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Live Train Tracking for Deshi IT

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An Undergraduate Internship/Project on Live Train Tracking for Deshi IT

By

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Summer, 2022

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September 19, 2022

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

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Attestation

This is to certify that the report is completed by me, WALID IBNE KHALED (ID:1730475), 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 Mr. Mohammad Motiur Rahman. I also certify that all my work is genuine which I have learned during my Internship. All the sources of information used in this project and report have been duly acknowledged in it.

Walid — 14/09/2022.

Signature — Date

WALID IBNE KHALED

Name

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Acknowledgement

I would like to firstly like to thank the Almighty Allah for giving me the endurance and the ability to work hard, and for giving me the ability to write this report and for giving me the chance to be able to do my internship at DESHI IT one of the biggest among the group of companies in Bangladesh. Also, my parents for their unconditional love and support that has sustained, nurtured, and got me ready for this challenge. I would like to thank my honorable faculty and supervisor Mr Mohammad Motiur Rahman, Lecturer, Department of Computer Science Engineering, Independent University, Bangladesh, for his invaluable guidance, patience, time, constructive criticism and thoughtful advice regarding various aspects of my internship and preparation of this report. Then I would like to express my gratitude to MR. Shuvo Joseph, Head of IT and CEO, for giving me the opportunity to complete my internship at DESHI IT, for his guidance and support in this three months internship program. The learning and experiences I have gathered here have helped me a lot as an app developer, system analyst and resource planning and this will surely help me in the next phase of life. I would also like to express my gratitude to all my colleagues for helping me throughout and making the internship process so much enjoyable.

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Letter of Transmittal

17 September, 2022
Mr. Mohammad Motiur Rahman
Lecturer,
Department of Computer Science and Engineering,
Independent University, Bangladesh

Subject: Letter of Transmittal for Internship Report, Summer 2022

Dear sir,

It is a matter of great pleasure for me to submit my Internship report regarding obtaining your kind approval. I, Walid Ibne Khlaed have completed my internship program and this report during my summer 2022 semester. This report is based on my experience and the work I did at DESHI IT during my internship. The primary goal for my internship was to gain experience in different technology related fields of the company, starting with research and development, documentation, content writing, web development and to get acquainted with best practices. Over the period of my internship at DESHI IT, I found out that I learned and applied a lot of new skills and technologies. The company comprises a small team for development, who learn, collaborate, and innovate together.

I hope, this report will be informative enough to fulfill your expectation and I would like to thank you for giving me an opportunity to submit this report.

Sincerely, Walid Ibne Khaled
ID: 1730475
Department of Computer Science Engineering
Independent University, Bangladesh

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Evaluation Committee

Mohammad Motiur Rahman

Signature

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Abstract

The objective of this paper is to develop a train tracking system using Global Positioning System (GPS) and Global System for Mobile Communications (GSM). Android platform 2.2 and Google API are used as the development environment. The system consists of applications for employees and applications for passengers. The applications for employees are used to track the trains using mobile phones to retrieve the current position every minute and to send the data to the Web server. The current train position is displayed on a Google Map. The Web application is used to manage the system. The applications for passengers display the status of the trains on mobile devices or Web browsers. The information displayed consists of the train schedule, time of arrival, delay time, average speed, and estimated time of arrival. In this report I will discuss the implementation of a push notification on a live train tracking application, that serves the purpose of Deshi IT also its design, testing and benefits it provides.

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Chapter 1

Introduction

1.1 Overview/Background of the Work

Deshi IT is an international company founded in 2014 with clients in Asia and the United States. They have applied skills in mobile application as well as web application development across a broad range of industries. Deshi IT is a full service technology company. They provide proficient, cost effective software development services throughout the world, both at their corporate development centers and at their client's premises. In addition, they provide competent management staff to assist their clients in all aspects of their mission critical projects. Deshi IT utilizes on-site staff where required to enable a high degree of client interaction and project management. Deshi IT is rock solid in its commitment to their clients. Their methodologies include advanced use-case and their two-phase quality assurance process. This allow for better technical and business requirements gathering, which allow them to deliver unique, innovative applications beyond customer's expectations. Their testing adds to their ability to deliver bug-free software. Depending on the software developed, They offer several levels of guarantees and system support.[1]

Live Train Tracking is an Android application project that supports the railway track system services as per train schedules. The project is designed with a good GUI that allows monitoring and controlling various trains on the network. It has happened so many times that you have been waiting at the railway station for someone to arrive and you don't have any exact information about train timing. The track management system operates on train schedules and lays appropriate tracks for trains to pass as per their decided route. The train management software has been designed to support and maintain data for multiple trains on the rail network. The train schedules and routes are maintained in a database. Whenever the train passes on a track the further track cross or joins are managed accordingly as per the train route. Once the train passes the track is then configured for the next scheduled train to pass.

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For the push notification portion we will be using Android Studio with laravel framework via firebase console. For developing any Android application, Android Studio remains one of the best options. Android Studio provides a unified environment where you can build apps for Android phones, tablets, Android Wear, Android TV, and Android Auto. Structured code modules allow you to divide your project into units of functionality that you can independently build, test, and debug.[2]

Laravel is an open-source PHP framework, which is robust and easy to understand. It follows a model-view-controller design pattern. Laravel reuses the existing components of different frameworks which helps in creating a web application. The web application thus designed is more structured and pragmatic. Laravel attempts to take the pain out of development by easing common tasks used in the majority of web projects, such as authentication, routing, sessions, and caching. Laravel aims to make the development process a pleasing one for the developer without sacrificing application functionality.[3]

The Firebase console provides analytics-based A/B testing to help refine and improve marketing messages. After you have developed logic in your app to receive messages, you can allow non-technical users to send messages per the instructions in the Notifications page in the Firebase Help Center. Firebase Hosting is a fully-managed hosting service for static and dynamic content as well as microservices. The service is backed by SSD storage and a global CDN (content delivery network). Zero-configuration SSL is built into Firebase Hosting, so content is always delivered securely. [4]

1.2 Objectives

The primary goal of my work is to create an independent project for a push notification on an android application, where this portion will later be implemented into the entire application.

It has happened so many times that you have been waiting at the railway station for someone to arrive and you don't have any exact information about train timing. So here we present to you a project on Live Train Tracking and Arrival Time Prediction which will be notified via a push notification. Using this system users can get the information about train timing, and is it on time or not. In this, the system will track the train timing at what time the train departed from a particular station and pass these timing details to another station's system where it will display the timing according to the train departed from the previous station. If the system finds any delay in the train due to a signal it will automatically update the train timing in the next station and will be displayed to viewers.

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1.3 Scopes

In this system there is an admin module, who enters the details about trains and its timing and these details will be passed through an internet server and is fetched by the system on other stations, and there is another system that shows train information to the viewers on platform. Second system will get all the information of all trains but will automatically select the data that refers to a particular station and show that information on screen. For example if an admin at Dhaka station enters information about Dhaka station Chittagong station system will not be affected, but Dhaka Station system will show the information about trains. This system works like – when a train departs late from a station, the admin will enter details about departure and its time, and this information goes in real time on the internet server and retrieved on other systems through internet server and shows the details on screen. Station masters on every station have a login wherein they may update train arrival time at their station when it arrives. This second System is installed on various locations on stations for viewers to view the information. Admin will add information like train departed from station, expected arrival at destination, delay in the train schedule, etc. This project publishes real-time train schedule events to subscribing multiple client applications.

- **Administrator Login:** The whole system is controlled by an administrator, administrator login into the system by giving his authentication details such as username and password. After login into the system, he can see the trains currently available to the passengers. The train details are train name, departure, destination, seat availability, and running days. An administrator can also add a new train into the databases.

- **Passenger Login:** In this module, the user can login into the system by providing their credential, if a user is new to this application, and doesn't have their credential details such as username and password; he can register as a new member in this system by registering.

- **Passenger Registration:** If any user doesn't have a username and password to login into the system, then he/she can choose to register as a new member by choosing the register option. He is prompted to give his personal and contact information such as name, address, phone number, email id, and he can choose his own username and password. If registration is successful then the user can login into the system, by username and password chosen by him/her.

- **Train Searches:** After successfully logging into the system, passengers can search the available trains by their requirements. The requirements may be departure, destination, journey date. The list of available trains is shown to the user. Then

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the user may select any train and make a ticket reservation. If no train is available, then the user may change the journey date, departure, or destination.

- **Ticket Reservation Module:** If the journey date, destination and departure is matched for a train then the passenger can select the particular train, after selecting the particular train, the user will get the train's details and seat availability in each class, the classes will be AC, sleeper and seater class. Users can select any class, and input the number of seats to reserve, if the user selected seats not available then he prompts to give only selected seats less than or equal to available seats. After selecting no. of seats, the user can make payment, when he is ready to pay, the details of reservation will be shown to the user such as class, number of seats, total amount. Then the user may confirm or cancel the payment. If he confirms the payment then only the ticket will be reserved for that passenger, otherwise it will be open to all.

- **Train Tracking:** The passenger has the option to track the Trains in real time. The train's physical location will show in the map with the place the train is traveling. Passengers can select a particular train, and then train details such as previous station, next static, train start date and expected time to reach the next station are shown to the user. The route covered by the train is shown as a particular color, and the route to be covered will show as the dotted particular color. The trains currently running on time will be shown in a specific color too, and trains currently running late will be shown in another color.

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Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

In my under-graduation studies, I acquired a lot of theories about programming and developing an application from start to finish. Most of the courses include both theoretical and lab work. I learned how to operate in a group in lab sessions, which will benefit me in real-world scenarios where I will have to collaborate with my colleagues to complete and deliver a project. It's very similar to working on projects in a group in lab class and working on projects in the office with colleagues. Some of the academic courses that were beneficial to my professional experience include: CSE 203 Data Structure and CSE 211 Algorithms, I want to keep these courses together as they are closely related, and one depends on another. From these courses, I learned the fundamental topics about arrays, linked lists, pointers, stack, and queues, BST, and Graph theory. Learning time and space complexity is helping to create faster working and smoother applications and providing the user a great experience. During these courses, I began to solve some competitive programming problems from practice problems and various websites, where I applied my data structures and algorithms knowledge to solve critical problems, which is now greatly helping me in solving logical and functional problems in the corporate world.

CSE 213 Object-Oriented Programming, in this course, I have learned how the format of my code should look like using classes and objects. In real applications, all my work is related to classes, objects, and functions. Without knowing the core concepts of object-oriented programming, I would not be able to understand how my code is working, and fixing bugs would be impossible.

CSE303 Database Management, this was also one of the most crucial courses I had ever encountered. I learned how to design databases using UML class diagrams, making a rich picture, and six-element analysis here. Designing databases is critical and crucial because it is the core foundation of every project. Learning how to take client requirements, translate them to a database, and then create a project out of them was one of the most

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significant things I learned during my undergraduate studies.

CSE 309 Web Applications and Internet and CSE 464 Mobile Application Development, from these courses I learned a lot starting from HTML, CSS, Bootstrap for front-end designing including how the applications in web servers work, learning about http requests like get, post, 4 put, delete, and update requests helped me a lot to learn the framework that I am using in my assigned project. I learned to collaborate and develop applications in a team environment and was also taught in these courses.

I learned laravel framework, native android and firebase console application for my project that was a feature called push notification in android application.

2.2 Related works

Banglalink Train Tracking: Banglalink Train Tracking Service provides train's location, movement schedule other related information to Bangladesh Railway commuters.

Bangladesh Train Tracker: In this app you will get train status using a 5 digit message from your phone and you will be charged a specific amount for each SMS.

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Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

A work breakdown structure (WBS) is a deconstruction of a project that is visible, hierarchical, and focused on deliverability. It is a useful diagram for project managers because it helps them to work backwards from a project's product to identify all the actions required to complete the project successfully. For this project, we've also created a WBS which reflects our workflow, visualization of scopes, responsibilities in a structured way. WBS was created for our project to be managed smoothly and more efficiently in an organized way. A top-down approach was used to produce our WBS and a phase based WBS. [5]

In the diagram Level 1 has six elements. Each of these elements are the phases of the project. The Level 2 Elements are the unique deliverables in every phase. All the lower-level components are deliverables. The project's primary steps include collecting requirements, designing, developing, testing, and deploying. The child tasks are the tasks that must be done to finish the current phase and go to the next phase. We have also made the cost calculation, resource allocation, and risk assessment, all of which are important for WBS and help us gain a better understanding of the project. A WBS also helps to avoid common project issues including missed deadlines, scope creep, and cost overruns, among others. When built as thoroughly as feasible, the WBS serves as a blueprint for completing what looks to be a difficult undertaking. However, when the project is broken down using a WBS, it becomes far more viable and approachable.

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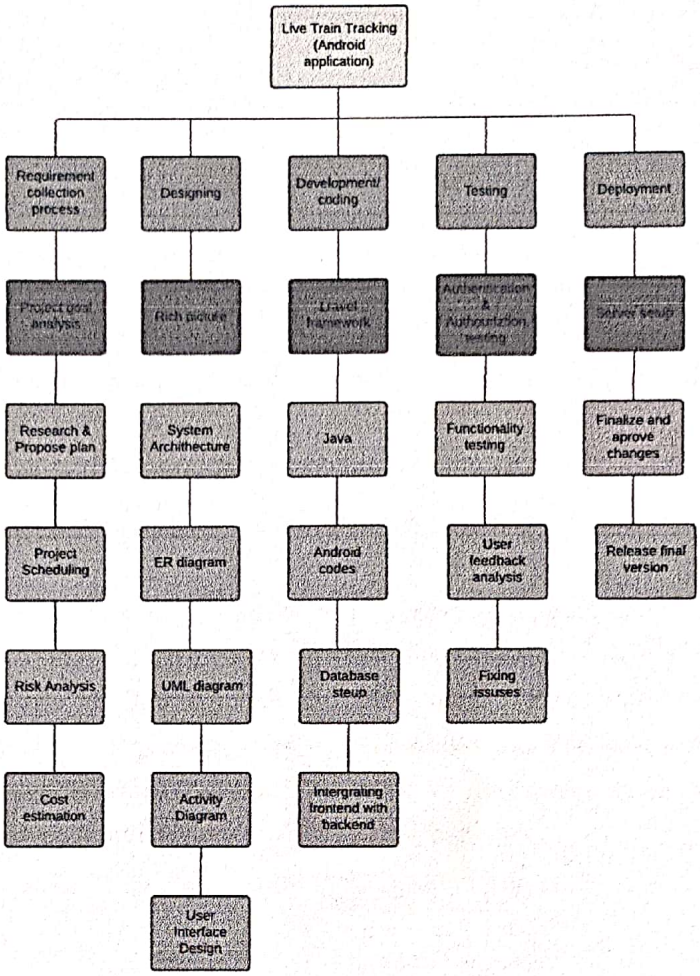


Figure 3.1: Work Breakdown Structure

3.2 Process/Activity wise Time Distribution

It is very important to accurately estimate the overall time required to accomplish the project depending on the activities to be completed. It is also important to create priorities and set goals to complete a successful project. The development phase is by far the most important because it takes the longest to complete. Because we are working in order, if one task is delayed, the rest of the tasks will be delayed as well. As a result, it is important to complete tasks according to the estimated schedule.

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Activity	Duration (Days)	Work (Percentage)
Requirement Collection	5	11
Designing	7	15
Development	25	48
Testing and Feedback	9	17
Deployment	5	9
Total	51	100

Table 3.1: Process/Activity wise Resource and Time Allocation

3.3 Gantt Chart

Gantt chart, which is widely used in project management, is one of the most popular and useful ways to depict activities (tasks or events) against time. A list of the activities may be found on the left side of the chart, and a suitable time scale can be found along the top. Each action is represented by a bar, whose location and length indicate the activity's start, duration, and end dates. This allows you to quickly see various activities, start and end time of activity, activity duration etc.[6]

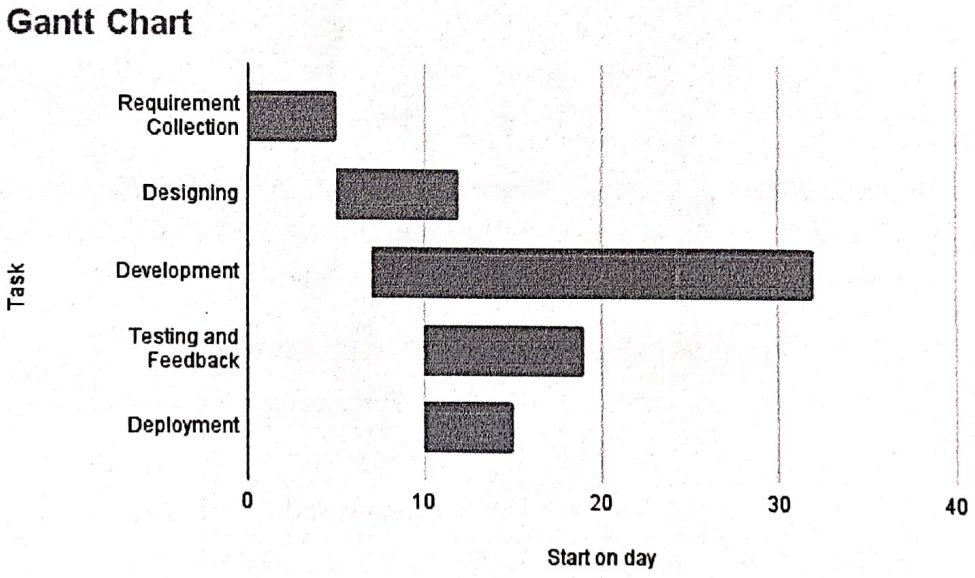


Figure 3.2: Gantt Chart

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3.4 Process/Activity wise Resource Allocation

The process of allocating and planning available resources in the most efficient and effective way possible is called resource allocation. Projects will always require resources, even though they can be scarce at times. Therefore, the project manager is responsible for the proper timing and allocation of these resources during the project schedule. Therefore, resource allocation is about managing the project and delegating resources to ensure that it runs as smoothly and efficiently as possible. The table below shows how resources are allocated.

Task	Resource allocation (Percentage)
Requirement Collection	10
Designing	20
Development	45
Testing and Feedback	15
Deployment	10
Total	100

Table 3.2: Process/Activity wise Resource Allocation

3.5 Estimated Costing

Cost estimation is one of the most important aspects of project planning and management. It is based on the number of resources, budget and time required for the scope of the project. Since cost estimates are for cost estimates and not actual costs.

Work distribution	Costing (BDT)
Requirement Collection	5000
Designing	10000
Development	10000
Testing and Feedback	12000
Deployment	15000
Total	52000

Table 3.3: Estimated costing

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Chapter 4

Methodology

A methodology is a collection of problem-solving approaches, practices, processes, techniques, procedures, and standards. They're well-defined processes that show us exactly what to do next, why each step is important in the entire software development life cycle, and how to complete a project stage. For this project, we are following the iterative and incremental development process. Iterative and incremental development is a method for combining iterative design and incremental development. The incremental method divides the software development process into small, manageable chunks called increments. Each increment builds on the previous version, allowing for gradual development and iterative software development refers to the process of repeating software development operations in cycles known as iterations. After each iteration, a new version of the program is created until the best product is found. Iterative and incremental software development starts with planning and continues through iterative development cycles that include continuous user feedback and incremental feature additions, concluding in the deployment of finished software at the end of each cycle.

Planning Phase: I have discussed the project with my organizational supervisor and gathered all the requirements for the various functionalities that will be included in the Android application. I began designing the application after I have written down and clarified all the requirements and doubts that I had.

Analysis Design Phase: I had to design the entire program in Adobe Illustrator, starting from the beginning to end. I demonstrated it to my organizational supervisor when I had finished designing. After the design was accepted, I went straight into the development phase.

Development Phase: As I previously mentioned, the whole application will be developed using PHP framework Laravel and java using Android Studio and firebase console which will make all the static Push notifications dynamic and fully functional. As we know laravel follows MVC architecture providing blade view which is a blade extension file. These views will be dynamic with a laravel custom admin site interacting with MySQL database. This phase may take the longest. Besides, we must provide proper

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authentication and authorization of all the users to maintain the proper security of the application.

Testing Phase: The testing phase is an interesting phase as more and more weird bugs come into action. So here I had to rewrite some of my code and had to keep algorithms time and space complexity to improve the speed of the application.

Evaluation Phase: This phase will help us to identify the lacking and problems of the system from a client's perspective. After getting the feedback, the Android application can be updated and made more sustainable. We can see that these approaches reduce overall risk and help the project respond quickly to changes, can quickly and easily adapt to any given change, can achieve transparency and total alignment in the development and testing phases, delivers overall higher quality products, and creates customer satisfaction from the above discussion of how to use each step of the methodology. For these reasons, I decided to employ the iterative and incremental technique to complete my project.

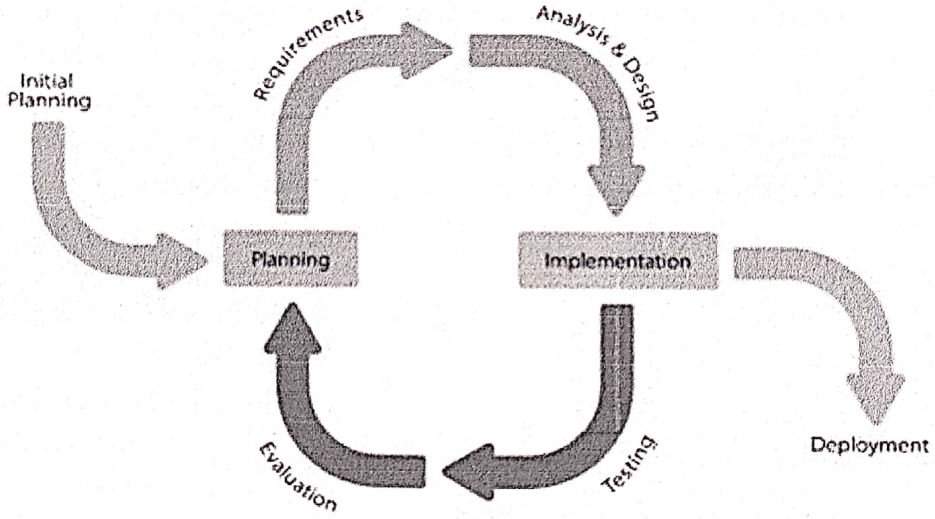


Figure 4.1: Iterative and incremental development process

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Chapter 5

Body of the Project

5.1 Work Description

Live train tracking is an Android application is used to track a train live from their android device. The feature I have worked on in my internship program is, Push notification from laravel server via firebase console.

The languages used for the application interface and connections it with firebase are

- Object oriented programming (JAVA)

Languages and frameworks use in back-end are:

- PHP
- Laravel (framework)
- MySQL (Database)
- Firebase storage

IDE/Software used in building the project:

- Android studio
- Visual Studio Code
- XAMPP control panel

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5.2 Requirement Analysis

Rich Picture

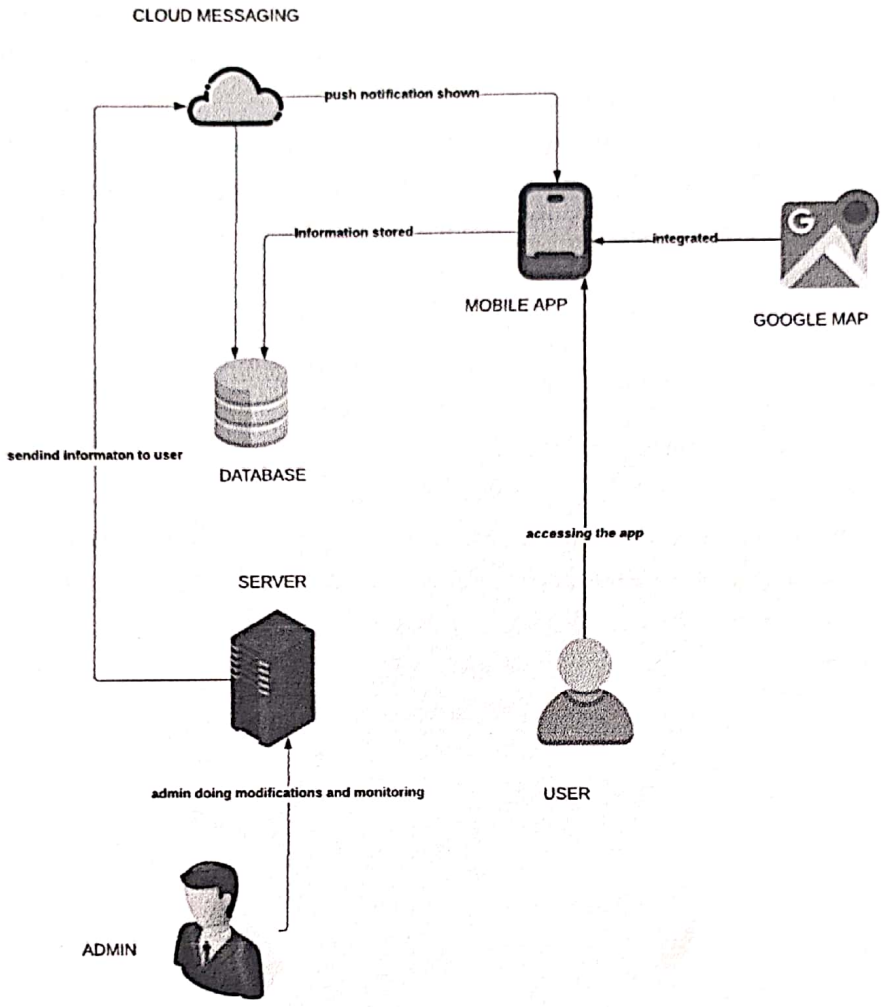


Figure 5.1: Rich Picture

Functional and Non-Functional Requirements

Functional requirement are the ones that are used by end users when the specifically request a condition that is certain according to the capacity of the system. These functions need to be included in the system by being the part of the contract. The way these are represented by the input of the system, operation, and the outcome that is required. They are mainly the user's requirements. [7]

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A non-functional requirement refers to the process of how a system should be and also its usefulness. Every requirement that is not come functional requirements can be considered as non-functional requirements.

Functional Requirements:

When a user registers, the database will store the data. Once the registration is completed the user tries to login, it will validate if the email and the password is correct. Once the validation is successful a user profile will be created. The user will be redirected into the specific homepage after registration. The users can search for their desired train and update the train details. Users can reserve tickets. Once reservation is done the user can track the train.

Non-Functional Requirements:

Usability – the application will be user-friendly and intuitive for the easy access of the users. Maintainability – The application will be maintained regularly so that it doesn't become slow or any bug fixes. Reliability – a system is most preferable when it is reliable, that is, the availability of the system is important. Therefore, the application will be built to make it as reliable as possible. Scalability – the system can be accessed from devices like smartphones and an aesthetically similar web Application for computers will be developed. Security – the system will be secured and personal information like the user's phone numbers, the email address will be safe.

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5.3 System Analysis

5.3.1 Six Element Analysis

Process	Human	Non-Computing Hardware	Computing Hardware	System	Database	Communication and Networking
Administrator Login	Admin	N/A	Smartphone (Android Device)	Android	MySQL	WiFi/ mobile data
Passenger Login	Passenger	N/A	Smartphone (Android Device)	Android	MySQL	WiFi/ mobile data
Passenger Registration	Passenger	N/A	Smartphone (Android Device)	Android	MySQL	WiFi/ mobile data
Train Search	Passenger	N/A	Smartphone (Android Device)	Android	MySQL	WiFi/ mobile data
Ticket Reservation Module	Admin and passenger	N/A	Smartphone (Android Device)	Android	MySQL	WiFi/ mobile data
Train Tracking	Admin and passenger	N/A	Smartphone (Android Device)	Android	MySQL	WiFi/ mobile data

Table 5.1: Six Element Analysis

5.3.2 Feasibility Analysis

A feasibility study is an assessment of the practicality of a project or system. A feasibility study aims to objectively and rationally uncover the strengths and weaknesses of an existing business or proposed venture, opportunities and threats present in the natural environment, the resources required to carry through, and ultimately the prospects for success.[8]

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Three key considerations involved in the feasibility analysis are:

Economical Feasibility: This study is carried out to check the economic impact that the system will have on the organization. The amount of funds that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

Technical Feasibility: This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

Social Feasibility: The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

5.3.3 Problem Solution Analysis

Many problems were encountered while completing the project and they were solved through study and analysis. Some of problems can be shortlisted and mentioned below:

System dynamic capability: the main requirement for this system was that it needed to be fully dynamic and easily customisable and while trying to fulfill this requirement the problem was detected. There were some problems while building relationships with entities. We had to go through trial and error a few times. After research and implementation this problem was solved and it was made fully dynamic so that it can adapt to any other requirements with only minor changes to the system.

Updating data: this issue arose during the development of the system's back end. The system requires the data to update with each edit. But it was failing to do so. After

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the error was detected and solved, the edited data was shown error free.

5.3.4 Effect and Constraints Analysis

Each project has its own set of constraints and risks that must be managed to ensure the project's ultimate success. Project managers have three major constraints: time, scope, and budget. The triangle of project management is often known as the three limits. Extending the project's scope, for example, will almost certainly require more time and money, but shortens the project's other aspects.

Time: timetable can save money while also reducing the scope. In the development of any undertaking, time is vital. All employees in our project worked from home and gave a daily update at the end of the day. As a result, our project stayed on track, and no delays were recorded.

Cost: for a project's budget one must include both fixed and variable costs, such as materials, permits and the financial impact of project team members. The budget was previously approximate because many other estimations were previously made.

Scope: a project may have its boundaries and that is defined by the scopes available. It defines the trait the organization and the project must gain. There was no backtracking in our project because the scopes were defined from the start. It also had the procedures to carry them out.

5.4 System Design

UML Diagrams

UML is an architecture. Mainly used in designing and then implementing the design in the system. It stands for unified modeling language. An application code may contain a thousand lines and to track the relations is very tough. It becomes easier with this diagram and UML diagrams are divided into two parts and they are components and subcomponents.[9]

Use Case Diagram: a use case diagram is a graph of actors, a set of use cases enclosed by a system boundary, communication (participation) associations between the actors and users and generalization among use cases. The use case model defines the outside (actors) and inside (use case) of the system's behavior. The following diagram

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depicts the use case diagram for the proposed system. The use case "Check classification patterns" represents that the user can obtain rules or classification patterns out of the original data set. This use case extends computation of information gain, because we make a division among tuples based on the information gain computed for each attribute. The attribute with maximum information gain is selected as the split criterion. The use case "Check privacy preservation" represents that the user can check the level of privacy on the data set. This use case extends generalization of data as level of privacy is directly related to the level of generalization.

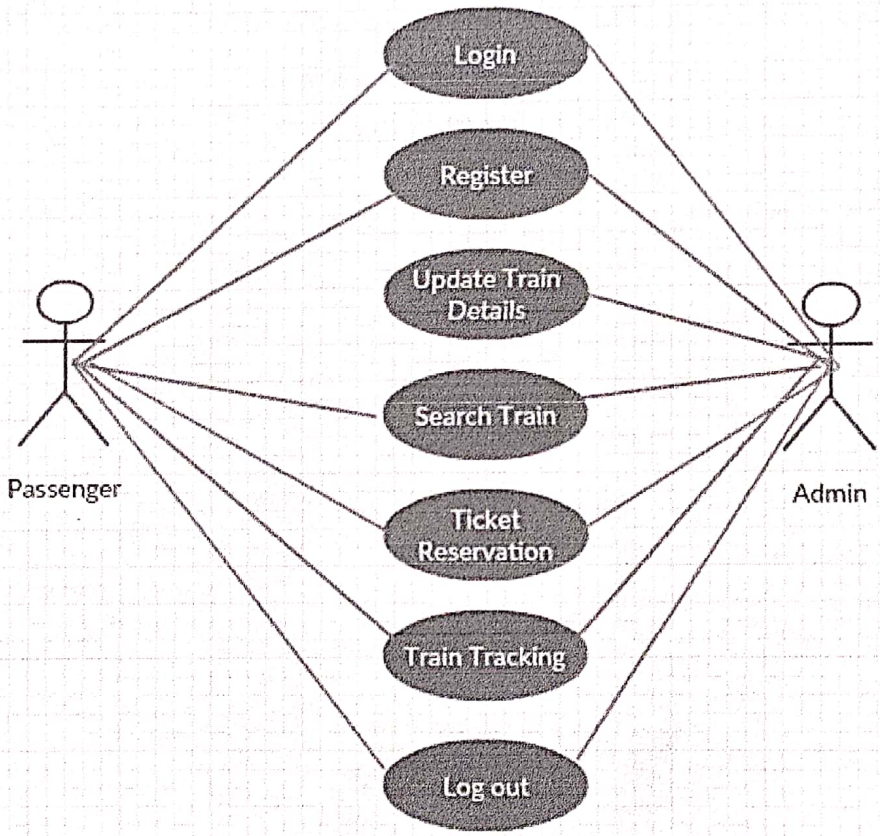


Figure 5.2: Use Case Diagram

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Sequence Diagram:

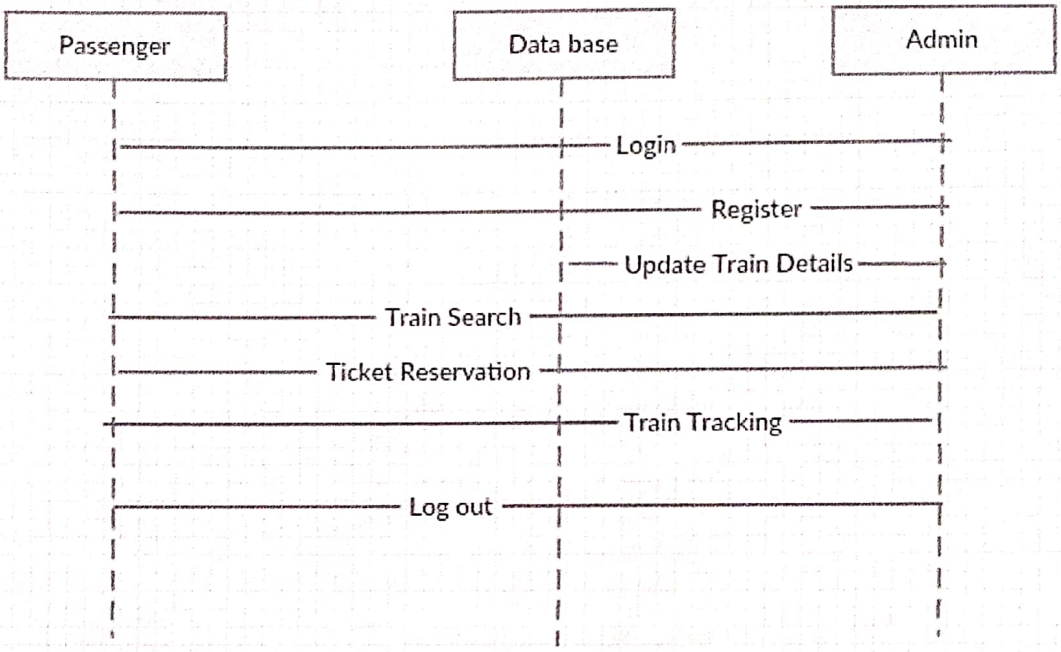


Figure 5.3: Sequence Diagram

ER Diagram:

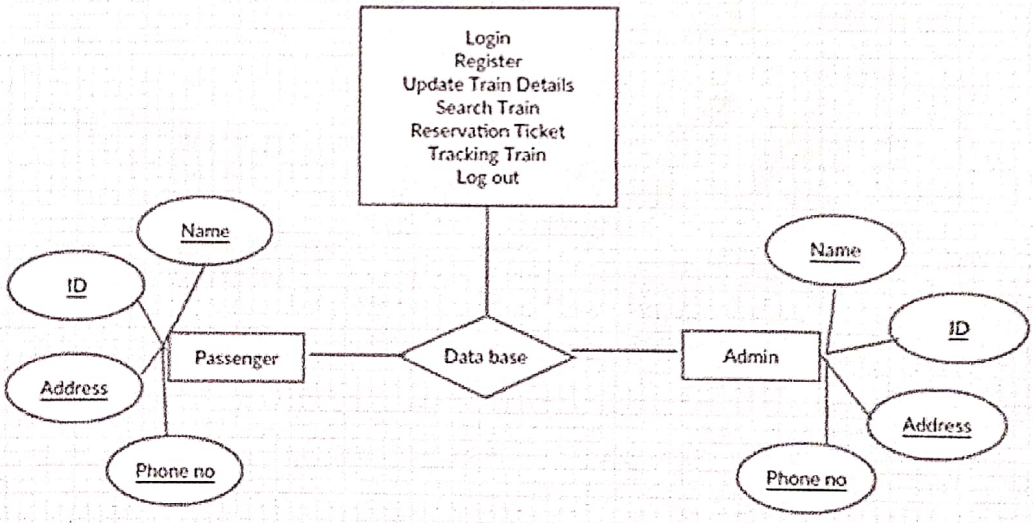


Figure 5.4: ER Diagram

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Activity Diagram:

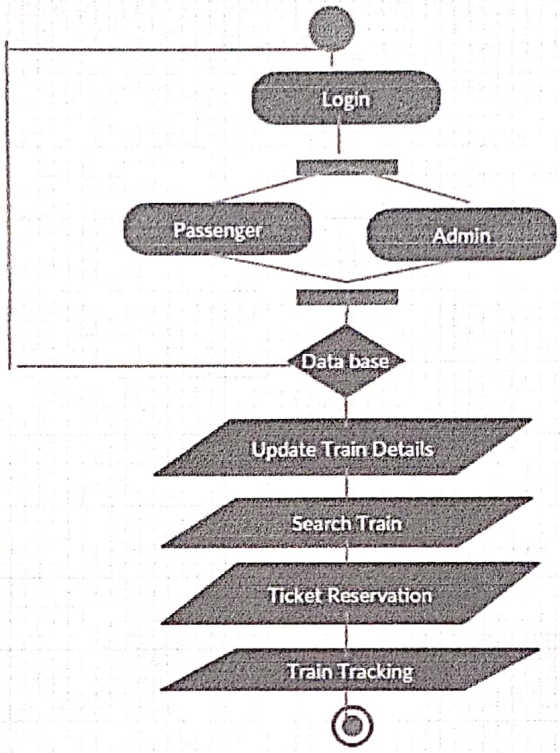


Figure 5.5: Activity Diagram

Data Flow Diagram:

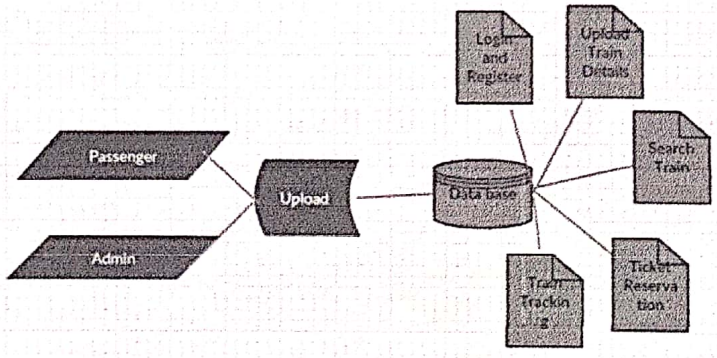


Figure 5.6: Data Flow Diagram

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Architecture

We strongly believe that the correct combination of latest information and communication technologies can provide an effective and feasible solution for the requirement of a reliable and accurate train tracking system to improve the efficiency and productivity of Bangladesh Railways. The solution we propose encompasses a powerful combination of mobile computing, global system for mobile communication (WIRELESS), Global Positioning System (GPS), Geographical Information System (GIS) technologies and software to provide an intelligent train tracking and management system to improve the existing railway transport service. All these technologies are seamlessly integrated to build a robust, scalable architecture.

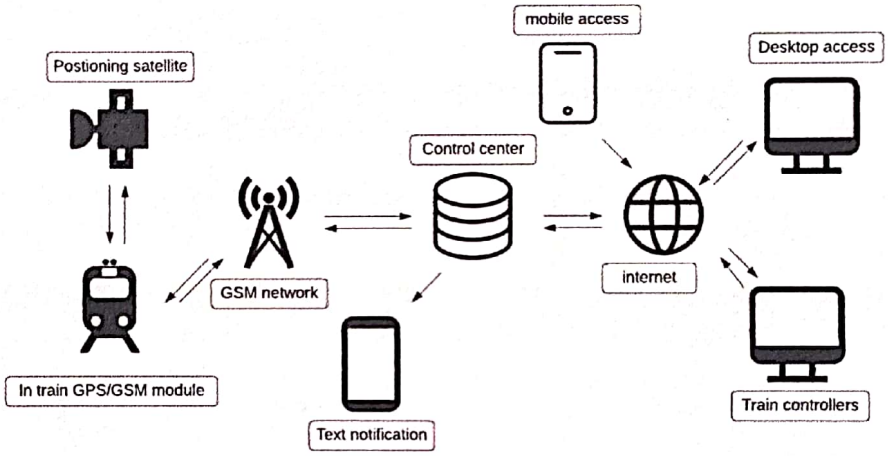


Figure 5.7: Architecture

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5.5 Implementation

Cron Jobs:[10]

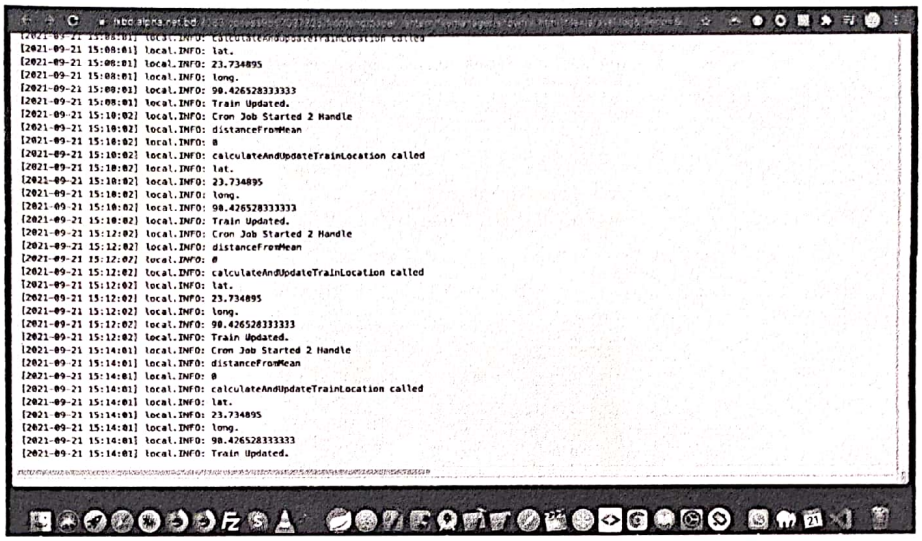


Figure 5.8: Cron Jobs (1)

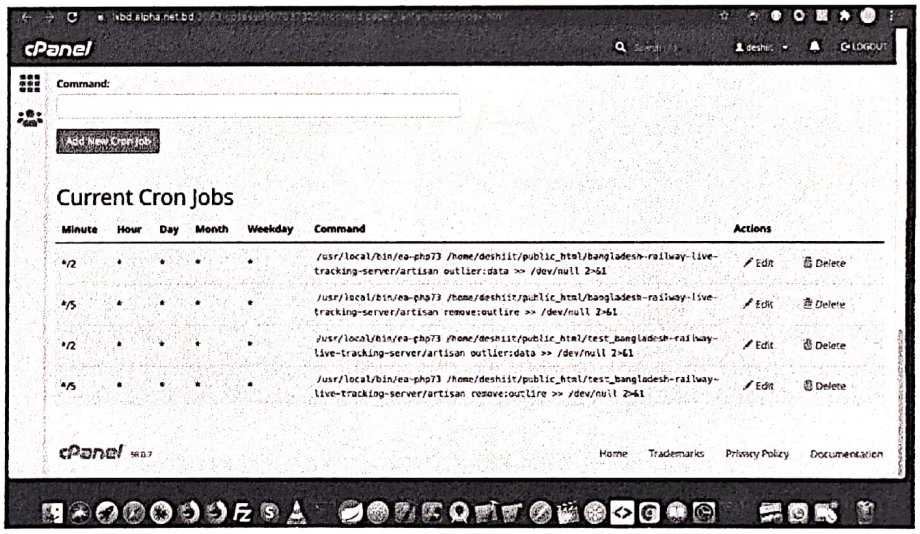


Figure 5.9: Cron Jobs (2)

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Backend Updater App:

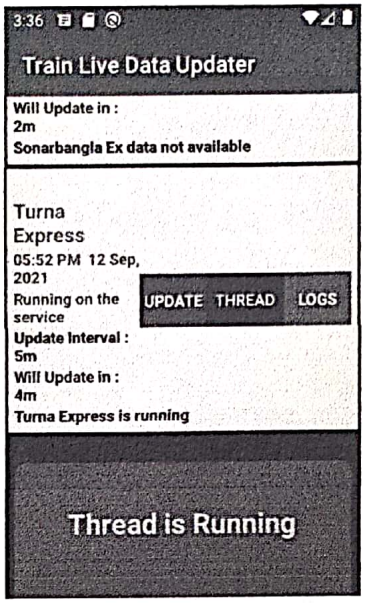


Figure 5.10: Backend Updater (1)

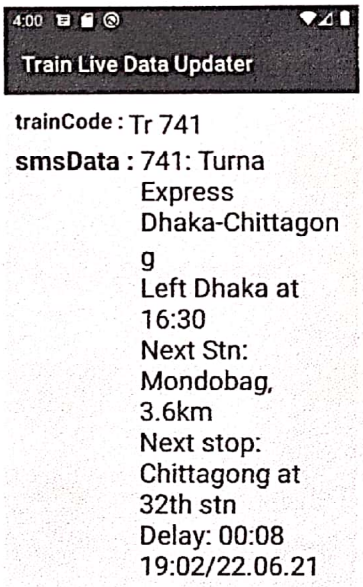


Figure 5.11: Backend Updater (2)

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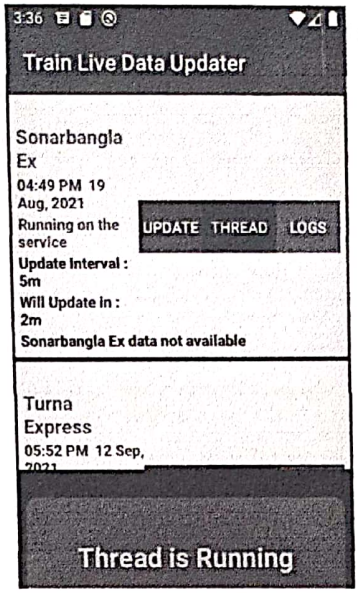


Figure 5.12: Backend Updater (3)

Frontend Updater:

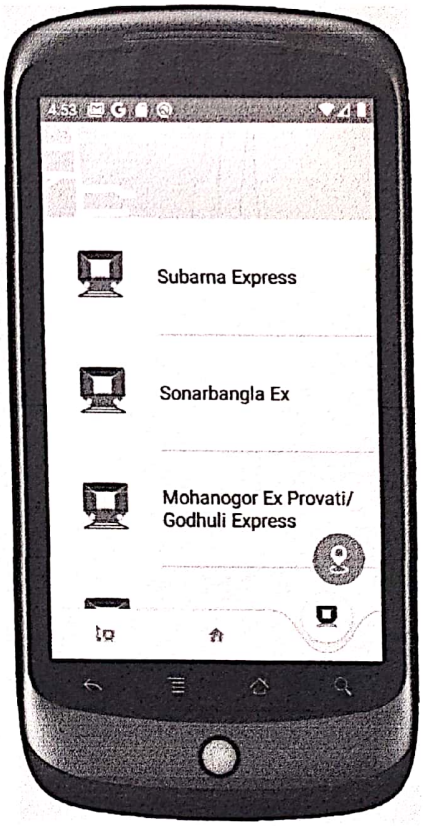


Figure 5.13: Frontend Updater (1)

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Figure 5.14: Frontend Updater (2)

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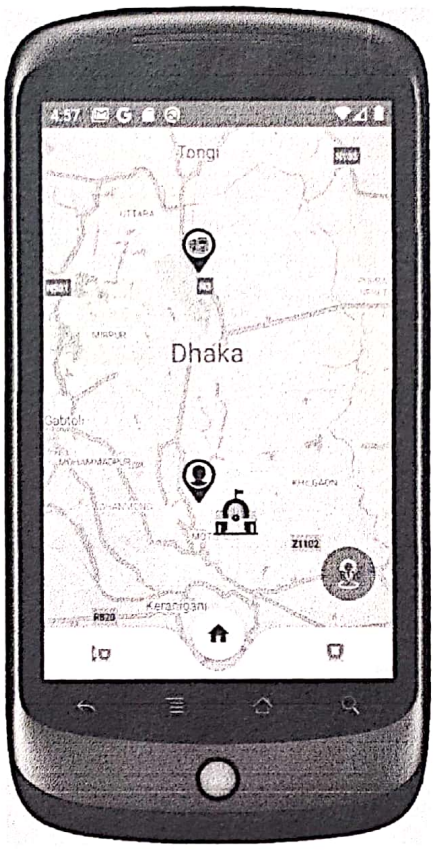


Figure 5.15: Frontend Updater (3)

5.6 Testing

Every device has a unique token number. If that is not matching or has an error in inserting in the PHP code then the system of push notification will not run. Thus resulting in error. Similarly, the cloud messages are coming via the Firebase. The Firebase created project is creating a unique server key. If that key is not properly matching or any miss typing occurs then in that case the push notification will also not occur.

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Chapter 6

Results & Analysis

Although the entire project is about tracking a train live via the smartphone, I was given the opportunity to show how the push notification will be shown in an android application. Since this is a prototype and not yet has been published out in mass audiences thus there is a lot of room for further modifications and testing before it is out in public for the real time experience. My portion will later be integrated into the actual project as per the company's statement. The push notification in an android application has been done using the android studio software, firebase console for cloud messaging and Visual Studio for PHP scripts which will be run through a server and the message in the notification will be appearing in the app via Firebase console.

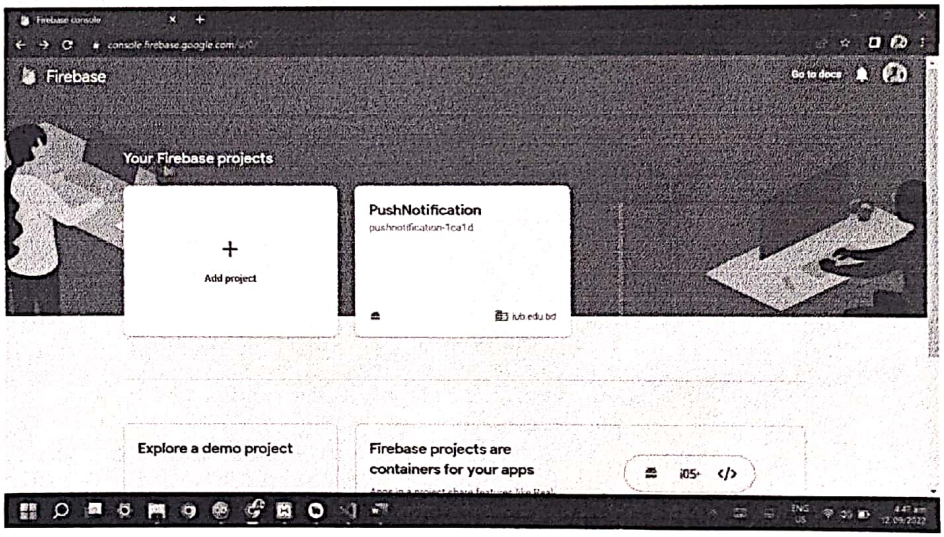


Figure 6.1: Firebase Console

The first task was to create a firebase project in the firebase console.

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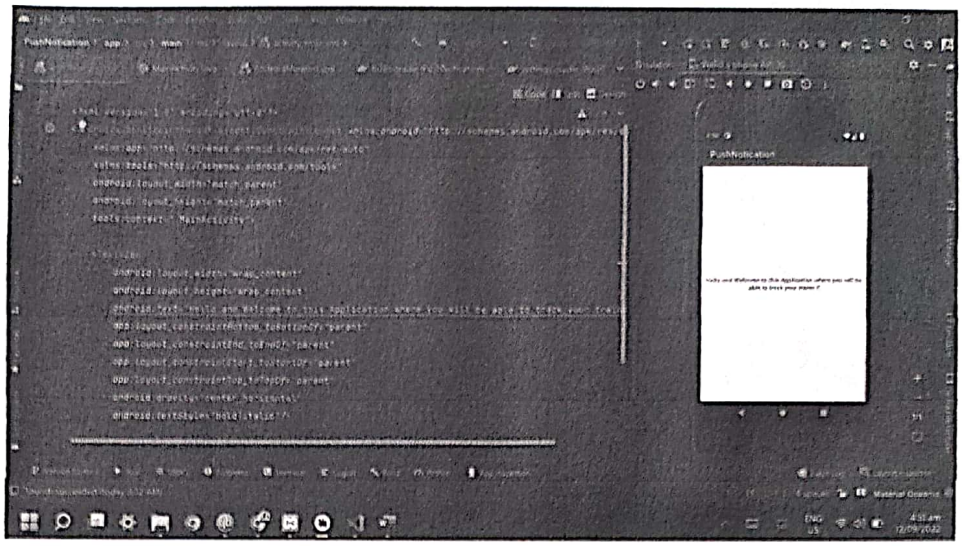


Figure 6.2: Android Studio App testing

Then the next task was to create an Android project and run the application. Connect the app to firebase and add dependencies. [11] Generate token and create firebase messaging service class and mention it to Android manifest.XML. Build notification channel and test the app. Generate PHP script and invoke the PHP script. Open the XAMPP for a local host and open the PHP script to run. Once executed the notification with a title and a message should e popping in the application in a no time.

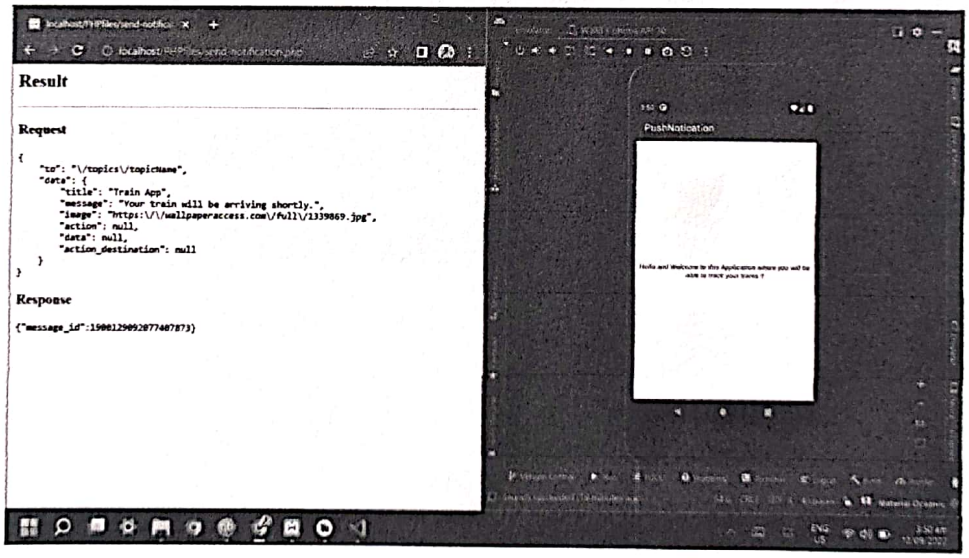


Figure 6.3: Before receiving Push notification from server

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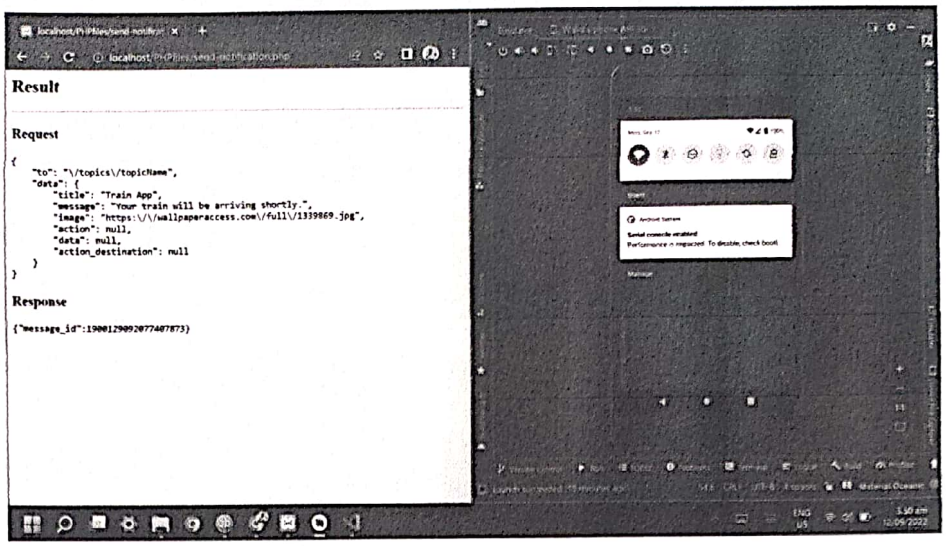


Figure 6.4: Before receiving Push notification from server

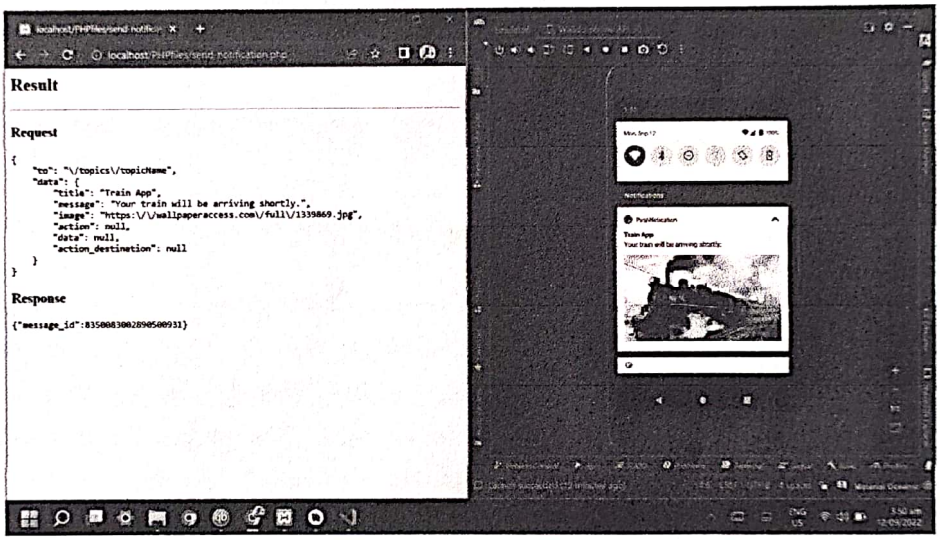


Figure 6.5: After receiving notification

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Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

In the project profession, sustainability is a business approach that balances the environmental, social, and economic components of project-based work to meet present stakeholder needs without compromising or overburdening future generations.

7.2 Social and Environmental Effects and Analysis

Making sure that people use this application can be challenging. Most of the people are insecure about their privacy, concerned that their privacy might be breached. So to ensure people trust the application will bring a huge challenge. Waiting hours after hours on the train station platform is a huge hassle and tiring. Asking the station master about the arrival time can not always go easy. They cannot be found and usually not in their best behavior. Social interaction can be difficult at times thus using this application to keep themselves updated. When it comes to environmental effects, waiting for a longer time and being not notified or not having any possible way to let the passengers know about the delay or cancellation of the journey causes fuss around the counters and leads towards much chaos.

7.3 Addressing Ethics and Ethical Issues

Customers are so reliant on their computers and mobile phones these days that an application can acquire a massive amount of internal and external data about them. While developing and launching an application, there are certain laws and ethics that must be followed. Some of them are as follows:

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Collecting only relevant user data: Only the most pertinent user data is collected for the purposes of company security and report generation. The information would be retained and preserved solely in databases, ensuring that it would not fall into the wrong hands.

Managing database security: The database and back-end server are both highly secure. The server's primary cPanel allows someone up to three attempts to log in; if they do not log in during those three attempts, their IP address will be permanently blocked. The database's credentials are managed by the firm itself.

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Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

Through my process of making this application I faced a lot of problems.

Understanding the Project Requirement and Office Environment: Understanding the initial requirement was difficult for me because, as a new member of the team, I needed to first learn how and what they were working on. The folder structure they used and how they wrote their code.

Adapting to New Technologies: They had preferred frameworks, so I had to study some of them before I could start working.

Keeping up to Speed: As it was my first time, learning new technologies and putting them to use was a slow process for me initially.

Identifying and Fixing Bugs: It was difficult to identify a bug at first because the frameworks were unfamiliar to me. However, some bugs take a long time to identify and fix.

8.2 Solution of those Problems

Understanding the Project Requirement and Office Environment: I learnt how to properly structure code, write the model, view, and controllers, which coding pattern to use, and how to write less code to accomplish the same amount of work.

Adapting to New Technologies: After my office hours were over, I went home every day and learned Laravel technology, Android studio and its functionality at night in

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order to keep up with my internship work. This project would not have been completed if I hadn't put in those extra hours.

Keeping up to Speed: My work speed was slow because I was learning new technologies and applying them to a real world project. I was able to enhance my speed with regular effort.

Identifying and Fixing Bugs: I learnt how to properly debug as well as some quick and easy debugging techniques from the senior developers.

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Chapter 9

Future Work & Conclusion

9.1 Future Works

As this project is still ongoing, we are planning to add more features to it for making it more user friendly as well as beneficial to the company. The company will focus more on authentic data and making it simple for regular usage. keeping the privacy confidential. There are more plans on making the application smaller in size in terms of storage so that anyone who doesn't own a flagship device can easily access the application through their devices.

9.2 Conclusion

After seeing many advancements and changes in the location tracking technology, Bangladesh Railways now have the ability to pinpoint the location and other attributes of an operational train in an economically accurate manner. Thus it is visible that to keep up with the today's demand for information and to comply with the citizen centric governance, technological advancements is essential for a 3rd world country.

I could never have imagined working as a full-time App developer before my undergraduate studies. I continued to learn new things from each of my respected faculty members, which is why I am here now. I would not be in the position I am in now if it weren't for them. I truly appreciate all of the faculty's efforts, as they attended classes early in the morning, late in the evening, and even ate lunch late to attend our classes. Our teachers, who had led us here, are the actual heroes. Thank you to all of my professors; being a software engineer would be a dream without them.

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An Undergraduate Internship/Project on yourTopic

By

Your Name : Walid Ibne Khaled

Student ID: **yourID** 1730475.

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.

Mohammad Motiur Rahman. (19/09/22)

(Signature of the Supervisor)

Mohammad Motiur Rahman

Name of the Supervisor

Department of Computer Science & Engineering

Independent University, Bangladesh

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