

METRO RAIL MANAGEMENT SYSTEM

BY

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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DAFFODIL INTERNATIONAL UNIVERSITY

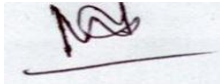
DHAKA, BANGLADESH

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APPROVAL

This Project titled “**METRO RAIL MANAGEMENT SYSTEM**” submitted by Soaib Mashrafi, ID No: 152-15-5594 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 02-01-2022.

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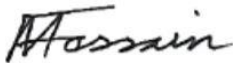


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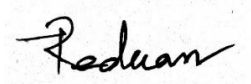


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DECLARATION

We hereby declare that this project has been done by us under the supervision of **Mr. Raja Tariqul Hasan Tushar, Senior Lecturer, and Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

The functional and implementation process of Metro Rail, a proposed software solution, is described in this study. Our software's major purpose is to keep the classic metro train system running while including a very dynamic online procedure. This software is available to those who are eligible for metro rail services. Initially, only residents of Dhaka will be able to utilize the software. People require a digitalization system since they are accustomed to using it in all aspects of their daily lives. As a result, customers require an electronic ticketing system that includes a digital payment channel. Modern technology necessitates contemporary solutions. Because metro rail is a relatively new system in Bangladesh, a large number of individuals may be unfamiliar with it. This online application provides them with a comprehensive solution for correctly using the system. To purchase a metro rail ticket, customers do not need to wait in a long line. They may examine the available seats, as well as the seats that are already occupied, and then quickly purchase their ticket by selecting the appropriate class. People can cancel their tickets and receive a refund if they do so before the scheduled departure time. As a result, saving customers money, time, and sweat is a huge benefit. This page gives a concise explanation of all of the software's terminologies.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In the traditional metro rail system, we will come across many problems such as follows. First, we can buy ticket only when ticket counter is open. Many people gather in front of the counter and the place become crowded due to maintaining the large number of lines. Second, people need to pay their ticket price traditionally. Maximum times it can be cash amount. So, there are many chance to steal the cash by the assigned person in the counter. Moreover, it is very tough to maintain the whole process like manage the payment system, ticket system, schedule system etc. If we consider all of the systems in a single platform with an online activity, then the maximum problems are gone away. The emerging technology has become the best solution to solve the time difference problem of e-ticketing system. Based on the architecture and anonymity of the technology, customers do not need to go to the counter or station. We make a web application software using the concept of metro rail management system. Here people can truly manage the whole process of metro rail with some extra facilities which are not provided if they get tickets from traditional way.

1.2 Motivation

Metro Rail is an online platform to get the original service of Dhaka Metro Rail. This online platform gives different services. Among them e-ticket and digital payment are extremely essential. User can pick a journey date with particular shift. After selecting date and time user need to provide some information like their name, email, phone number, from where they want to go, exact destination, class and they can pick available seats. After finishing the information stage, user now pay their amount digitally. Afterwards they can print their ticket at any time. This ticket need to show the metro rail ticket manager. So that, he never charges you for your journey anymore. This is how people can complete their journey through this web application.

Moreover, users can see only their information in dashboard. But, admin can see everyone's information in dashboard for particular date wise. Admin can add another admin in the system.

1.3 Objectives

- To maintain and manage the Metro Rail information easily.
- Provide data access through the normal users and admins according to their roles and levels.
- Avoid complexity.
- Reduce time for data processing.
- Indicate the date, shift, and time and seats availability.
- Transparent and secure payment system.
- Data shown according the API we provided.
- Secure and error free.
- Smooth running program.
- Have station information to manage the system.
- Tour guide information.
- You can add a post if you found any lost items.
- User found the lost items easily.

1.4 Expected Outcomes

- Keeps all the records of the user registration.
- Keeps all the records of user's journey information.
- Shows all the information of the available seats per time.
- Track the journey information to payment process.

- CRUD operation maintained through the database.
- RFID payment system if the user does not pay the total price.
- Lost and found management system.

1.5 Report Layout

The current chapter provide introductory information regarding the project. We discussed about the project motivation, its objectives and expected outcomes. In the next chapter, we will try to discuss about the background. Preliminaries or terminologies, existing projects and challenges are briefly discussed in chapter 2. Requirement specification like business process modeling, requirement collection and analysis, use case modeling and description, logical data model and design requirements will describe in chapter 3. In chapter 04, we will talk about out implementation processes like, frontend, backend design with interaction design and UX. In the next chapter which is chapter 05, in this chapter we will also talk about the implementation as well as the testing information. Such as implementation of database, testing implementation will describe on that chapter. Impact on society, environment, and sustainability with ethical aspects will discuss in chapter

06. Finally, in chapter 07, we briefly describe about our future scope with conclusion.

CHAPTER 02

BACKGROUND

2.1 Preliminaries / Terminologies

The main target of our Metro Rail project is to provide the privilege to buy metro rail ticket from online platform. There is no need to go outside before the journey time for metro rail purposes. Recently, it has become a popular trend for an increasing amount of people to find ticket online. Our web application is designed and developed by JavaScript. React functional component library is used for client side materials. Bootstrap is only for design purpose. This is a project with the objective to develop a basic react web application where a consumer can buy tickets for particular time and date in the application to know about the technologies used to develop such web application.

2.2 Related Works

This project is only for Bangladeshi people. Not only for all Bangladeshis but also whom are live in Dhaka city. We have intension to do something for our Dhaka people who suffer big issues while travelling in the city. Metro rail reduces the traffic jam. People don't have any tension to go somewhere on time. Cochin University of Science & Technology students made a mini project based on metro rail management online, they noted – their project integrated service which provide all information about the metro rail and its routes for public [1]. On the other hand, the existing system cannot be collected or processed the information regarding metro rail. Communication process not so quickly and efficiently. Another thing is, the current working framework doesn't ensure that the right data reaches the exact person at the real time.

2.3 Comparative Analysis

Dhaka city is capital of Bangladesh. More than 21741000 people lives in metro and 8906039 people live in urban area. The density is 29105 per kilometer square [2]. Many people from another district go Dhaka city for their sustentation. So the public transportation system become very low day by day. People suffers worst traffic

congestion which is exceptional in the world. To overcome from this unwanted situation, government try to make a large project for transportation which is known as Dhaka Metro Rail. The Dhaka Metro Rail known as Dhaka Metro which is approved by mass rapid transit system [3]. In this system people need to buy a ticket from the station and sometimes it very hard to get a ticket in the extreme shift. Extreme shift means office time, school time etc. In this time the pressure become high due to more people. So, it is hard to get a ticket for school boy or girls. Sometimes it is also hard to buy ticket for a woman. So, I decided to make a system where everyone can see the ticket status, train time and date, available seats and they can buy ticket from their home. They can pay their price from home as well. I think, this system makes people's life easier.

2.4 Scope of the Problem

For developing a good project, I followed software development process. In my case, I use Trello. Trello is an open source platform where people can assign their task with reminder and description. They also can add label for their task which contains the value or necessity of the task. Every part of this project is connected with another part. So, if I stacked in a particular part, I cannot go to the next one until I solve the present one. It takes more than one week to collect requirements and gather information extensively. For design, implementation and testing it takes more than four weeks.

2.5 Challenges

The biggest challenge for this project was to know its absolute requirements for public. I have to collect the admin panel information also. Actually, the project architecture was very toughest part I faced in the implementation period.

On the other hand, which seats are selected by users and find the selected seats data was very challenging for me. So after that, I use vanilla JavaScript algorithm to find the selected seats. Another one is payment gateway. In Bangladesh, bkaash, nagad is available for everyone. But stripe is not available in Bangladesh. Even so I implement the stripe payment gateway to take my project to the next level. But it was difficult for me to add a bkaash API as a payment gateway.

CHAPTER 03

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

There are many processes to develop a software. A developer or a project manager first map the project criteria in a different part. Then they start processing to develop the application. In my case, I had to first design the process in which I should go through. For this, before implementing I start focusing on project architecture. For creating the architecture, I had needed to create a flowchart, flow diagram, use case model, gantt chart and many other things. These things help me to execute the software step by step without any errors.

3.2 Requirement Collection and Analysis

For developing this project, I have used following requirements which are defined in table. But these requirements could be changed for another developer.

Requirements	Tools
Operating System	Windows, IOS, Android
System Design	Figma
Language	JavaScript
Frontend	React.js, CSS
Backend	Node.js, Express.js
Database	MongoDB
Coding Tools	Visual Studio Code
Browser	Google Chrome

Table 3.1: Software Requirements List

3.3 Use Case Modeling and Description

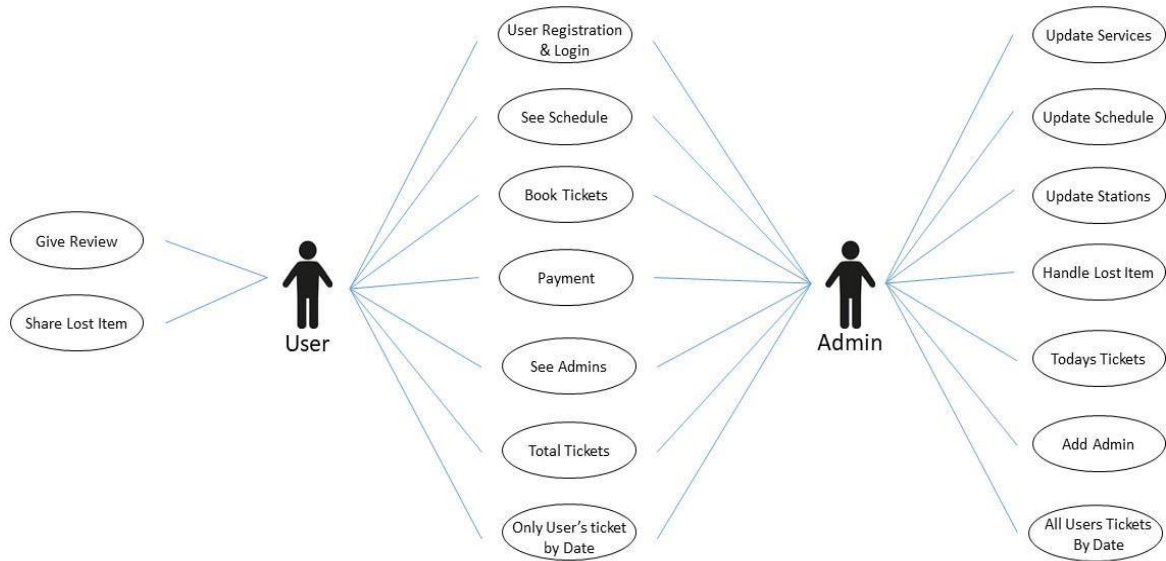


Figure 3.1: Use Case Diagram

3.4 Logical Data Model

Actor Perspective Use Case for all users including admins.

(a) User Registration and Login:

Use Case Name:	Registration and login
Scenario:	Registration system for every users including admin.
Description:	For using the system, every user need to sign up with email and password. Without registering no user cannot be able to use the system.
Actor:	Normal user and admin.
Precondition:	Every user need to register before using the system.
Post Condition:	Every user need to login before using the system.

Exceptional Condition:	Need to use valid email id.
------------------------	-----------------------------

Table 3.2: Use Case for Registration & Login

User can be a normal user or can be an admin. Everyone needs to register first. Otherwise they cannot use the core components of the system. May be they can see the home page, review section, service section, stations, tour guide section. Rest of the components are secured. User cannot register with invalid email account. Password must contain uppercase, lowercase, number and special characters. After completing the registration user need to login to use the system.

(b) Select Schedule:

Use Case Name:	Select Schedule
Scenario:	User can select available shifts with time and date.
Description:	User or admin can select journey date. Then they can see the available shifts with available seat number. They can choose any schedule for booking a ticket.
Actor:	Normal user and admin.
Precondition:	Every user need to register and login before using the system.
Post Condition:	Every user need to give proper information for booking tickets.
Exceptional Condition:	Need to select a journey date.

Table 3.3: Use Case for Select Schedule

In the select schedule use case, user can be a normal user or can be an admin. After login successfully, they can able to go to the book ticket section. Then they have to select a

journey date first. After that they are able to see some shifts for this date. Each shift contains different timestamp. They choose any one of them and complete the booking system by providing some important data.

(c) Book Tickets

Use Case Name:	Booking Tickets
Scenario:	User can select particular seat with boarding point and destination.
Description:	User or admin can select particular seats. They have to provide the boarding point, destination, which class they want to use, name, phone and email.
Actor:	Normal user and admin.
Precondition:	Need to select journey date and shift.
Post Condition:	Need to pay total price.
Exceptional Condition:	Must select a class and select at least one seat. Boarding point and destination must be different.

Table 3.4: Use Case for Booking Tickets

(d) Payment

Use Case Name:	Payment
Scenario:	Payment for buy the booking ticket.
Description:	User or admin need to pay total price. The total price will find after booking the ticket.
Actor:	Normal user and admin.
Precondition:	Need to select payment method that you want to use among bkash and stripe.

Post Condition:	Need to submit the Pay button to send the payment data to the server.
Exceptional Condition:	In stripe, user need to provide valid card number, expiration date and CVC.

Table 3.5: Use Case for Payment

(e) Total Tickets

Use Case Name:	Total Tickets
Scenario:	User can see how many people book tickets in metro rail.
Description:	User or admin can see total number of tickets booked by user. This is a marketing strategy to show people how famous the metro rail is.
Actor:	Normal user and admin.
Precondition:	Need to book ticket by user.
Post Condition:	Need to go to the dashboard.
Exceptional Condition:	Must book a ticket. Otherwise no data will show in the dashboard.

Table 3.6: Use Case for Total Tickets

(f) Only User's Tickets by Date

Use Case Name:	User's Ticket by Date
Scenario:	User can see their booking information for particular date. But admin can see all user's booking information for particular date.

Description:	User or admin have to select a particular date. Then if the user is an admin, he will see the all user's information for this particular date. If the user is normal user, then he will see only his booking information.
Actor:	Normal user and admin.
Precondition:	Need to select journey date.
Post Condition:	Have a look on the right side of the page.
Exceptional Condition:	Someone need to buy a ticket for this day, otherwise it will show "No Appointments for this Date".

Table 3.7: Use Case for User's Ticket by Date

User's tickets by date use case is a very exceptional use case for this system. Why it is exceptional for me? Because, it has some techniques to understand. This use case for admins or sometimes for normal users. Normal user found another data but an admin can find another data for this system.

If we considered from normal user's perspective, then a normal user first login successfully and go the dashboard and click on the tickets. Then they see a calendar.

After clicking on some dates, they will not found any data because user doesn't have any booking information for the particular dates. If they book a ticket for a particular date and click on the particular date then user can found some data in a table format which contains name, phone number, class and price. For example, user booked a ticket for 19th October and he click on the 19th October in the calendar. Then he found only his information. He cannot able to see others information in this section.

On the other hand, if we see from admin's perspective, it will show all users data for a particular date. For example, if some users like, user A, user B and user C book tickets for 19th October. If admin click on the 19th October, then admin can see all user's (user A, user B and user C) data on the table.

I implemented this system with node.js. In the backend, server just checkout or filter the logged in email. If the email is a normal user, then it will perform as a normal user and show only normal user data. Similarly, if the email is found on admin database, then it will perform as a admin and show all user's data in the dashboard. This is how the system works.

Actor Perspective Use Case for all normal users.

(a) Give Review:

Use Case Name:	Review
Scenario:	User can provide their review for metro rail service.
Description:	Only user can share their experience for this system. These reviews are shown in the homepage.
Actor:	Normal user only.
Precondition:	Need to be a registered user.
Post Condition:	Go to homepage for testimonial.
Exceptional Condition:	Only three reviews will show in the testimonial section.

Table 3.8: Use Case for Review

(b) Share Lost Item:

Use Case Name:	Share Lost Item
Scenario:	User can share if they found any lost items in metro rail.
Description:	If user found any lost items, then they can able to share it to the system. Then everyone

	can see the data.
Actor:	Normal user.
Precondition:	Need to share at least one lost item.
Post Condition:	Go to 'Find your lost items' section to find your items.
Exceptional Condition:	All data displayed. There are no CRUD operation for lost items.

Table 3.9: Use Case for Lost Items

Actor Perspective Use Case for admins.

(a) Update Services, Update Schedule, Update Stations, Handle Lost Item, and Today's Tickets, Add Admin

Use Case Name:	Update Services, Update Schedule, Update Stations, Handle Lost Item, Today's Tickets and Add Admin
Scenario:	Admin can update service section, update the schedule date, time and shift, update stations, delete lost item post, can see only today's tickets and able to add another admin.
Description:	Admin update their services at any time, they can change their shift time, and they can add more stations or may be reduce it. If any user post about a lost item and admin found some inappropriate things on that, then admin can delete the post from the lost item section. Admin can able to add another user as admin.
Actor:	Admin only.

Precondition:	Need to be an admin. Admin can add another admin and the upcoming admin must be a user first.
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Table 3.10: Use Case for all admin perspective

3.5 Entity Relationship Diagram

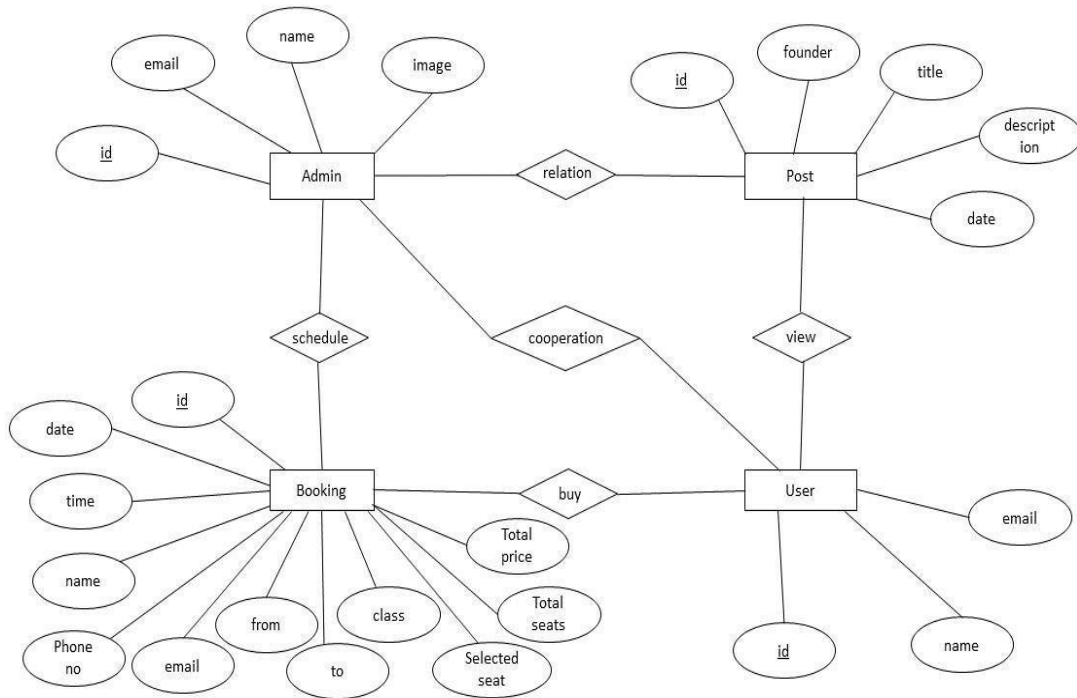


Figure 3.2: ER Diagram

3.6 Overview of Website:

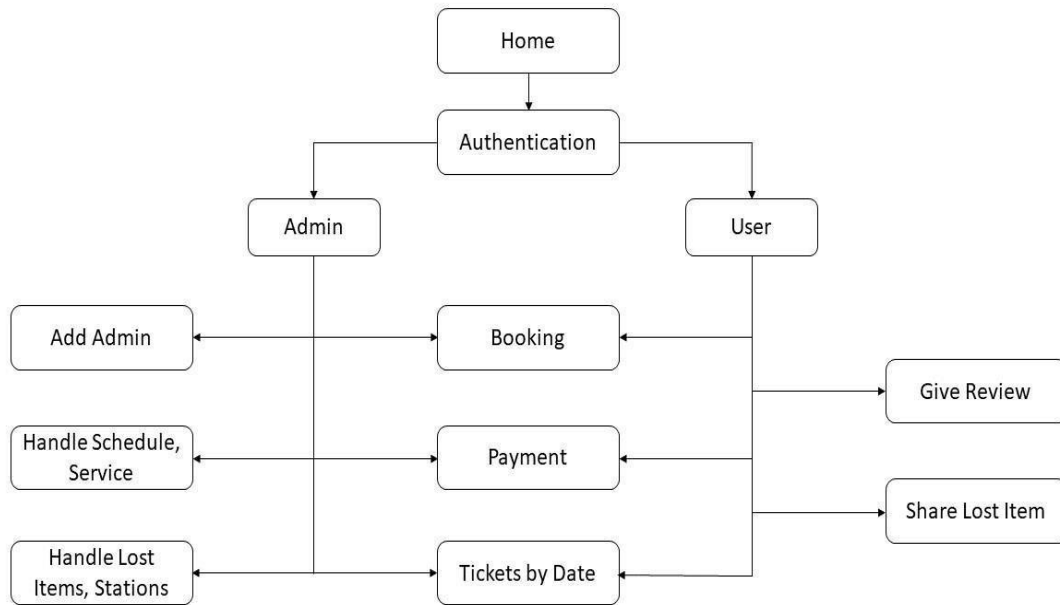


Figure 3.3: Overview of Website

3.7 Design Requirements

When a software developer works on a project, his primary goal is to achieve the overall design that the system requires. It means that when a person utilizes the system, it will be more adaptable to their needs. In every way, keep the system basic. It must be simple to use. The software merely provides each user with their stated goal. The user can then continue to use the system in order to improve their experience. However, in other circumstances, developers must keep in mind certain considerations, such as reducing errors and eliminating the need for future maintenance and enhancement.

CHAPTER 04

DESIGN SPECIFICATION

4.1 Front-end Design

Frontend design is essential for every software. Many things are dependable in frontend design. System is user friendly or not, it will depend on frontend design. Attractive design attract people and people always use to that software. For this project, we tried to build an attractive software which is very eye-catching and easy to use for admins and users. In frontend design, this application contains some screens which shows in below:-

- Home page
- Time Travel
- Login page
- Registration page
- Station page
- Tour guide page
- Lost and found page
- Found your lost items page
- Dashboard
- Tickets by date page
- Today's ticket page
- Add Admin page
- Settings / Our admin page

4.2 Back-end Design

Backend is very important part for my project. Only frontend cannot handle all things of our system. Main things are maintained from the backend server. We use MongoDB as database and use express.js and node.js as backend. Every data is stored in the database. MongoDB store the data with a good sequential manner. Database has some different collection like admin collection, getTickets collection, lostAndFound collection, stripe collection etc. Data stored for a particular collection. For example, if any user post about lost items, then it will store in lostAndFound collection. If any admin assigns a user as admin then it will store in admin collection, if anyone paid amount then it will store at stripe collection. We just made an API to perform some asynchronous request. GET, POST, PUT, DELETE are some http request this is how we get data from database and post data on database. This is how our system is running.

4.3 Interaction Design and User Experience (UX)

Interaction Design is most important part of user Experience design. An application fruition depends on User satisfaction. How an application is more attractive to the user mostly depends on interaction and Design part. In my application, we used the useful model of interactive design.

4.4 Implementation Requirements

Implementation requirement is given below:

- (a) Visual Studio Code
- (b) Google Chrome Dev Tools like console, elements, application, network etc.
- (c) Good JavaScript knowledge.
- (d) Good knowledge in Node.js, Express.js, npm, nodemon, dotenv etc.
- (e) Proficiency in file upload system through express.js file upload system.
- (f) Understanding in firebase.
- (g) Very good proficiency in react.js.

(h) Context API, state management, react hooks, react-hook-form.

(i) HTTP request handling and many other implementation requirements needed.

CHAPTER 05

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

A sustainable Database Management System (DBMS) is required for our system. Every data of our system is stored in the DBMS. When someone login or register in our system, these authentication data send to the firebase. But, when any user books a ticket, pay for it and several booking information like, seat number, class, phone, email, name etc. has been stored in an optimized way in the database. Generally, these data stored through a POST http method. Moreover, developer use the data to maintain further development. Which customer buy which ticket is get from the database.

So, we understand that the database is very essential part for our project. Developer need to give it a higher security. Otherwise hacker may steal all the information of our system. For this, developer give access to authorized user who can able to perform according their roles. Developer may set them as a moderator, who can able to see the data only. Or developer may set them as an admin, so that, they can able to see, modify or delete the data from the database. This system is provided by MongoDB. Because, in our system, we use MongoDB as database.

5.2 Implementation of Front-end Design (a) Login

/ Registration Page:

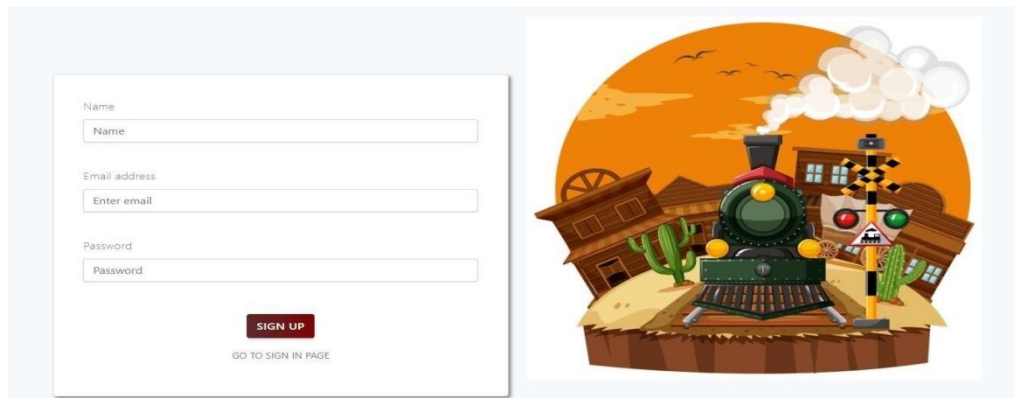


Figure 5.1: Registration Page

(b) Home Page:

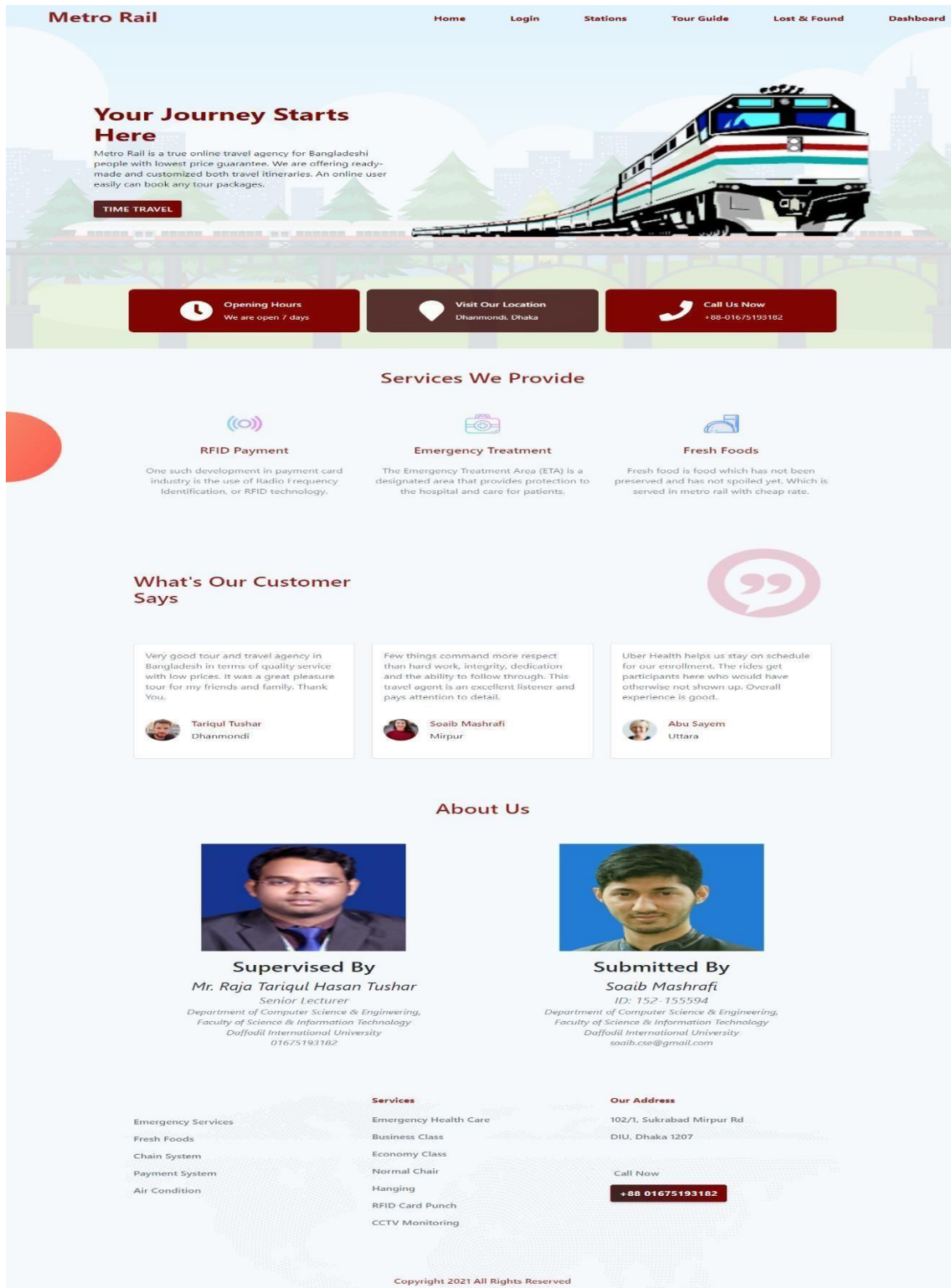


Figure 5.2: Home Page

(c) Lost and found page:

Metro Rail Home Login Stations Tour Guide Lost & Found Dashboard

Please Share, What You Found !

FIND YOUR LOST ITEMS

Your Email

What you found ?

Please... give brief description

SEND

Figure 5.3: Lost and Found Page

(d) Lost Items:

Metro Rail Home Login Stations Tour Guide Lost & Found Dashboard

<p>FOUNDER: ROHIT@GMAIL.COM</p> <p>LAPTOP WITH HEADPHONE</p> <p>I GOT A LAPTOP AND A HEADPHONE FROM THE METRO RAIL. PLEASE, GIVE ME PROPER INFORMATION REGARDING THE ITEMS YOU LOST AND RETURN IT FROM ME.</p> <p>FOUND DATE: THU SEP 30 2021</p>	<p>FOUNDER: OAHIDZIHAD1@GMAIL.COM</p> <p>WALLET</p> <p>WALLET WITH SOME MONEY</p> <p>FOUND DATE: THU SEP 30 2021</p>	<p>FOUNDER: AYATUNNABI@GMAIL.COM</p> <p>MOBILE</p> <p>GALAXY S5</p> <p>FOUND DATE: SAT OCT 02 2021</p>	<p>FOUNDER: MAHMUD@GMAIL.COM</p> <p>IPAD</p> <p>IPAD 8TH GENERATION. WHITE COLOR. WITH WHITE PENCIL.... VERY EXPENSIVE</p> <p>FOUND DATE: SAT OCT 02 2021</p>
<p>FOUNDER: METRO@GMAIL.COM</p> <p>CHIRUNI</p> <p>CHIRUNI IS LOST BECAUSE OF MY WIFE. HOW CAN I MANAGE A GOOD WIFE INSTEAD OF A CHIRUNI?</p> <p>FOUND DATE: SAT OCT 02 2021</p>	<p>FOUNDER: RUBINA@GMAIL.COM</p> <p>SUN GLASS</p> <p>A BLACK WOMAN SUN GLASS FOUND IN THE PURBACHAL STATION.</p> <p>FOUND DATE: SAT OCT 02 2021</p>	<p>FOUNDER: MUNNA@GMAIL.COM</p> <p>BODY SPRAY</p> <p>INTAKE BODY SPRAY BAG... SEEMS VERY EXPENSIVE. COLLECT IT FROM ME ASAP.</p> <p>FOUND DATE: SAT OCT 02 2021</p>	<p>FOUNDER: OAHIDZIHAD1@GMAIL.COM</p> <p>WALLET</p> <p>WALLET NWALLETWALLETWALLET WALLET WALLET WALLET WALLET WALLET</p> <p>FOUND DATE: MON OCT 04 2021</p>
<p>FOUNDER: ABUSAYEM609@GMAIL.COM</p> <p>MOBILE</p> <p>MOBLIE PHONE</p> <p>FOUND DATE: MON OCT 04 2021</p>	<p>FOUNDER: 01777247399</p> <p>TAKA</p> <p>JHOPIPU OOIU PUOPIPIPO O IOIPOIP</p> <p>FOUND DATE: TUE OCT 05 2021</p>	<p>FOUNDER: SOAIB1@GMAIL.COM</p> <p>A BRACELET</p> <p>A GOLDEN COLOR BRACELET WHICH SEEMS VERY EXPENSIVE.</p> <p>FOUND DATE: THU OCT 07 2021</p>	

Figure 5.4: All Lost Items Page

(e) Dashboard:



Figure 5.5: Dashboard Page

(f) Tickets by date:

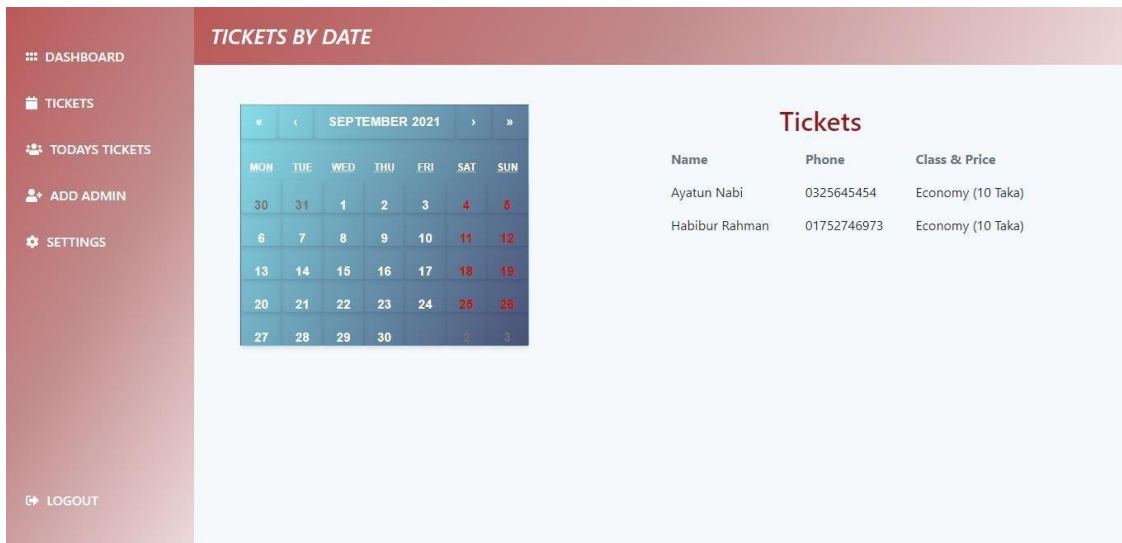


Figure 5.6: Tickets by Date Page

(g) Add Admin Page:

ADD AN ADMIN

Email address
Enter email

Name
Name

Upload Image
Choose File No file chosen

SUBMIT

Figure 5.7: Add Admin Page

(h) All Admins:

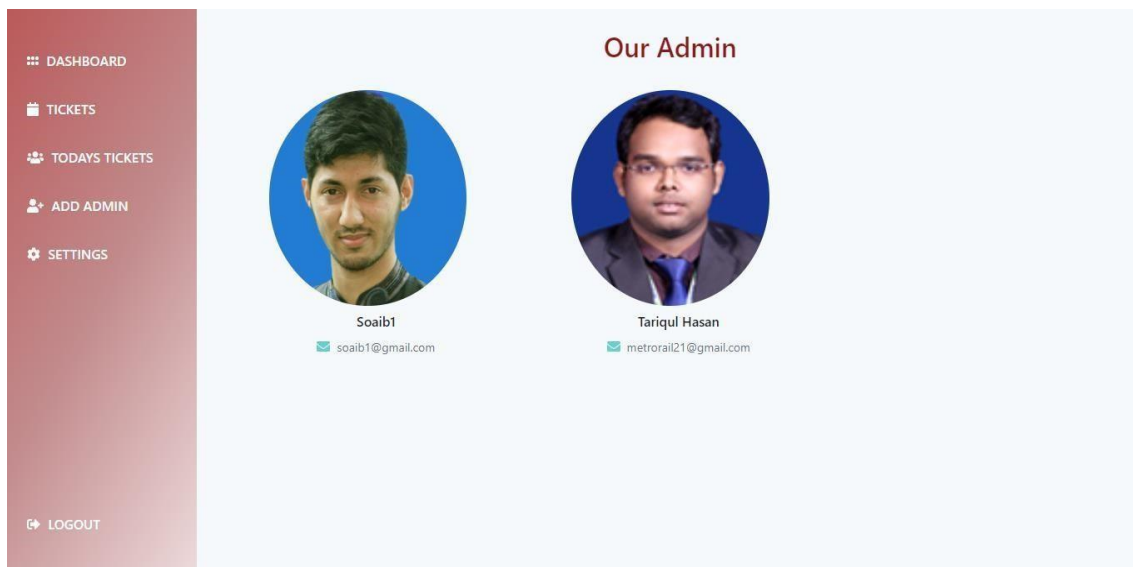


Figure 5.8: All Admins Page

5.3 Testing Implementation

Test implementation is essential for every software related projects. Because, after completion of any project, a tester can found some bugs or errors from the project through software quality assurance method. In this system, I check some methods several times like, login, register, lost and found, calendar dates, shift, seat number, class etc. In the initial period, I found some bugs. After that, I solve all the bugs and finally this is a great project now. I tested following factors which are given below:

- Login System
- Registration System
- Booking Tickets
- Check Tickets by Date
- Available Seats
- Set Seat Class Properly
- Add Admin
- Logout Method
- Today's Booked Tickets
- Normal User and Admin user differentiation
- Lost and found system
- Scrolling and smoothness etc.

5.4 Test Results and Reports

In this section, I will provide some test result report briefly. The reports will be in a tabular format to understand easily. There are many functions to be test, login and registration system, booking system, admin system, lost and found system and many more. But we only discuss about few of them which are described given below:

(a) Test Case for Registration:

Test Case #01		Test Case Name: Registration		
System: Metro Rail Management		Subsystem: N/A		
Designed By: SoaibMashrafi		Design Date: 10-09-21		
Executed By: SoaibMashrafi		Execution Date: 22-09-2021		
Precondition: Everyone need to register first if they want to use the system.				
Step	Action	Expected System Response	Pass/Fail	Comment
1	If the user clicks only the register button without filling the required fields, then the process will not be work	All the fields need to filled up	Pass	Fill up the form
2	Invalid email address will not be registered	System will show an error message	Pass	Invalid email address
3	Need to provide valid name	System will show an error message	Pass	In name field, no number or special character will be granted
4	The password should contain at least 6 characters	System will show an error message	Pass	Password should be at least 6 characters Including special character or numbers.

Table 5.1: Test Case for Registration

(b) Test Case for Login:

Test Case #02		Test Case Name: Login		
System: Metro Rail Management		Subsystem: N/A		
Designed By: SoaibMashrafi		Design Date: 11-09-21		
Executed By: SoaibMashrafi		Execution Date: 23-09-2021		
Precondition: Everyone need to login first to access their account.				
Step	Action	Expected System Response	Pass/Fail	Comment
1	Enter wrong email	System will show an error message	Pass	Need to provide registered mail
2	Enter wrong password	System will show an error message	Pass	Need to provide appropriate password
3	Enter registered email without password	System will show an error message	Pass	Need to provide appropriate password
4	Enter valid password without email	System will show an error message	Pass	Need to provide registered mail
5	Sign in button clicked without filling all information	System will show an error message	Pass	Need to provide registered mail and appropriate password
6	Sign in button clicked with filling all information	The account will be accessed by authorized user	Pass	System login successfully completed and redirect to the home page.

Table 5.2: Test Case for Login

(c) Test Case for Booking:

Test Case #03	Test Case Name: Booking Tickets
System: Metro Rail Management	Subsystem: N/A

Designed By: SoaibMashrafi			Design Date: 12-09-21	
Executed By: SoaibMashrafi			Execution Date: 27-09-2021	
Precondition: Need to select the journey date				
Step	Action	Expected System Response	Pass/Fail	Comment
1	Clicking on the Book Ticket button for a particular shift	System will show a modal.	Pass	No Comment
2	Enter invalid Name	System will show an error message	Pass	Need to provide valid name
3	Enter invalid phone number	System will show an error message	Pass	Need to provide valid number
4	Enter invalid email address	System will show an error message	Pass	Need to provide registered mail
5	Enter your boarding or pickup point	System save data	Pass	No Comment
6	Enter your dropping point	System save data	Pass	No Comment
7	Set the class	System save data	Pass	No Comment
8	Select seats	System save data	Pass	No Comment
9	Click Submit button after filling all info	System show an alert and redirect to the payment option	Pass	Redirect to the payment page

Table 5.3: Test Case for Booking Tickets

CHAPTER 06

SUSTAINABILITY

6.1 Impact on Society

Using this application, public can easily find their desired tickets for an expected date.

They will get many options to choose. They don't need to go the ticket counter for booking or buying a ticket. So, they do not need to go outside from their home. In Dhaka city, the main reason for traffic jam is many people in the street. Our system reduces the people from the street. So that, another vehicle is free from crowd. I think it is very good thing for our society.

On the other hand, people may save their big amount of time. They can utilize this time for another work. They may produce or may can earn extra money by utilize the time.

They don't need to join in the ticket counter line, so they don't have anxious in their mind. Old person, young people everyone can get tickets from metro rail. So, ticket counter and station will be free from crowd and streets are free from jam. Our society get a full of life.

6.2 Impact on Environment

If the society get full of life, then automatically our environment gets a life. There has been equity in society and environment. Our stations are so clean. Metro rail will not damage the environment. There has been no pollution like, sound pollution, environmental pollution etc. will not be occurred by the metro rail. Inside the metro rail is absolutely clean and eye catchy. Even children can easily move one place to another through metro rail.

On the hand, our system doesn't allow to anyone to smoke at the station or inside the metro rail. We have many volunteers who works 24 hours to check these things. This system maintains all kind of government rules and regulation. The privacy system is very good for all users.

6.3 Limitations

There are no projects which do not have limitations. Every project has limitations. For managing the whole process, we have considered some methods which are not suitable to manage the system. So, we just need to eliminate the methods from the system. And we consider them as limitations. In our system, there are some limitations which are given below:

- User who do not register yet cannot booking the tickets.
- User who do not register yet cannot access the lost and found section and dashboard as well.
- User who do not register yet cannot see the available schedule and seats also.
- Registered user cannot delete their account without the permission of admin.
- No user cannot able to block each other in the system.
- Normal user cannot able to add an admin.
- Normal user can only see their data from the dashboard by selecting particular dates.

6.4 Sustainability Plan

As I use JavaScript for core implementation. It is true that, there are many functionalities to add and modification. I alone cannot handle all kind of stuffs. I think there are many things for development. Due to short time, I am not get the plan for sustainability. But it is sure that this project is unique and creative now in Bangladesh. This powerful software makes people's life easier. It is need to be make more dynamic but it is widely used, efficient application for Dhaka people. Less competitor is the main advantage for business purpose. In future the competitor may produce. There is no doubt about its sustainability.

CHAPTER 07

CONCLUSION AND FUTURE SCOPE

7.1 Discussion and Conclusion

There are several metro rail companies in the globe today, and they utilize a variety of metro rail management software. However, in Bangladesh, there is only one metro rail that has yet to begin operations. I'm hoping it opens soon. Our suggested metro rail management system aims to prevent the flaws that were discovered in prior metro rail management software. However, this software could be a game-changer in metro rail management.

7.2 Scope for Further Developments

There are many scope for further development in this system. As I said earlier, this project need many criteria to add and modify some functionalities. In which cases we need future development are described in given below:

- Less ambiguity
- Increase accuracy
- Increase reliability and efficiency
- Provide appropriate information regarding the metro rail that is why user can take necessary decisions.
- Decrease time complexity and space complexity.
- More accessible, easy to use.
- Add heavy features for the station master also.
- Live train management tools.
- Live signal and holding position
- Eye catchy UI/UX
- Mobile app is must for both android and iOS.

- Refund system
- Bangladeshi payment gateway system
- Who lost their items can also post in lost and found section as a victim.
- RFID, food price payment from the system

These are the possible features which could be implemented for future development. On the other hand, the developer team always maintain the project and try to improve the functionality they added in the project. So that, user can easily use the system efficiently.

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PLAGIARISM REPORT

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