects, etc. As "Dorao app" involves many complex data structures, the skills gained from this course made handling them much easier. **Object-Oriented Programming:** This course is a deep dive into classes and its objects and instances of them. And given that Flutter's programming language "Dart" is also a OOP language and quite similar to java the knowledge I gained from the course helped me to write helper and global classes and other constants which made the code base less repetitive and more reusable. It helped to design the "Dorao app" code base in a modular format. Also, as the application grew bigger, this practice helped avoid writing new modules from scratch by using parts of old modules and adding new functions or overriding them. **Database Management:** This was the first course which taught me how to design and plan a project. It covered popular planning and strategy practices such as System Development Life Cycle, Rich Picture, Requirement Analysis, Entity Relationship Diagram, Business Process Model and Notation Diagram and many more. These techniques helped in the development planning and strategy of the "Dorao App". **System Analysis and Design:** This course introduced the tools and techniques for the design and analysis of information systems. Topics covered include Systems and Models, Project Management, Tools for determining System Requirements, Data Flow diagrams, Decision Table and Decision Trees, System Analysis, System Development Life Cycle models, Object-Oriented analysis, Use-Case modeling, United Modeling Language, Feasibility analysis, Structured analysis, System prototyping, System design and Implementation, Application Architecture, User Interface design, Front-end and backend design, Database design, Software Management and Hardware Selection, Case studies of Information Systems. All these lessons helped to land the final project. **Software Engineering:** Along with System Analysis and Design, this course further taught me about the best industry standard Software Engineering practices such as

Gantt charts and Process flow diagrams. These were used in real life scenarios in my internship and was only possible for this course. **Mobile Application Development:** Given that the "Dorao app" is a multi-platform mobile application project it is only fair to greatly attribute the majority of my achievements during this internship to this course. Using Android Studio during the course greatly helped me during the internship since the whole app was developed using the Android Studio IDE. Not to mention my familiarity to the Firebase Google Cloud service as well.

2.2 Related works

There are other apps similar to our project that already existed before ours and have been made with a similar concept. Apps such as ***SweatCoin***, ***Yodo***, ***Optimity***, ***Runtopia*** and ***LifeCoin*** use a similar gamification concept but rewards users with in-app currencies that can be traded in for real life gift cards, products and services. Its difficult to tell what SDK's most of these apps were developed with other than access to some API reference documentations for developers but given that Flutter and React Native are two of the most used SDK's for mobile development. Flutter was the perfect fit for our project. Other than conceptual similarity, apps such as ***Strava*** gave inspiration for UI/UX, ***Google Fit*** helped with plugin implementation for acticity tracking and ***Pokemon Go*** was used to take in ideas for prevention of "spoofing". That is essentially trying to fool the activity tracker into think that the user is walking whereas actually in fact they are tricking it with a fake gps location. The Pokemon Go Adevnture Sync is such a spoofing prevention system which helped with the introduction of the **geolocator.dart** plugin and **location.dart** plugin to the dorao app. One in-charge of foreground location tracking and the other for background location tracking.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

Work Breakdown Structure (WBS) is a structure based on hierarchy which demonstrates a project's breakdown into smaller nested segments. For our project, we have produced a WBS so that we have better team coordination. WBS covers a visual of all the scopes, risks, points of communication, responsibilities, costs and guarantees that it does not skip essential deliverables. For brainstorming and collaboration, it is the ideal tool for the team. In our WBS, we have used the top-down approach.

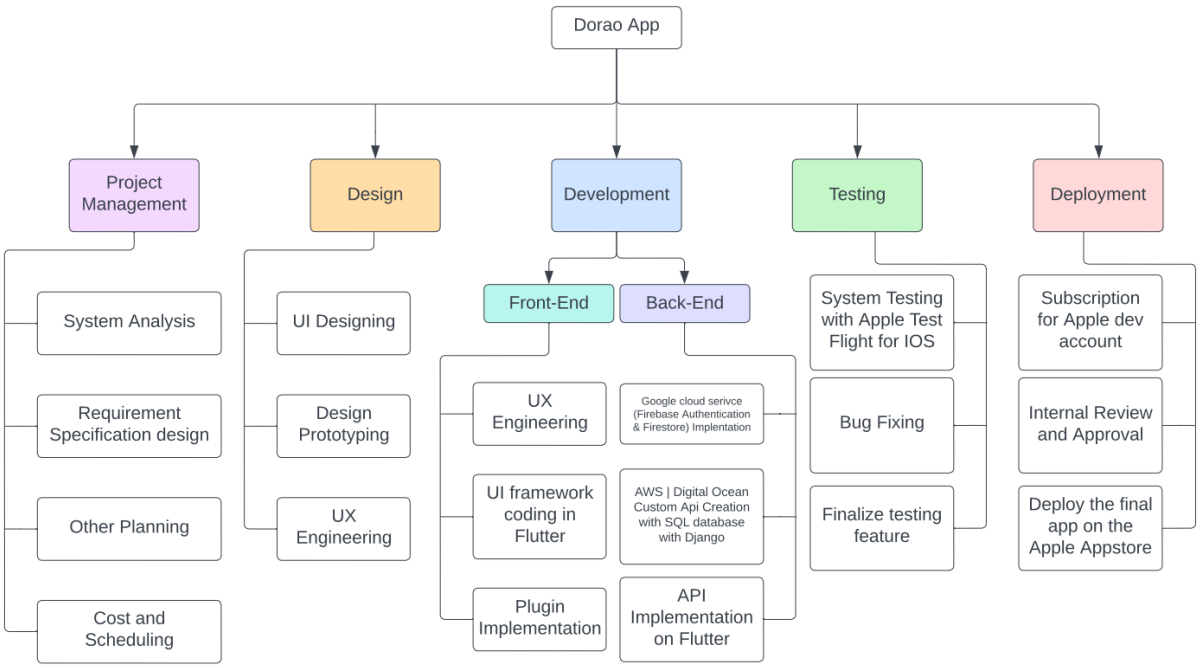

Figure 3.1: Work Breakdown Structure

3.2 Activity wise Time Distribution

The estimated time required to end a project successfully defines process wise time distribution. This helps the developers create a mind map as to how efficiently they need to work in order to meet the deadlines. The most significant challenge in correctly designing an application is time and time management. So, first and foremost, the content must be fixed, and development must be based on this context. The technique of planning and regulating how much time to spend on various tasks is known as time management. Good time management allows an individual to do more in less time, reduces stress, and leads to professional success. Time distribution is greatly needed to complete any project in this case developing a multi-platform mobile application .

3.3 Gantt Chart

I am providing a Gantt chart here to show the timeline of my project dividing it into different aspects of the work throughout the 24 weeks of our project. Most of the time was consumed for the design and development process of development. As shown in the figure:

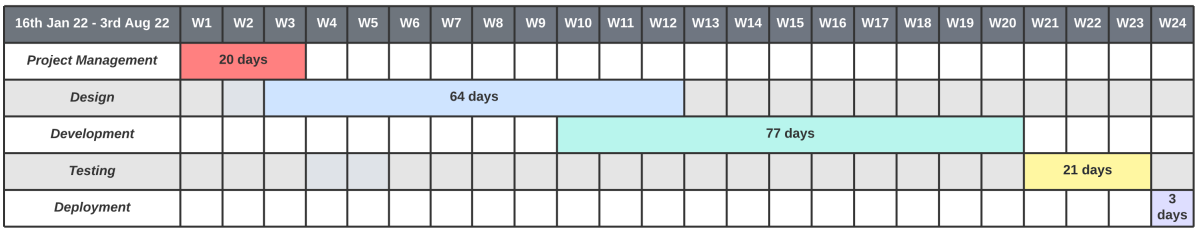

Figure 3.2: Gantt Chart

3.4 Activity wise Resource Allocation

Resource allocation is the process of assigning assets in a manner that supports your team's goals. For this project, the developers are considered as the primary resource followed by the computers used in the office, the servers required for the deployment of the project. Every employee of the company is considered a resource, hence everyone has assigned a particular assignment with certain deadlines, all of which collaborated to the entire production of the project.

- **Project Management:** This is the first period of the project, where the idea to update the app of the project was decided by the CEO and the operations team. During the first 2 days of the development process, the developers, operations team and the CEO engage in hours of discussion of how this project should be updated from top to bottom, the approaches to be taken, creating smaller goals and setting deadlines for them and discussed the entire requirements for the completion of the project.

- **Design:** This was where me and the design team came in. In this phase the we go through all the project management planning, system and requirement analysis documents to implement the UI designs. The marketing, operations and design team appointed me to take lead on the UI/UX while they worked on the banners and icon for the appstore. After with I made UX prototypes of the app to demo the app to the rest of the team.
- **Development/Coding:** At this stage, the designs for the app are complete and dev team and I started working on updating the UI framework code of the existing app's flutter project, while the management team kept regulating whether all the deadlines were maintained. The whole process is going for 77 days.
- **Testing:** Testing started as soon as the app was published on Apple's Test Flight through Appstore Connect. The app is then exported as an .ipa file for ios users through xcode and through Test Flight volunteer app beta testers were appointed to test out the app thoroughly. Once the bugs are identified by the beta testers we then try to recreate the bug in android studio and solve the issue.
- **Deployment:** We had to delay the deployment phase since we were tring to make sure we get the time to remove the major bugs that were faced in testing. After the extension, Once all the major bugs were fixed we prepared the .ipa file for appstore, uploaded all the appstore pre-requisites. The app is still currently under review since the Apple uses their in-house app testers to test every app that goes up on the appstore.

Table 3.1: Resource Allocation Chart

Activity Wise Resource Allocation		
Activity	Days	Work Percentage
Project Management	20	11.9%
Design (Parallel with coding)	64	33.1%
Development/Coding	77	40.8%
Testing	21	12.5%
Deployment	3	1.7%
Total	168	100%

3.5 Estimated Costing

The cost was calculated on the basis on only the IOS development process of Dorao app v2.0.2. It depends on the size, requirements, functionalities and design of the App. This includes the salary of all employees of the company since the whole company is based around this app. This includes my salary as a UX engineer and Jr. dev, logo design cost, Banner design cost, and many other tools that were used in this app. The cost of developer and resources used were

also taken into account. Some of the costs are subscription based so I stated the yearly cost of those subscriptions. The estimated costs was Tk 12,09,000 (BDT) for the whole project.

Table 3.2: Estimated costing

Featrures	Cost (BDT)
Development	5,20,000
Design	50,000
Firebase	5,000
Digital Ocean	2,000
Domain (Dorao.xyz)	5,000
Domain (Dorao.app)	5,000
SSL/TSL certificate	12,000
Apple developer program	10,000
Other fixed costs	6,00,000
Total	12,09,800

Chapter 4

Methodology

4.1 Course of Action

Amongst all the Software Development Methodologies a SDLC or Software Development Life Cycle is imperative to engineer a software from ground up. The SDLC process is a software industry standard to design, develop and test high quality softwares and comes in many models. Each software organization chooses the model that fits them the most during project management mostly focusing on the optimal cost, time and resources. A typical Software Development Life Cycle consists of the following stages: 1. Identifying the problem 2. Determining the requirements 3. Analyzing all the system needs 4. Designing the recommended system 5. Developing the system 6. Testing and maintenance 7. Evaluation of the system.

4.2 Software Development Life Cycle Models

The following are the SDLC models that were considered for the development process of the Dorao App project:

1. Agile
2. WaterFall
3. Spiral
4. Iterative
5. Incremental
6. Rapid Application Development
7. Prototype
8. Extreme Programming

4.3 Application of Methodology

For the Dorao app we decided to use the **Iterative Model methodology**. Even though both Incremental and Iterative model uses a similar concept of a progressive development process the incremental model is where at the end of each phrase or section, you have nothing to review or feedback on. However, in our case since we used the **Iterative Model** we updated the app over multiple builds/versions. The most significant versions being v1.0.0(9), v1.3.0(32), v2.0.0(36) and v2.0.2(38). These are the versions that were finalized and published to the Google Playstore and Apple Test Flight/Appstore. The iterative model is where software development teams iterate the idea and improve as they iterate over versions. When you move from one version to another, you decide (based on feedback) what features need to be in the new version as a better choice and what you need to leave out.



Figure 4.1: Visualization of an Iterative model

Chapter 5

Body of the Project

5.1 Work Description

Dorao is your running companion helping you track your progress and motivate you in unconventional but effective ways. Alongside regularly creating endless challenges catered to help encourage our users, we are also constantly able to take on clients to help them promote their produts, doubling as both a marketing platform as well as a fitness tracker. With a wide range of exclusive partnerships, Dorao is able to offer you creative incentives such as discounts on food orders, sportswear, footwear and more to keep pushing you to reach your fitness goals. The Dorao app tracks the user's physical activity through multiple built-in sensors in their phone in order to maintain an accurate knowledge of the user's geographic location. The activity tracker also ensures that the user is either walking or running and has several contingencies in place to prevent illegal activities such as using a cycle/car/rickshaw or any other vehicle in that matter by tracking movement speed.

The following are the modules of the application:

- **Registration and Login:** After opening the app for the first time users are greeted with a Login/Signup page from which they are sent through a recently installed mobile number verification OTP system. Users can Login/Signup with their Google/Facebook/AppleID/ Email, but all of them require the user to verify their account with their mobile number. This is to avoid any malpractice or fraud from the users since there is offer/coupon code access involved.

- **Home and Challenges:** If the user has already been logged in and mobile number verified they are sent straight to the home page where they can choose to just time and track their walk/run or they can choose to complete one of the set challenges in the "Challenges" section of the app. After completing challenges users can accept rewards in the form of coupon codes for exclusive deals with their favourite brands and services.

- **Group:** After completing a walk/run users have the option to post a selfie or a snapshot of the route taken by the user on any group they have joined or created in the group

section. Also in the group section there is a leaderboard section that allows members of the group to compete over who can cover the most total distance with the app.

- **Misc:** Other features the app provides is keeping track of all the users completed challenges are run history, with other app admin side features such as sending push notifications as an alternative to using google ads for passive monetization.

5.2 Requirement Analysis

Rich Picture

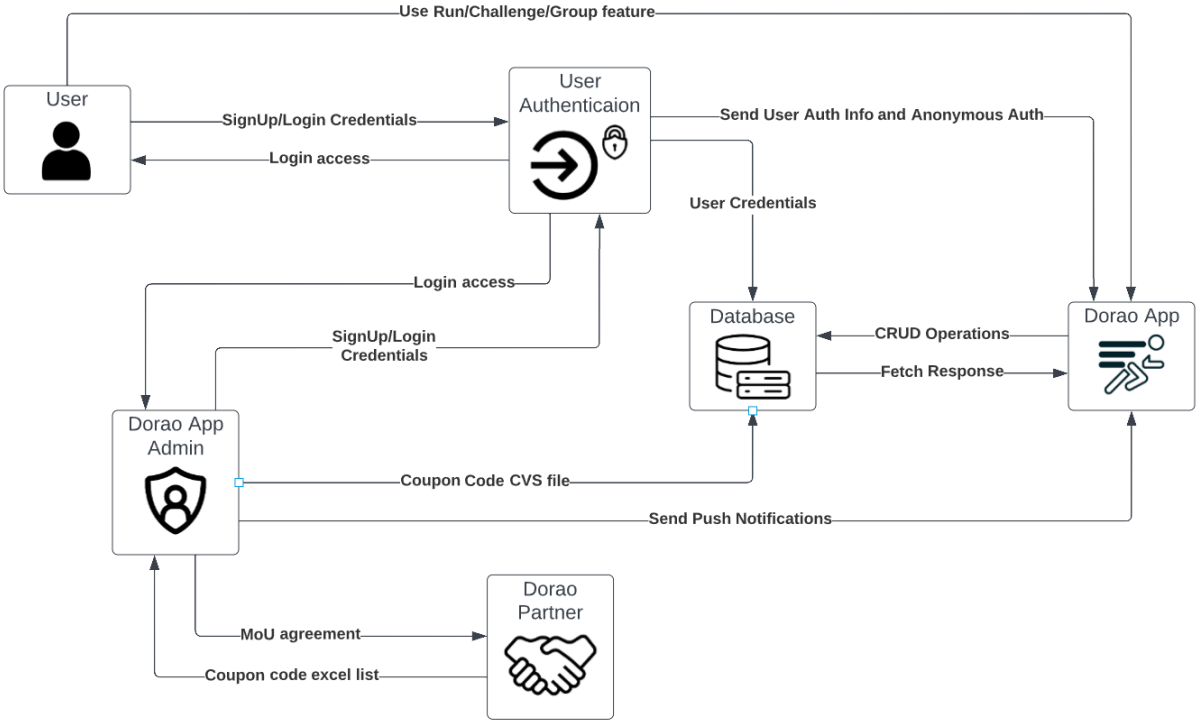

Figure 5.1: Rich Picture

Functional Requirements

Functional requirements capture the intended behavior of the system. This behavior may be expressed as services, tasks or functions the system is required to perform. [1]

Table 5.1: Functional Requirements 1

Function: User Signup and Login
Input: Username/Password/Mobile Number
Process: Save User Credentials to Firebase Auth
Output: User Saved
Precondition: Must have internet connection and use Mobile number OTP
Postcondition: Login is confirmed and user is taken to home page and also asked for location tracking permission

Table 5.2: Functional Requirements 2

Function: Go for a walk/run
Input: Click "Start" or "Set a Goal" button
Process: Activity and location tracking Enabled
Output: Map shows walk/run route in realtime
Precondition: Location Permission must be enabled
Postcondition: Walk/Run data is saved on the database

Table 5.3: Functional Requirements 3

Function: Complete a Challenge
Input: Go to Challenge and select one before starting walk/run
Process: Activity and location tracking Enabled
Output: Map shows walk/run route in realtime and progress with challenge
Precondition: Location Permission must be enabled, Challenge must be selected
Postcondition: Challenge reward is unlocked if it is completed can be redeemed from challenge section

Table 5.4: Functional Requirements 4

Function: View all walk/run history
Input: Go to side drawer menu from home page and select "History"
Process: Fetch all of user's walk/run hitsory from database
Output: Generate a walk/run history list of user chronologically catgorised
Precondition: User must have completed at least one walk/run
Postcondition: Distance, Location, Time and Date of walk/run

Table 5.5: Functional Requirements 5

Function: View all completed challenges
Input: Go to side drawer menu from home page and select "Completed Challenges"
Process: Fetch all of user's completed challenges hitsory from database
Output: Generate a walk/run history list of user chronologically catgorised
Precondition: User must have completed at least one walk/run
Postcondition: Distance, Location, Time and Date of walk/run

Table 5.6: Functional Requirements 6

Function: Set a new challenge
Input: Offer coupon Code .csv file, offer duration of the challenge, discount amount, distance requirement, offer image
Process: Create new challenge card on the challenge seciton and populate with coupon code rewards
Output: New challenge with offer details on the challenge section
Precondition: Can only be done from the web based admin portal which requires special admin access
Postcondition: A push notification of the new offer challenge sent to all active users under "Inbox" section

Table 5.7: Functional Requirements 7

Function: Create a user group
Input: Group Name and Cover Photo
Process: Create new group under user's database table
Output: New Group added user's "Groups" section
Precondition: cover photo .png or .jpg file
Postcondition: User that created becomes the group admin

Table 5.8: Functional Requirements 8

Function: Post a selfie or route image to a desired group
Input: Select the desired group from list of user's group
Process: Add post info under group's database table
Output: New post on the group's social feed
Precondition: User must be in the group. User must complete a run and post immediately after
Postcondition: Original user who made the post and group admin can delete the post, other members of the group can report the post.

Non-Functional Requirements

Nonfunctional Requirements (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs. [2]

- **Performance and Scalability:** The performance of this app was hard to optimize as the app has a lot of elements on screen at the same time. It was also imperative that the overall costing for the database remained at a predictable and reasonable amount. Thus the introduction of AWS, Digital Ocean and the customizability of an SQL based database.

- **Portability and Compatibility:** The app is available in mobile devices on both android and IOS and as for compatibility, we have made it available for android 5 and above which is pretty low considering the current versions of android. And on IOS from 3.5 - 6.5 inch screen iphones to ipads of 12.5 inch all support the app. Not to mention Flutter's ability to transcend a wide range of modern day platforms and OS's,

- **Reliability, Availability and Maintainability:** We are always trying to make sure that our code is broken into as many components as possible and remove all cases of repeated/dead code. This way we can edit without breaking the entire app. We also

have a single source of truth so if we want to make a change that should affect multiple components, we can do it easily without creating any unforeseeable bugs.

- **Usability:** We made sure the user knows what to do and how to do using UI tutorials at the beginning of the app. We make sure that the instructions are clear and buttons are easily visible. There are also extensively descriptive screen recordings and screen grabs to help guide users.
- **Security:** Accounts credential is saved into the database securely. Passwords of each user's account is encrypted and then saved to database the process is done automatically. Along with these SSL/TSL certification was also done to ensure the utmost security.

5.3 System Analysis

5.3.1 Six Element Analysis

Process	System Roles				
	Human	Hardware	Software	Database	Comm. & Networks
Signup/Login	User	Smartphone	Android/IOS	Google Cloud service/Firebase/Firestore	WAN
Home Page	User	Smartphone	Android/IOS	Google Cloud service/Firebase/Firestore	WAN
Walk/Run	User	Smartphone	Android/IOS	Google Cloud service/Firebase/Firestore	WAN
Complete Challenge	User	Smartphone	Android/IOS	Google Cloud service/Firebase/Firestore	WAN
View walk/run history	User	Smartphone	Android/IOS	Google Cloud service/Firebase/Firestore	WAN
Completed Challenges History	User	Smartphone	Android/IOS	Google Cloud service/Firebase/Firestore	WAN
Create a user group	User	Smartphone	Android/IOS	AWS/Post Grade SQL/Digital Ocean	WAN
Post on group social feed	User	Smartphone	Android/IOS	AWS/Post Grade SQL/Digital Ocean	WAN
Delete group/Remove group member/Delete post/Report post to group admin	User	Smartphone	Android/IOS	AWS/Post Grade SQL/Digital Ocean	WAN
Check group leaderboard	User	Smartphone	Android/IOS	AWS/Post Grade SQL/Digital Ocean	WAN
Export User Data	Admin	Computer	Web Browser	Google Cloud service/Firebase/Firestore	WAN
Send push notification to app inbox	Admin	Computer	Web Browser	Google Cloud service/Firebase/Firestore	WAN
Set new challenge	Admin	Computer	Web Browser	Google Cloud service/Firebase/Firestore	WAN
Generate User created Group list	Admin	Computer	Web Browser	Google Cloud service/Firebase/Firestore	WAN
Make user created group verified	Admin	Computer	Web Browser	Google Cloud service/Firebase/Firestore	WAN

Figure 5.2: Six Element Analysis

5.3.2 Feasibility Analysis

The analysis of a proposed project is to determine whether it is feasible and should go ahead is called feasibility analysis. Confirmation of design, plan and strategy is the main priority of this analysis. This can be used to validate assumptions, constraints, decisions and approaches. [3]

The following are the main parts of the feasibility analysis of this project:

1. **Technical Feasibility:** In technical feasibility, evaluation of the software, hardware and the other technical requirements of the proposed project are performed. This evaluates the details of how we intend to deliver a product or service to customers. Employees, materials, transportation, where our business will be located, and the technology that will be necessary to bring all this together. Dorao has been developed using the Flutter UI framework. The use of latest version of Dart, Django, SQl, Java, Ruby and Swift helped to build a much efficient and faster website. Moreover, these technologies are very popular in the modern industry and are being used thoroughly within a growing community.

2. **Operational Feasibility:** Operational feasibility is a measure of how well a proposed system solves the problems and satisfies the system requirements identified during the scope definition and problem analysis phase. It is dependant on human resources available for the project and involves projecting whether the system will be used if it is developed and implemented. Dorao has been developed in such a way that it can be conducted very easily. People will accept it without any doubt. It is a well planned system. People of all ages will be able to use it. It reduces physical and technical hardships and promotes health and fitness. Users need not have a lot of technical knowledge to run this system. Every instruction is very clear to the users. We hope this system will be able to fulfill the requirements of the users.

3. **Economic Feasibility:** In economic feasibility, costs and benefits are identified. It determines cash flow and assigns values to costs and benefits. Development costs and production costs are included in economic feasibility. If this system can reach the users it will definitely bring benefits. With a wide range of exclusive partnerships, Dorao is able to offer you creative incentives such as discounts on food orders, sportswear, footwear and more to keep pushing the user to reach their fitness goals.

4. **Market Feasibility:** Dorao is a fitness concern to its users but at the same time it is a marketing platform for our clients. We help retailers promote their products through discounts displayed in the challenge section of our app. We have a set of marketing campaigns planned throughout the year that will help us to acquire more users. Such as; Partnerships, Social Media Influencers, Sports events, Giveaways, etc.

5. **Legal Feasibility:** In our legal analysis, before we tend to prepare a GDD, we tend to analyze if the sport involves any copyrights, trademarks, licensing agreements, or alternative contracts that might incur some fees, legal proceeding prices, acknowledgement, or restrictions. After which comes the preperation of Terms of service and Privacy Policies. Not to mention trade license and other legal documents that are required for MoU's.

5.3.3 Problem Solution Analysis

The main problem that a web developer has to deal with during the web development process is that the requirements are always changing. According to a poll done by Stack Overflow Devel-

oper, 33% of respondents contemplate developing an website with no specified requirements.[4] During the implementation of the project many issues occurred. There were a bunch of bugs at first and recreating a bug is a bigger issue. If recreating the bug takes time then the process is dragged and it takes longer.

- **Identification:** Giving the app to beta testers who will record their whole user experience to the point of the encounter of the bug and send over the recording for fixing. Along with that is the implementation of Firebases "Crashlytics" which provides very detailed insights
- **Requirements that are affected:** We review the testing reports and check if the reported bug is app breaking or it disrupts the user's experience.
- **Solution:** We then recreate the bug step by step and get to the reason of the occurrence and implement a fix.
- **Test:** We then send it back to testers with the new patch applied and they test the app again to look for more bugs.

5.3.4 Effect and Constraints Analysis

- **Effect:** Mobile phones of different variety being available in the market makes things very difficult as we have to make sure we gather the largest customer base for the app. As per data, very few people use the highest end devices to use mobile apps. So, for our app we decided to target the mid and low range device users and optimize better for them to broaden the customer reach and make sure the user gets a smooth and seamless experience.
- **Constraint:** This app was not published by an external publisher. This is an in-house project and company resources were used in production to implement it without any guarantee of monetary returns.

5.4 System Design

UML Diagrams

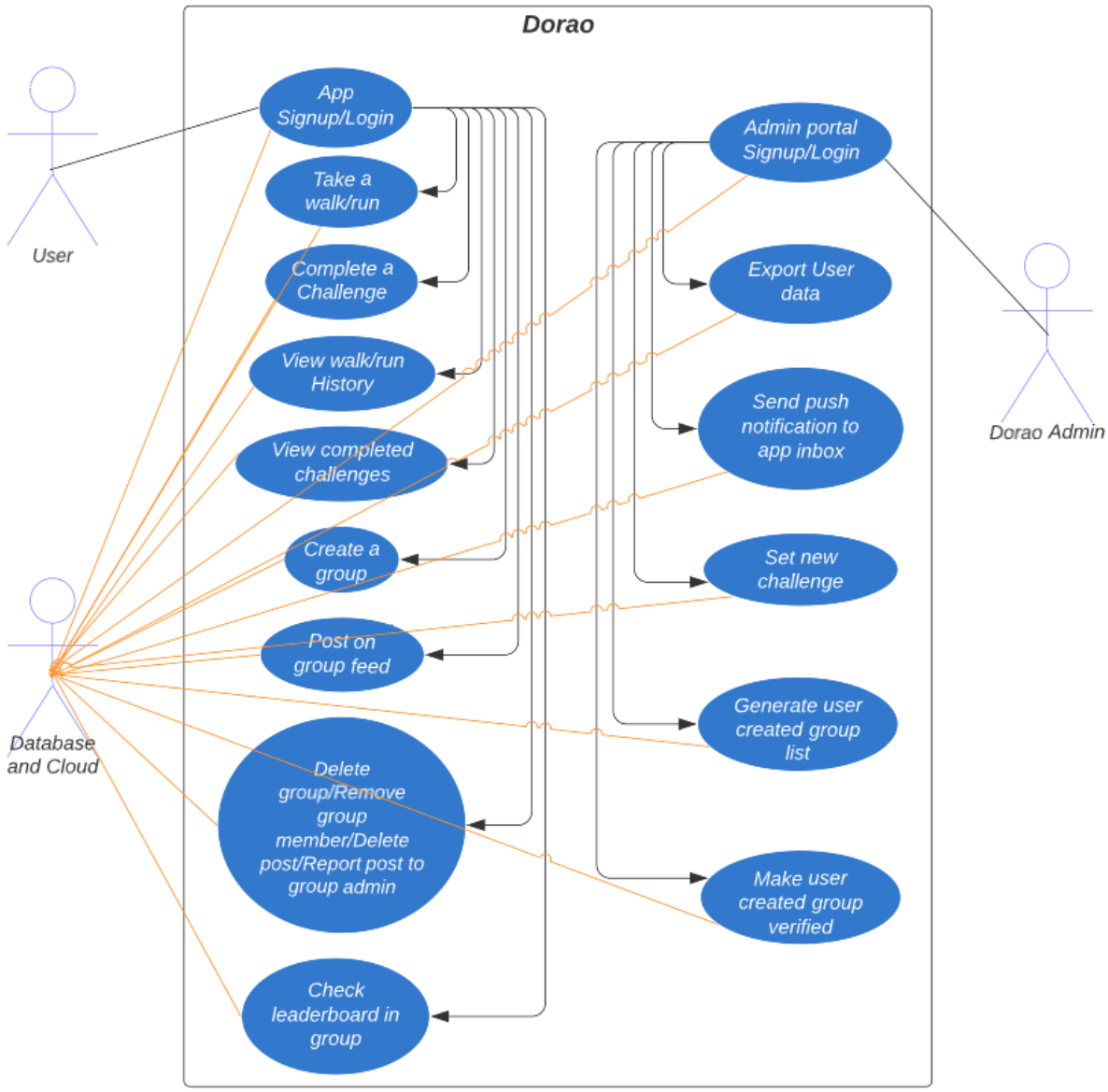

Figure 5.3: UML Use Case Diagram

Architecture

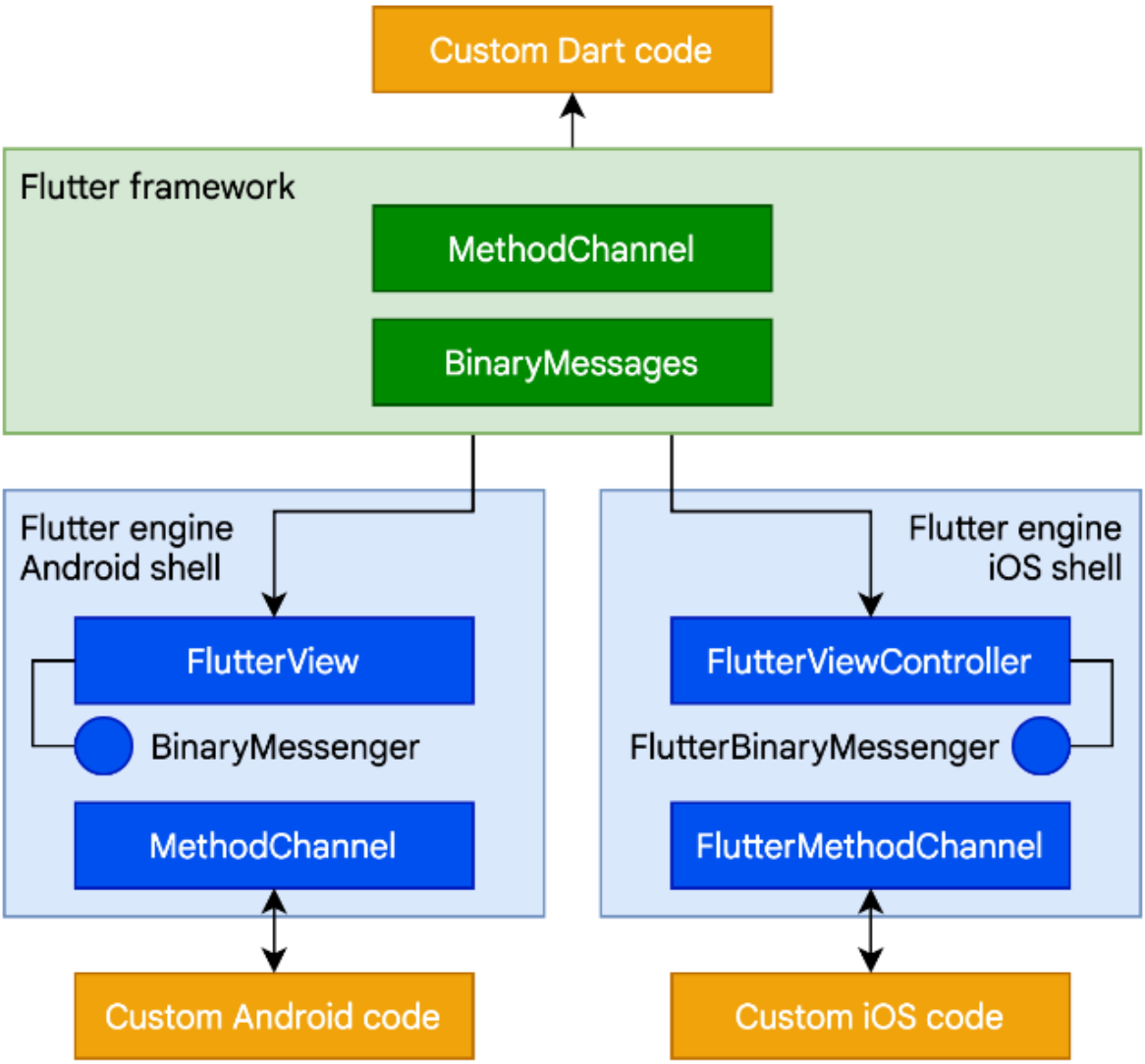

Figure 5.4: Android & IOS application architecture

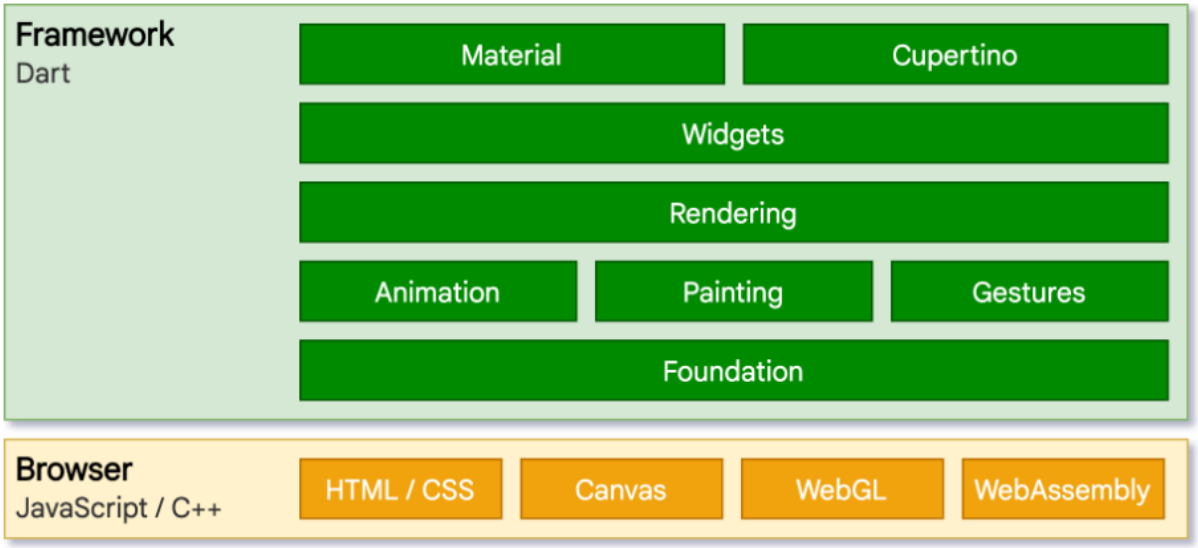

Figure 5.5: Web application architecture

5.5 Implementation

Design

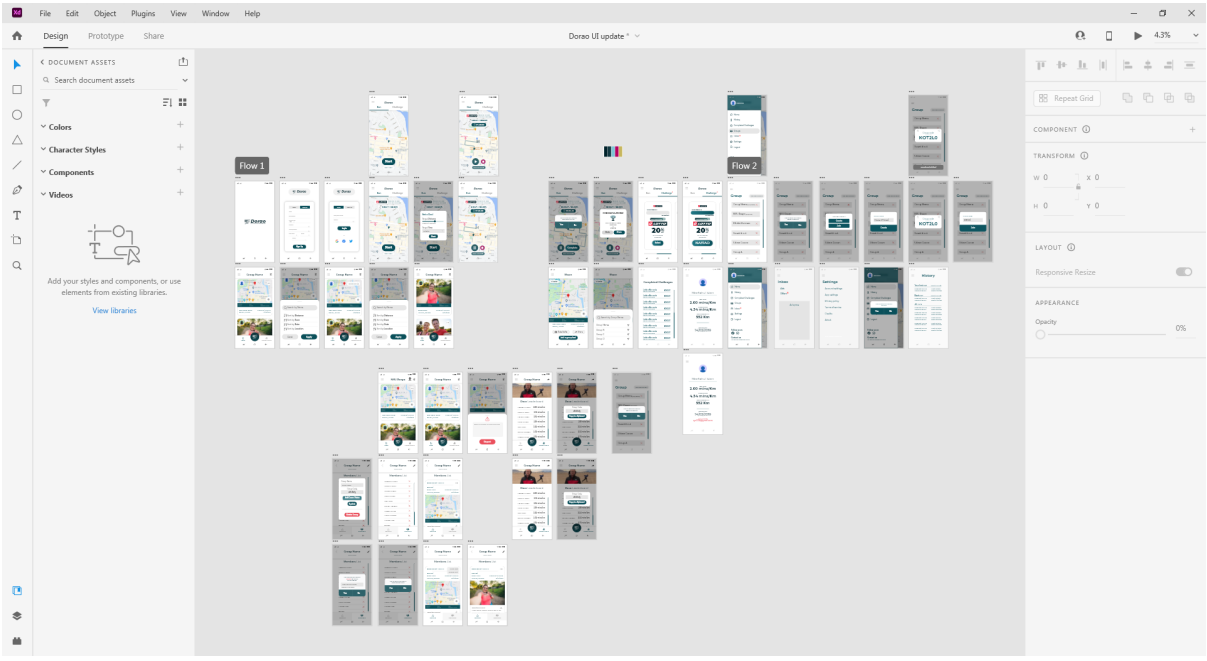

Figure 5.6: UI Design work on Adobe XD

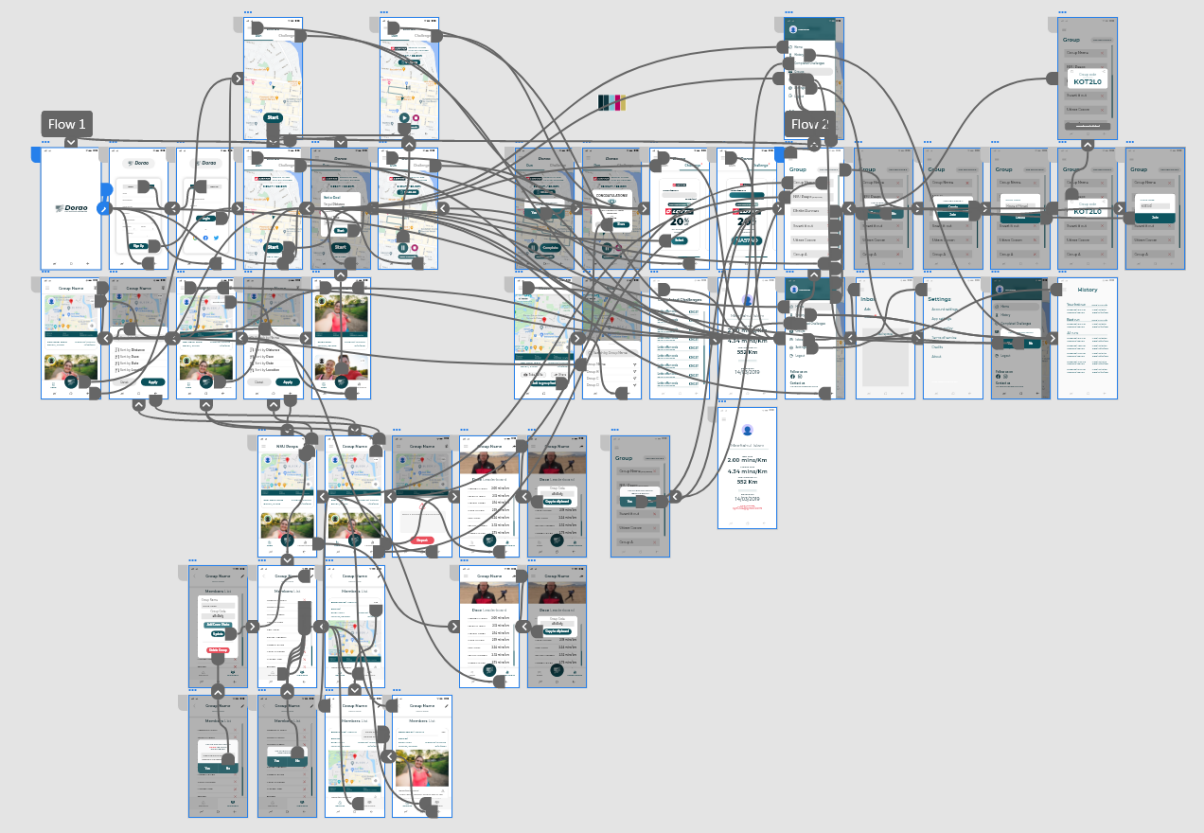

Figure 5.7: UX Engineering & Prototyping on Adobe XD

Development

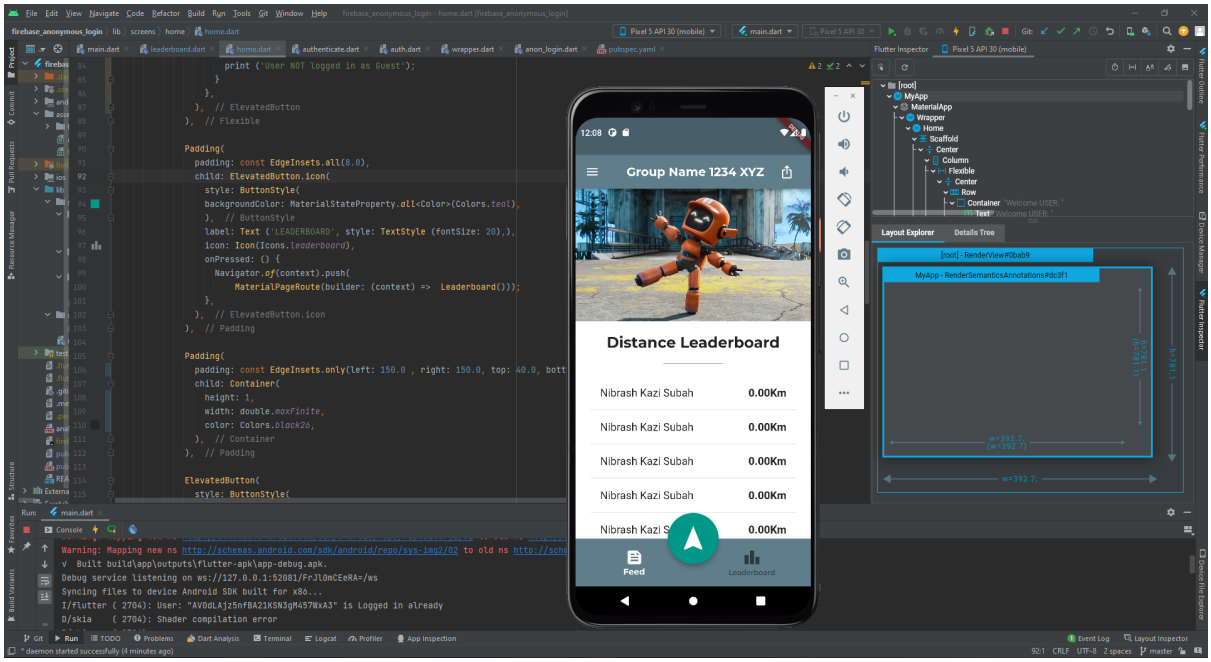

Figure 5.8: Flutter Development work done on Android Studio

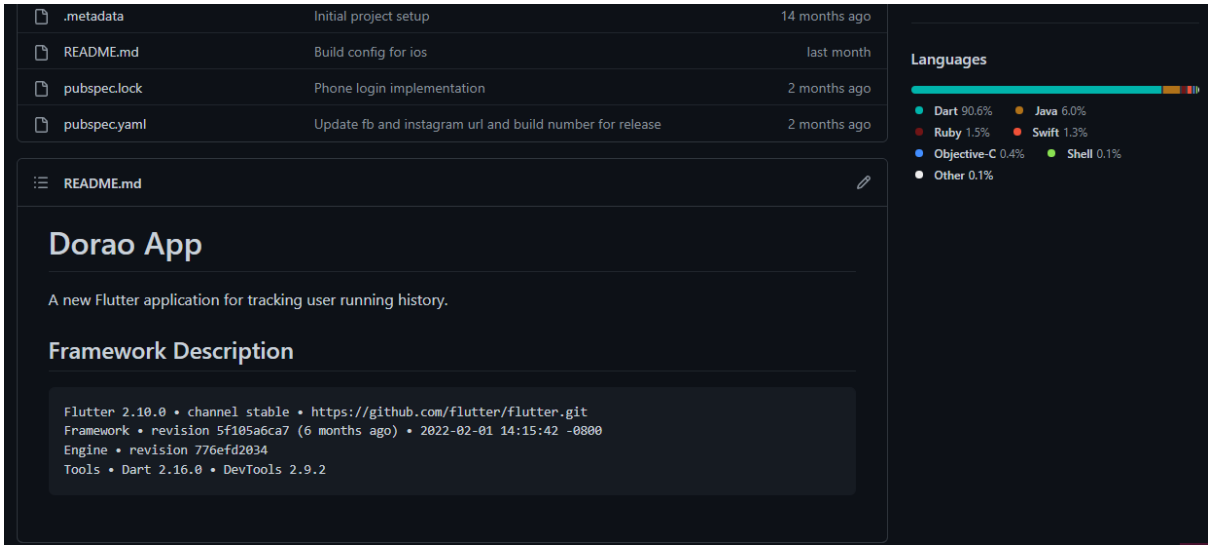

Figure 5.9: Dorao app Flutter repo

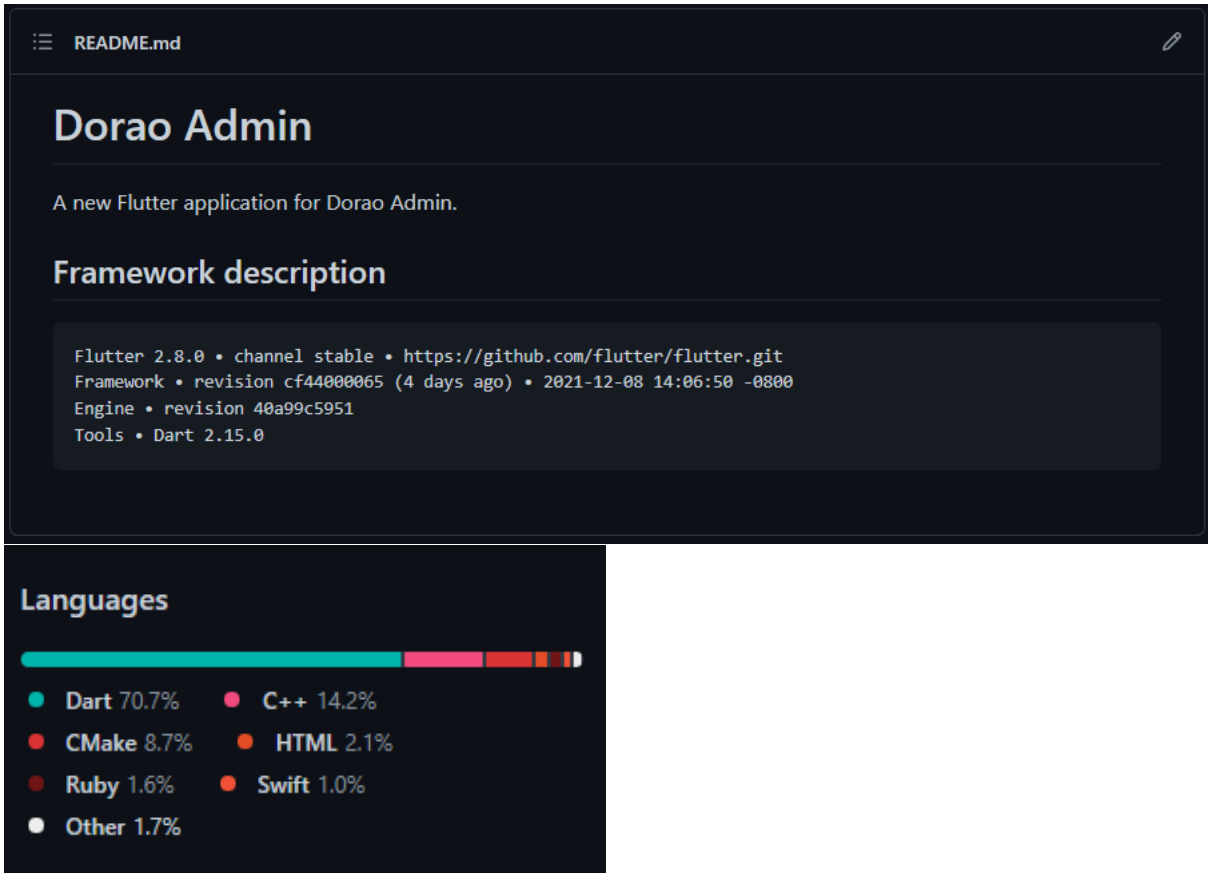

Figure 5.10: Dorao admin portal repo

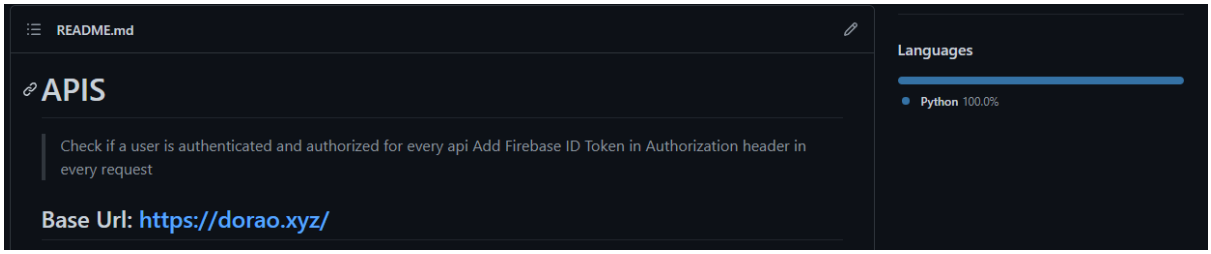

Figure 5.11: Dorao app api repo

Chapter 6

Results & Analysis

Dorao App, was released and updated multiple times over it development life cycle. The market already has similar apps with similar mechanisms which caused some issues. As the overall design and UI is different and since it exclusive to Bangladesh the app passed the review phase in Google use Store. Once the app passed the review, we looked forward to the first day retention which is basically the percentage of people that use and keep the app rather than uninstalling it. Also the reviews of the users on the first day matter a lot. Firstly the app link is shared with experienced testers who give their opinion and apply their market research on our app and give their feedback and report bugs if they find any. The user reviews are also given priority as we get to fix the app as soon as possible and update it on the store in a day or two.

Next is crashes and ANR which is the "App Not Responding" issue. If any of our users were to struggle using the app on their device it could possibly be and issue with their device configurations or with the app files. So Google prompts the user if they want to send their information over to the developers so the developers can check the issue and figure out a solution. Explanation Graphs in Chapter 7.

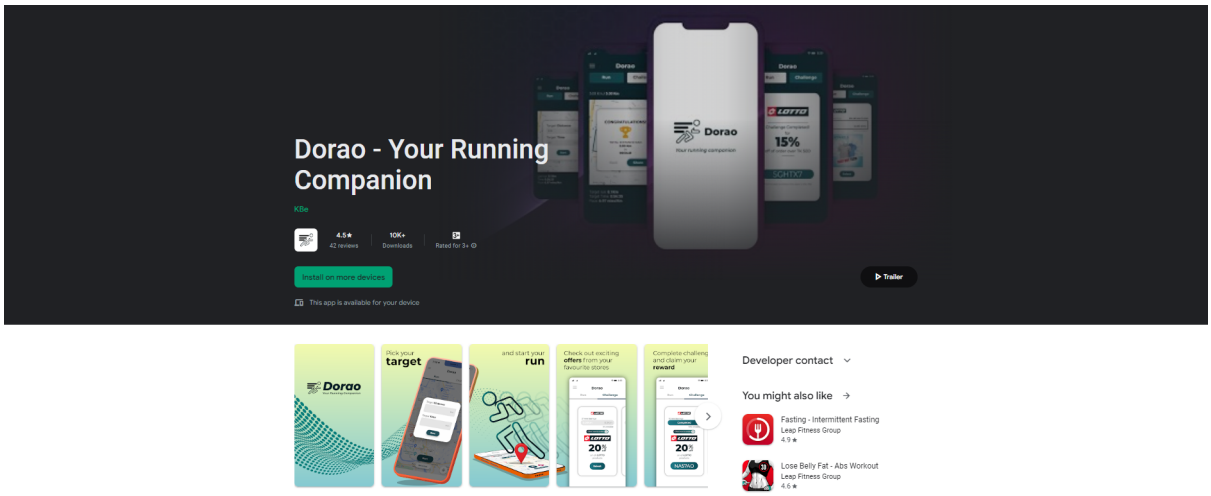

Figure 6.1: Playstore Page

6.1 Mobile Application UI

6.1.1 Input Forms

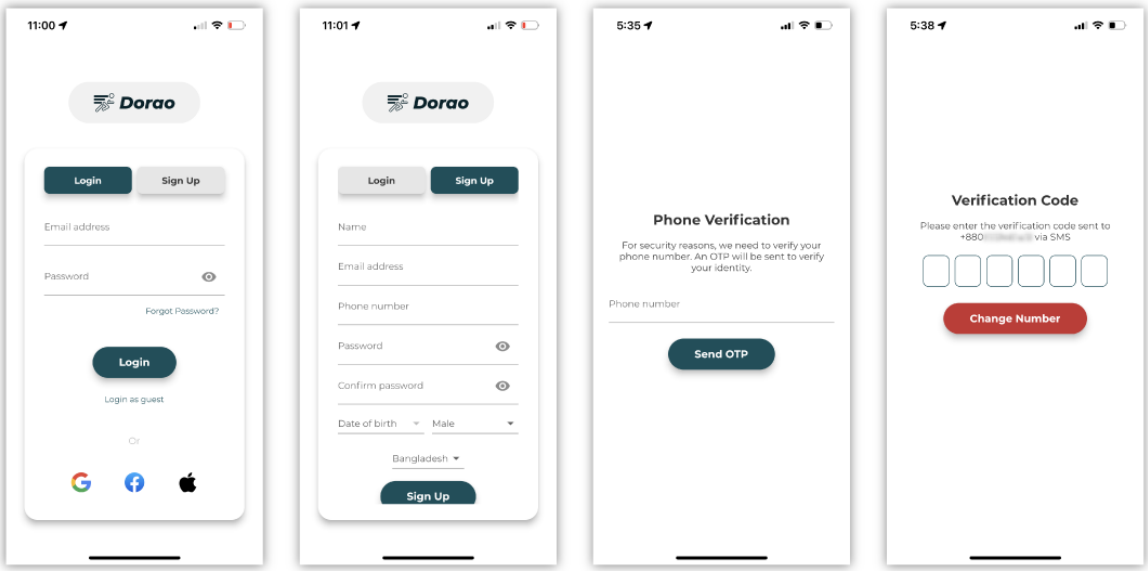

Figure 6.2: SignUp Login input forms

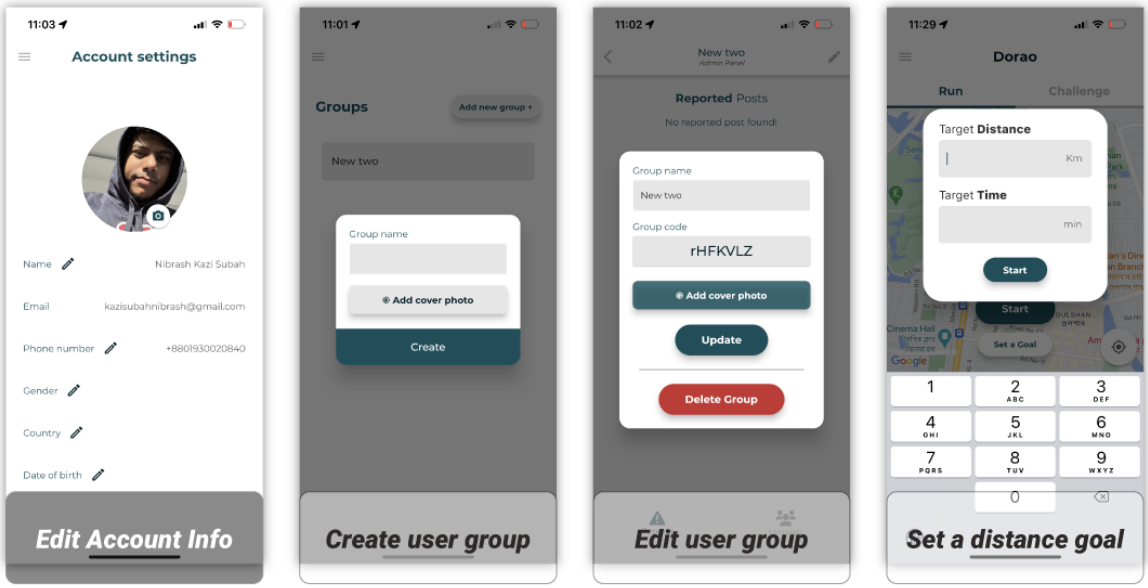

Figure 6.3: Other input forms

6.1.2 Generated Output

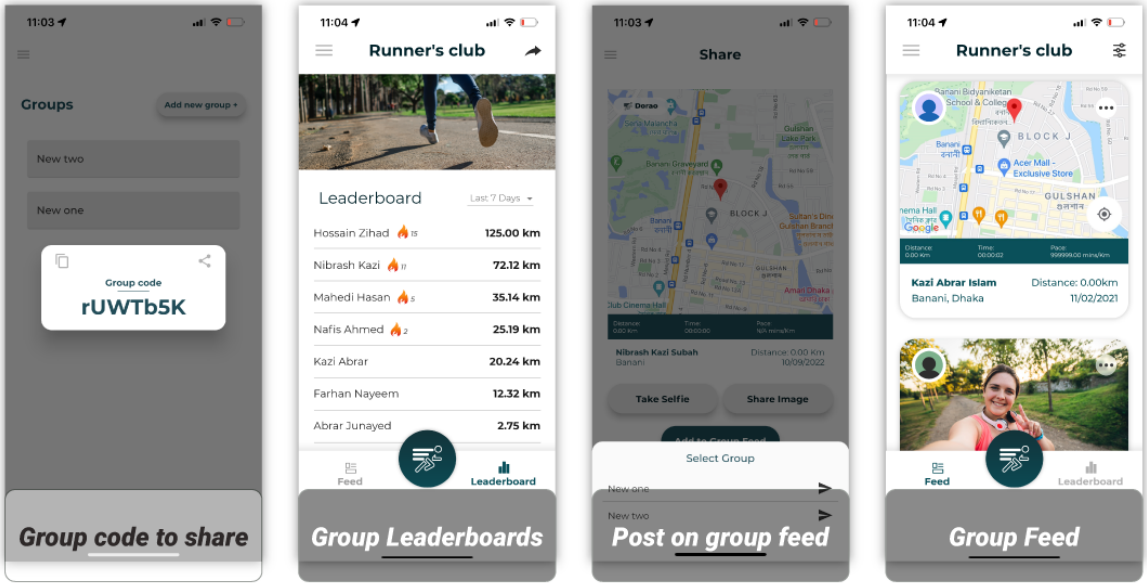

Figure 6.4: Output

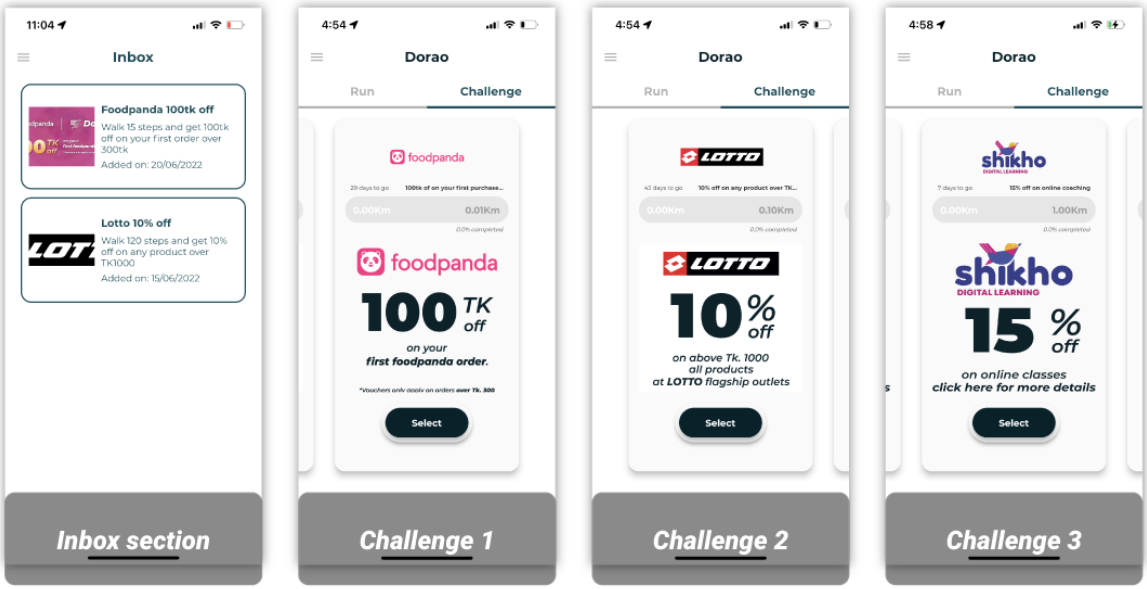

Figure 6.5: Other Outputs

6.2 Dorao App Admin Portal UI

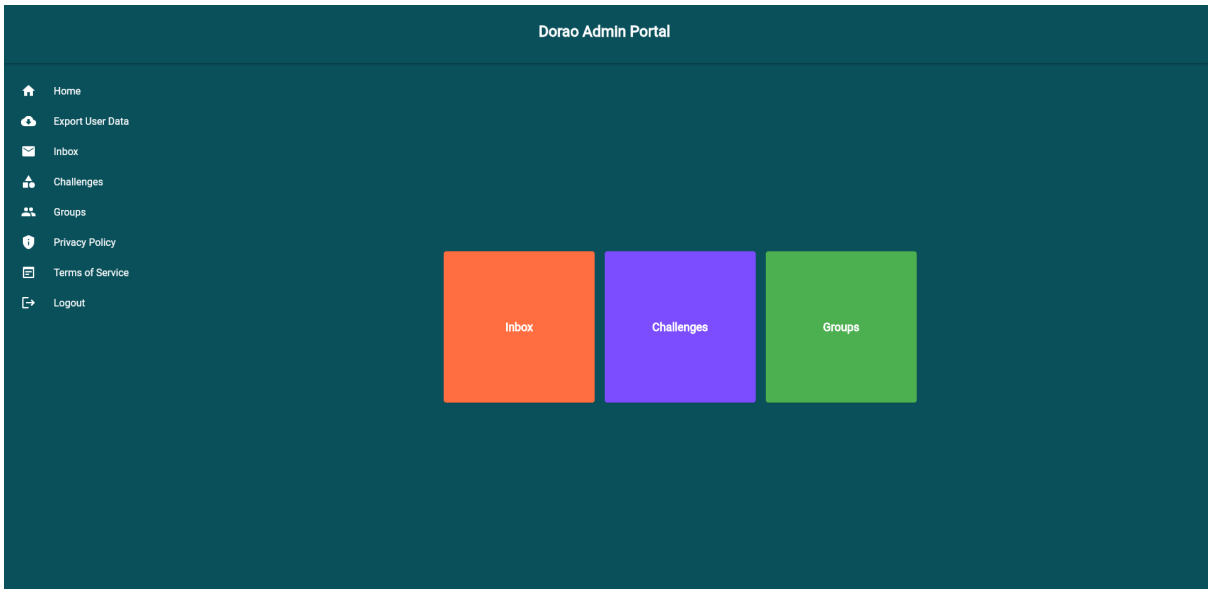

Figure 6.6: Admin portal home page

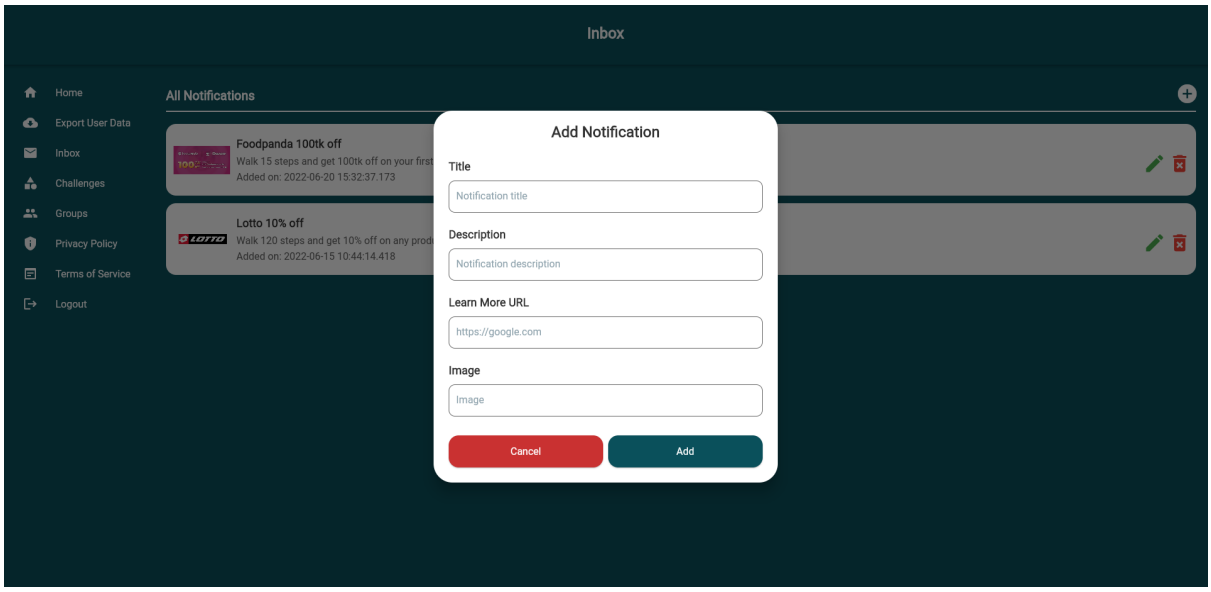

Figure 6.7: Sending Push Notifications

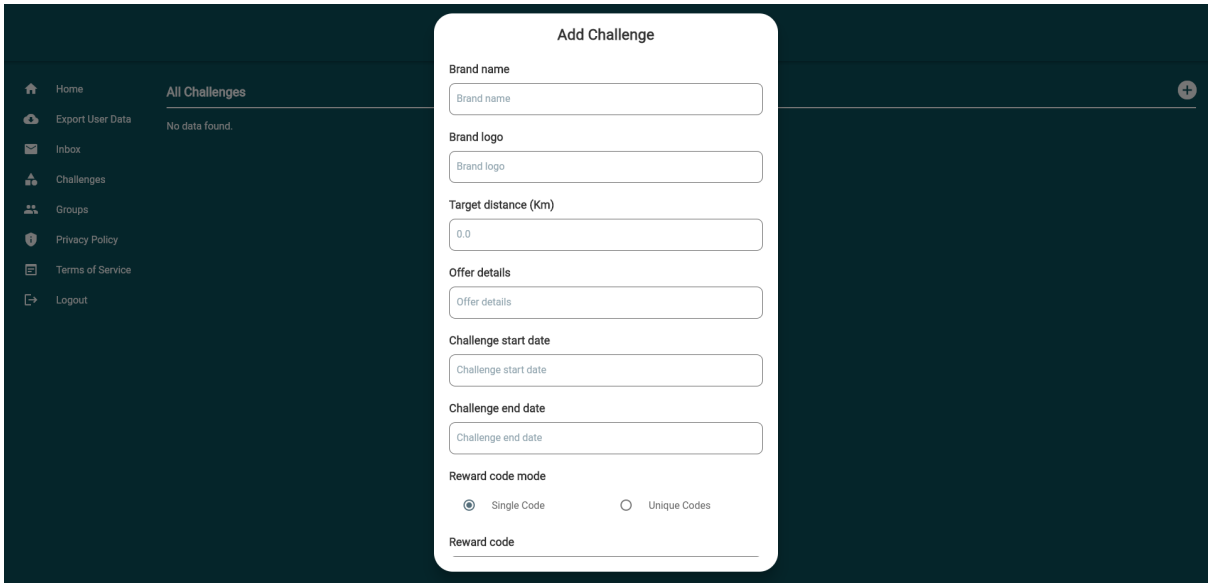

Figure 6.8: Add Challenge

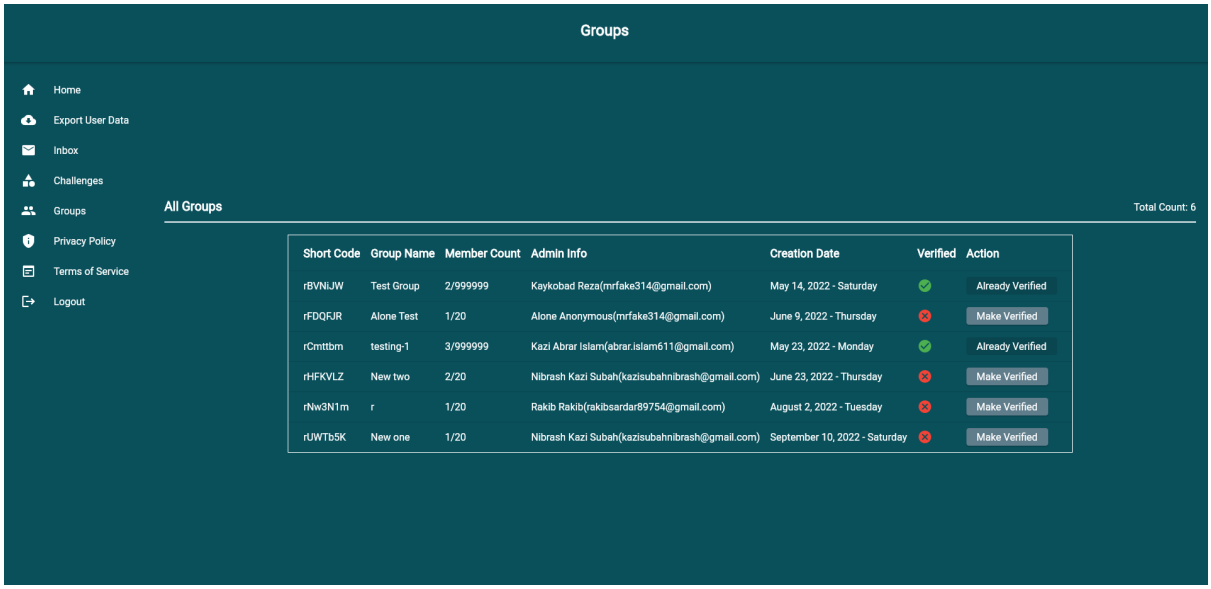

Figure 6.9: All groups and verified section

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project

Community Sustainability

After the deployment of the project, Dorao App it has reached thousands of people in google Playstore and is constantly growing in number of users. The app is shown in the top results if searched with its name. There are also many postitive reviews and reviews pointing out bugs and issues that we are constantly working on and updating the app to keep the community happy. The user rating being 4.5 stars is also a good sign that the app will be successful on IOS as well.

Financial Sustainability

This means how the app will be maintained and the cost behind the maintenance. With deep insight from Firebase's Crashlytics the app will be constantly updated with bug fixes and future updates may also include new features depending on the user reviews. For the bug fixes, visual or in scripts, we need programmers and designers to work on them. Therefore, the main cost would be the salary of the employees working on the project and there is also another cost that comes with marketing of the product. There is a steady revenue stream from partnerships with different companies such as Foodpanda, Shikho, Lotto, Lee Cooper, etc.

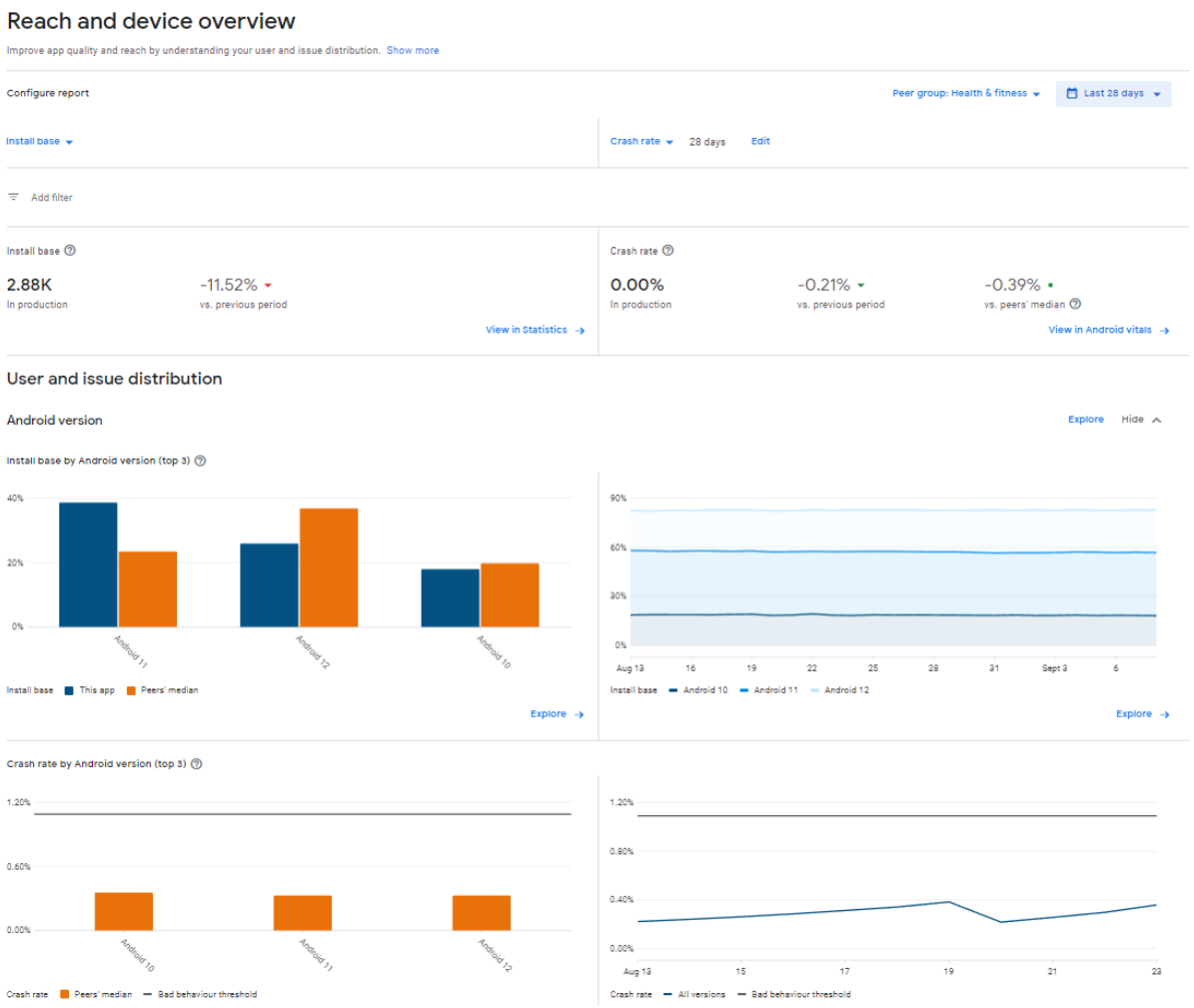

Figure 7.1: Stats from Playstore

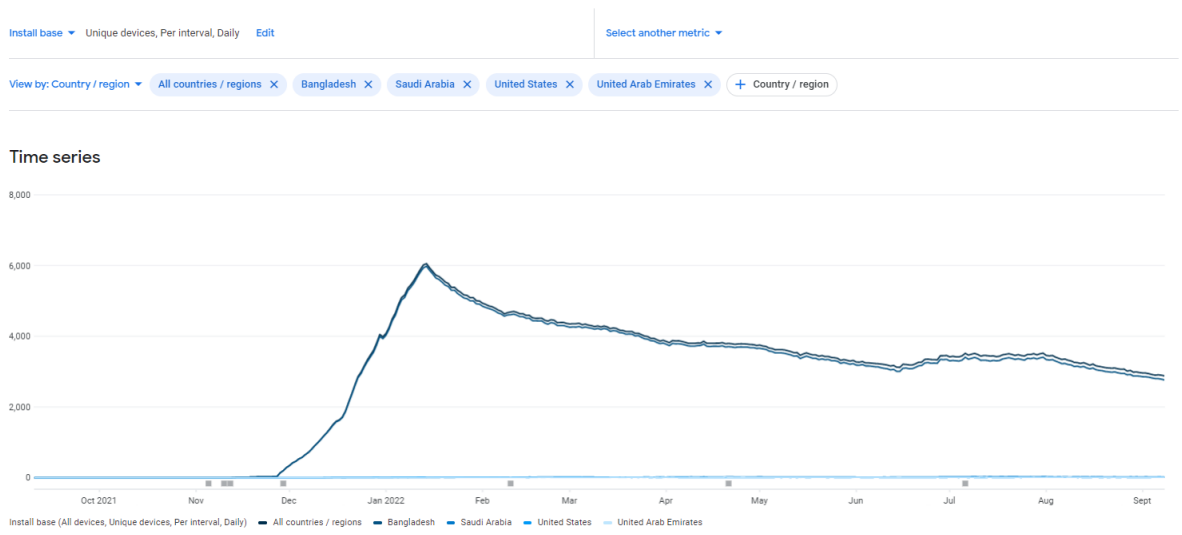

Figure 7.2: User Retention overtime

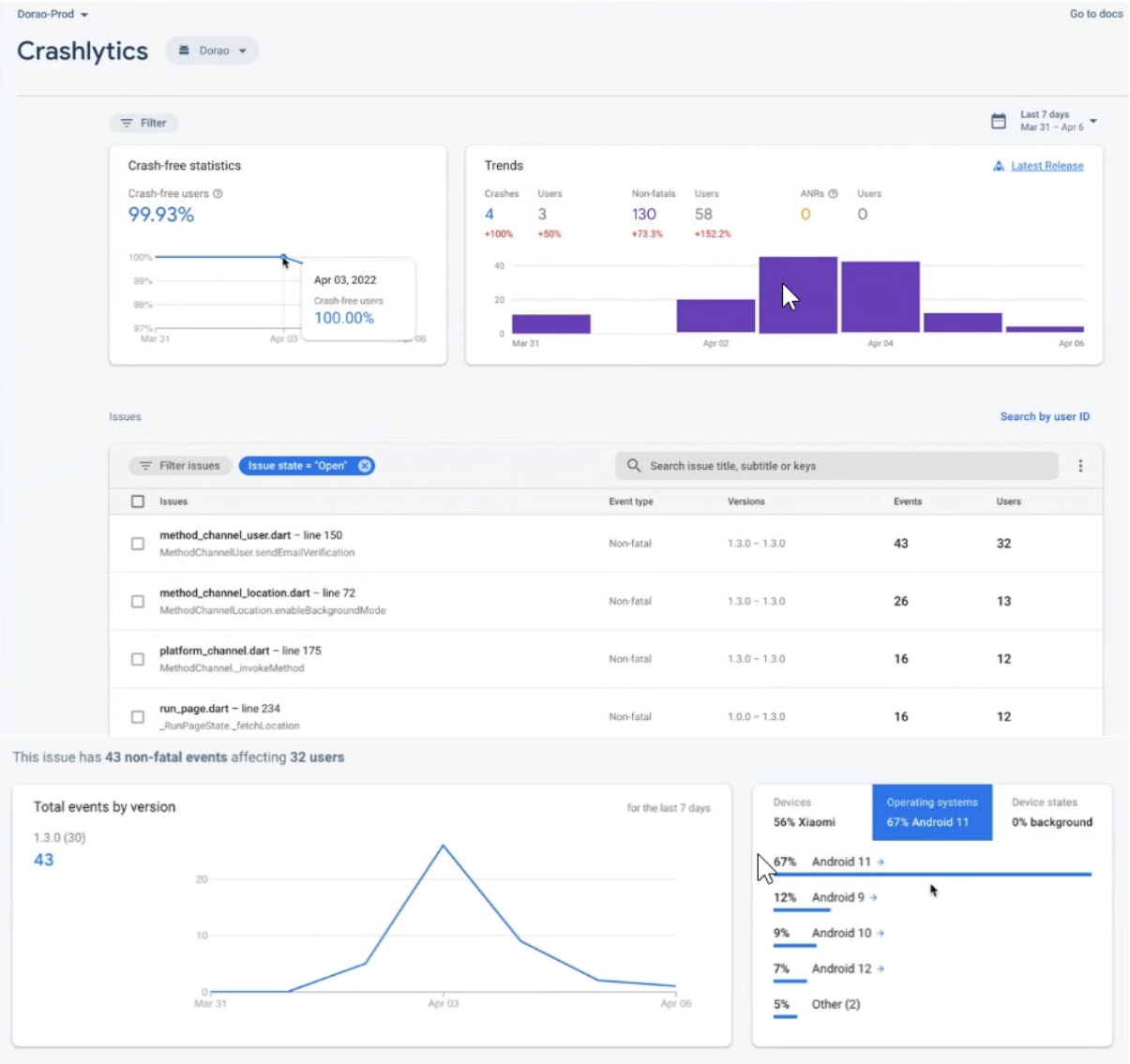

Figure 7.3: Crashlytics stats

7.2 Social and Environmental Effects and Analysis

Social Effect

Dorao app is an a health and fitness app, which means that it is for people who want to stay fit and want to take care of their body. It is for users to make a lifestyle change with other monetary incentives. It is for people who do not have a lot of free time to go to the gym but has a habit of regularly walking. The app is very engaging for regular people because of how simple it is to use and access

Environmental Effects

It is very simple to be honest. An app that incentivizes its users to walk and run means it also prevents them from using vehicles. Vehicles that could be harmful to the environment thus having positive effects on our surroundings.

7.3 Addressing Ethics and Ethical Issues

Fraud

Since the app brings in moentary gain for its users there is a risk of fraud one of which already presented itself practically in one of our campaigns. Thus preventive measures such as Mobile number OTP verification was introduced to prevent users from claiming the same offer code after completing a challenge with multiple accounts.

Data Security

To download the app the user must have a google/facebook/appleID/email account. We do not require the user the sign up on any other place. They will be using the same account to us as the one they regularly use. We take permission from the user to send us their crash report, location, activity tracking info but no other data is taken.

No Discrimination

There is no discrimination of any kind based on race, sexuality, gender, religious beliefs, color, language, political or other opinion, national or social origin, property, birth, or other status.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

The following are the noteworthy problems I faced during the Internship:

8.1.1 Struggling to ask for assistance

This was one of the problems I faced while working at Dorao. Having said that I want to clearly state that Dorao had the best working environment I have seen given that I worked at two other firms before Doaro. I struggled with asking for assistance mostly when I got assigned work separately. I felt intimidated to ask for help since I was the only one assigned to the task. I needed to prove myself that I could do it on my own otherwise why would I even be assigned to complete this task on my own. I could not have been more wrong.

8.1.2 Fraud Detection during a popular Campaign

This situation occurred when we first partnered with Foodpanda to release an offer campaign of 100tk discount coupon code by just walking 15 steps which was approximately 0.01km. This low distance challenge was to ensure a successful campaign and also since Dorao is just starting out so in order to tap into this market we need to set very easy challenges to complete and slowly work our way up. But it backfired in the wrong way in a matter of 48-72 hours all 1000 coupon codes were claimed and we needed to get more from Foodpanda since it was under the MoU contract. Even though it would have been a cause for celebration things seemed suspicious so out internal dev team along with the CEO and Operations team started going through the user data list and realised that within this 48-72 hours approximately 400 new accounts were made in the app which is unnatural. Upon closer inspection it appeared a handful of users were making multiple fake accounts using fake emails and claiming all the coupon codes. Thus the fraud was detected and the challenge was taken down temporarily to avoid more mishaps.

8.2 Solution of those Problems

8.2.1 Struggling to ask for assistance

My organisational supervisor, Kazi Abrar Islam who is also the CEO was very kind and sat with me personally multiple times to guide me and make me understand that I can not only go to my other team mates for help during co-op tasks but also when it is just a solo task that I have to do on my own. Especially since I am still learning the ropes. It took time for me to adjust but I slowly but surely started to practice what Mr.Abrar taught me.

8.2.2 Fraud Detection after Foodpanda Campaign

We installed a OTP mobile number verification system that forces all existing and future users to verify their account with a mobile number which users could only have access to a handful of.

Chapter 9

Future Work & Conclusion

9.1 Future Works

There is a bunch of ideas for new features to the app. Although it depends on the feedback of the userbase. For future works we are planning on a employee fitness programs and a fitness based e-leanring platform. With the google dev team constantly updating Flutter with new features and upgrades along with the community adding new plugins for flutter everyday the scopes to improve Dorao app is very bright.

9.2 Conclusion

I've had an incredible time during my internship. I am extremely fortunate to have found those who are so persistent and patient with me while teaching me. The company I work for has decided to offer me a permanent position because I have received a tremendous amount of resources and support from them. Every project I work on is always inspired by the people I work with, and they always offer assistance when they see me having trouble.

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An Undergraduate Flutter Development Internship/Project at Dorao

By

Nibrash Kazi Subah

Student ID: **1720158**

Summer, 2022

Consent Form

The student modified the internship final report as per the recommendations made by his/her academic supervisor and/or panel members during final viva, and the department can use this version for archiving.

Asif Bin Khaled
(Signature of the Supervisor)

Md. Asif Bin Khaled
Department of Computer Science & Engineering
Independent University, Bangladesh