An Undergraduate Internship/Project on Restaurant Management Web App for OS IT Solutions LTD.

By

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May 12, 2022

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

Department of Computer Science & Engineering

Independent University, Bangladesh

Attestation

This is to certify that the report is absolutely completed by me, Syeda Nazia Haque (ID:1830928), submitted in partial fulfillment of the requirement for the Degree of Computer Science from Independent University, Bangladesh (IUB). It has been completed under the guidance of Ms. Ajmiri Sabrina Khan. I would also like to further clarify that no third-party organization, except the one where I am working as an intern, has helped for the completion of this report. Any resources used in this project are mentioned in the reference section of this report.

Signature	Date
Syeda Nazia Haque	
Name	

Acknowledgement

First, I would like to thank the Almighty Allah for keeping me and my family safe throughout this pandemic and for giving me the opportunity to do my internship at OS IT Solutions LTD. Mostly, I would also like to thank my honorable and cherished faculty, supervisor and advisor Ms. Ajmiri Sabrina Khan, Lecturer, Department of Computer Science Engineering, Independent University, Bangladesh, for her invaluable guidance, patience, time, constructive criticism and thoughtful advice regarding various aspects of my internship and preparation of this report. Next, I would like to express my gratitude to Mr, Mohammad Moniruzzaman (Munir), Managing Director and CEO of OS IT Solutions LTD., for giving me the opportunity to complete my internship at OS IT Solutions LTD. and my colleagues for their guidance and support in these four months internship program. The whole experience has been a chance of a lifetime.

Letter of Transmittal

May 12, 2022
Ms. Ajmiri Sabrina Khan
Lecturer
Department of Computer Science and Engineering Independent University, Bangladesh.
Subject: Internship Report submission Spring, 2022.
With due honor and respect, I, Syeda Nazia Haque, from Spring 2022, Section 12, would like to submit my Internship report. This report is written to kindly inform you that I have started my internship program and its report. My internship started from 1st February 2022 and will end at the end of May. I am doing my internship at OS IT Solutions LTD.
This report is based on my experience and the work I did and am doing at OS IT Solutions LTD. for my internship. I wanted hands-on experience in the corporate world and to get an idea how technology is developed in a work environment; including research and development, documentation, content-writing, software development, and to get acquainted with software development processes and practices from client perspective. As I am doing my internship, I feel I have developed many soft skills, but still I have a lot to learn.
I would like to thank you immensely for all your guidance and support. I hope and pray that this report fulfills all the requirements and is up to your expectations.
Sincerely,
Syeda Nazia Haque, 1830928

Evaluation Committee

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Signature

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Name

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Supervisor

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Internal Examiner

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External Examiner

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Convener

Abstract

Restaurant Management Web App is a web application that will work on any device with internet connection. This project will help users in bringing ease to their restaurant seat reservation as well as ordering food online with just a few clicks from the comfort of our home or anywhere in Dhaka (at the moment). The application will maintain all user details; like their profile details, order details and payment details, and restaurant details; like their menu and seat availability details. The system needs an active internet connection to be operated by users. Moreover, we all love to eat out with a friends, family, or colleagues and often we post on food groups on Facebook to know what places are appropriate to visit with certain people. So instead of going through those comments and getting confused; our application will give you a dynamic view of restaurants where you can book your table and food without any manual hassle. This report will further discuss the methodologies we used to develop this system successfully as well as the framework and modules implemented to make it user friendly.

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Chapter 1

Introduction

1.1 Overview/Background of the Work

Online food ordering platforms are blossoming with time, especially after the pandemic has hit us, people enjoy restaurant food at the comfort of their home. But as things are getting normal with time - restaurants have opened their dine in options and people are once again enjoying having their meals at their favorite restaurants. This web application will help users find their favorite restaurants and select their favorite seat to reserve and dine with their loved one. The users will get a dynamic view of all high-end restaurants in Dhaka city. The restaurants will have a dashboard and they will update the availability of seats and menus every day.
The web app will be developed using React Js along with Firebase at the moment to produce a successful MVP and as for the backend Node Js and express is used.

1.2 Objectives

The main objective of this project is to ease customer service for restaurants in Bangladesh. Everyone enjoys sharing meal with their friends and family, however, often people have to sit in line for a table or most of the time they don't get their desired seats. But this system will allow users to reserve their seats and order food beforehand. So, when they reach the restaurant, they can get their food without waiting for it for a long time. Plus, there will be a payment gateway in the system, so users will be able to pay online. The application will help us to get rid of the manual task of reserving seats through phone calls or going through Facebook groups to find the perfect restaurant to dine out. The web app will be available in both Android and IOS in the near future.

1.3 Scopes

Here are the scopes of the project:
• Booking Management: Users can create booking at restaurants. After creating a booking, the system automatically assigns an OrderID and user can then use the OrderID to edit and track orders according.
• Pricing Administration: Can be used to set the price for a unique product in different level.
• Contact Management: It provides an interface to create customer contact in the system.
• Menu Management: Restaurants can create, update, read and delete the items stored in the menu.
• Receivable: It provides Billing and Payment Gateway.
• Procurement: It give interface for purchase requisition and receipts.
• My Enterprise: It allows the user to create new offers, update and add new features to the business.
• Tools: It gives the user to schedule processes, set preferences, worklist, report and analysis, collaboration massaging.
• Dashboard: It gives the users dashboard which shows all his/her pending task and completed task, for example: Pending delivery reports.
• Order Execution: Here the user will order status.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

I have received valuable lessons from all my courses and instructors that have helped me in my work life and I am sure will also help me in the future struggles as well.
CSC-101: The first coding exposure we got from CSC-101,C++ was taught here. It taught me the basics of coding that shaped me to how I am programming now.
CSC-203, Data Structures: we truly were able to use data in ideal structures such as Stack, Queue, Linked List, Array, Pointer and so on plus from here we actually got the idea how to handle data dynamically.
CSC-305, Object-Oriented Programming: In the developing industry most of the data is represented as an object. It also taught how to write modular programs which made codes less repetitive and more reusable.
CSC-401, Database Management: This was the course that taught me how to design and plan a project. It covered popular planning and strategy practices such as Six Element Analysis, Problem Analysis, System Development Life Cycle, Rich Picture, Requirement Analysis, Entity Relationship Diagram, Business Process Model, Normalization and many more.
CSC-405, System Analysis and Design: This course gives an overview of Used Case Diagram, Used Case Scenario, SDLCs and how to adapt each one of them to the project.
CSC-460, Multimedia Systems, it is a mobile app development course where I learned Android with Java, SQLite and Firebase that actually helped to secure my internship.

2.2 Related works

Foodpanda- It is one of the most popular food ordering platforms in Bangladesh. They have a versatile platform to help users order food from different platforms. Foodpanda has a multi-sided business model, with two interdependent customer segments that are

both needed in order to operate:
Consumers - Individuals who want to be able to order foods from restaurants online.
Restaurants - Those who want to be able to obtain customers outside usual channels.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

WBS is a hierarchical structure which demonstrates a project's breakdown into smaller segments. For our project, we have produced a WBS so that our work is coordinated. 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. Here, we have used the top-down approach

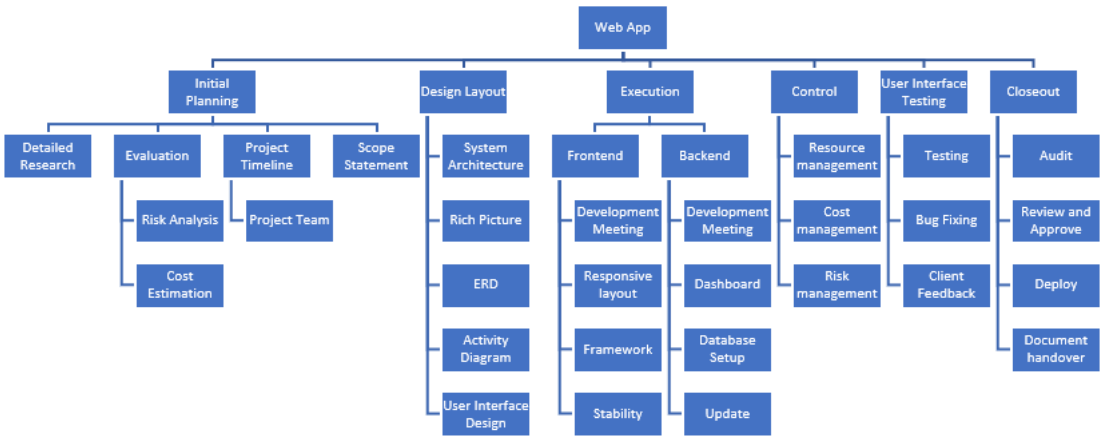

Figure 3.1: WBS of the System

Task	Days	Work Percentage
Requirement Analysis	15	20
Design Layout	10	10
Development	25	40
User Acceptance Testing (UAT)	15	15
Deployment	15	15
Total	80	100

Table 3.1: Time Distribution

3.2 Process/Activity wise Time Distribution

Each section in the WBS requires time allocation to meet the deliverable. The table below shows them in details:

3.3 Gantt Chart

We have used the Gantt chart to plan and schedule all the activities that were needed to be done to complete the project successfully.

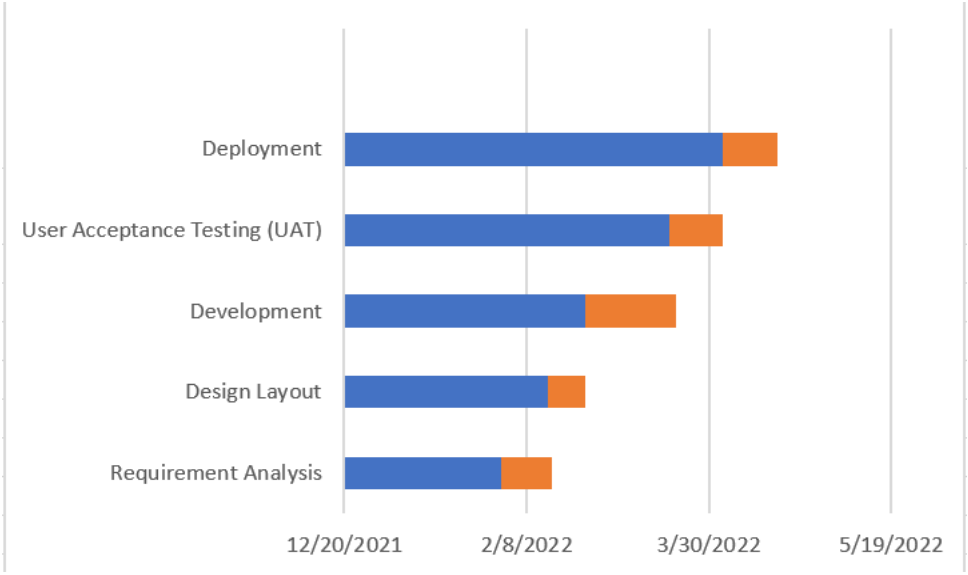

Figure 3.2: Grantt Chart of the System

Work Distribution	Costing
Development	$50000
User Account	$2000 per year
Deployment	$9000

Table 3.2: Cost Distribution

3.4 Estimated Costing

The cost was calculated on the basis of the features the company required for the system. This includes pre-designed themes, logo design cost, Number of users included.

Chapter 4

Methodology

One approach to developing service-oriented Web applications is to transform high-level business models to a composition language that implements business processes with Web services. [1] Simultaneously, for a project to develop successfully, it goes through certain methodologies. It is important for every company to take control of the process by coordinating the various underlying activities and resources involved that will lead to success. Before we chose the framework for our project, we went through the following list of methodologies to conduct our project in the most appropriate manner.

Lean Startup Methodology

We use this methodology because this project is new and fresh so to develop such a product, it needs a principled approach which is what lean startup methodology offers. Hence, the first phase of our web app will be a minimum viable product (MVP) to initiate development. The lean startup model allows build, measure and learn from the system while being developed. Using this methodology, the aim is to building and launching the web application fast and at a lower cost.

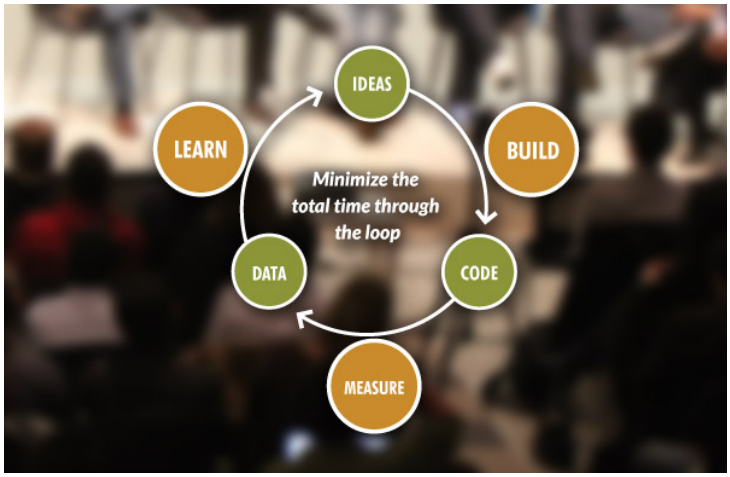

Figure 4.1: Lean Startup Methodology

Chapter 5

Body of the Project

5.1 Work Description

The web application for restaurant management system will help users to reserve table and order food before going to a restaurant. The system will display various restaurants of Dhaka city from which users can select after viewing ratings and reviews from other users. The application will help users to experience a hassle free dine in with friends and family. I am working on both frontend and backend of the project. The frontend will be developed with React Js and for the backend Node Js and Express will be used along with Firebase for the database. Since I am developing the MVP currently and Firebase is a virtual database that will help to get the application running and store data simultaneously just the way the client requires at the moment.

5.2 System Analysis

5.2.1 Six Element Analysis

Process	Human	Non-hardware	Hardware	Software	Database	Communication on Network
Login/Register	Users enter email and password	N/A	Computer/ Mobile phone	Browser	Firebase	WAN/LAN
Reserve table	i.Select table picture. ii.Select the time. iii.Enter number of people.	N/A	Computer/ Mobile phone	Browser	Firebase	WAN/LAN
Order food	Select food from menu option.	N/A	Computer/ Mobile phone	Browser	Firebase	WAN/LAN
Payment Gateway	Enter "Confirm" after selecting table and food. Select Payment. Enter Payment Details & confirm.	N/A	Computer/ Mobile phone	Browser	Firebase	WAN/LAN

Table 5.1: Six Element Analysis

5.2.2 Feasibility Analysis

The feasibility analysis is a key factor of our project. As we know that it is very important to conduct the feasibility study to evaluate the design and development process of a project. After we do a feasibility analysis we can understand if our system is useful and works the way client wants it to. Here's how our system is feasible:

- Technical Feasibility: Here the company needs to understand whether the technical resources and team can actually execute the system. Our organization first had the requirements settled then to develop the system accordingly we chose the tech stack and we also kept in mind that we shouldn't't go for a tool that is not possible to learn and implement within a short time. For instance, developing this system in IOS was not possible for us at the moment because we do not have the hardware or software support to develop IOS at the moment. Since, I am familiar with React Js and Firebase so working with that has given me the technical feasibility.

- Scheduling Feasibility: Here, the company will estimate a certain time for a project to be completed and let the client know. This is very important as maintaining deadlines is necessary for a project to be successful. By conducting scheduling feasibility, we could determine certain constrains such as: technical, technology, budget, resources, logistics, and financial. So, as I am developing the MVP, I am following the schedule dedicated for my project so that I am not all over the place.

- Operational Feasibility: Here, we understand how the project plan satisfies the requirements from the requirement analysis. Each requirement that needs to be implemented in the project are analyzed and that helped me to understand how I can actually develop the system simultaneously how my company can benefit from the project.

5.2.3 Problem Solution Analysis

There were certain problems that I faced while working on the project. Here are the analysis of those problems:

1. Deploying as mobile app
   Problem: First, I was supposed to start the project with android and the tech tool was changed twice for that.
   Solution: However, it became quite difficult to develop it in mobile, since there was not appropriate set up provided to develop android app, while also learning the tool simultaneously. Since we had to submit the MVP at due time so I had to start the web app to deliver the MVP within the deadline.

2. Setting up restaurant information dynamically
   Problem: I was getting a lot of error to set up the restaurants information dynamically so that users can view them in real time.
   Solution: I had set up the dashboard from each of restaurant's end so that they can have access to change any information from their end in no time. Firebase can be used as a virtual database and so the problem was solved.

3. Search engine
   Problem: filter was only returning ID of the data, but I needed the whole information of the restaurant once filter is executed.
   Solution: So, I had to return the object. But figuring out the logic to do so took time and there I got errors.

4. Setting up authentication user level
   Problem: I needed to set up 3 user levels: admin, customer, and restaurant. However, while doing so I faced problems in setting user level in Firebase. After setting the user role, what happened was that the registration worked fine but login did not. So, when admin/manager would register they would be directed inside the web app's homepage but that's what login is supposed to do.
   Solution: Because of the changes in Firebase version it took me quite some time to figure out the solution and the correct methods. Next, I had to recheck my code and found that credentials did not match when the forms were returning object

5.2.4 Effect and Constraints Analysis

Through this system users can view various restaurants in Dhaka city and try out different cuisines. The users will have an ease dine in facility that will make their experience in a restaurant more pleasant. However, there are some limitations in our system. For instance, the system will only show restaurants in Dhaka city and there is

no food delivery option available. Nonetheless, we are working to add more feature and scale the project further so that people from anywhere in Bangladesh can enjoy our system.

5.3 System Design

5.3.1 Rich Picture

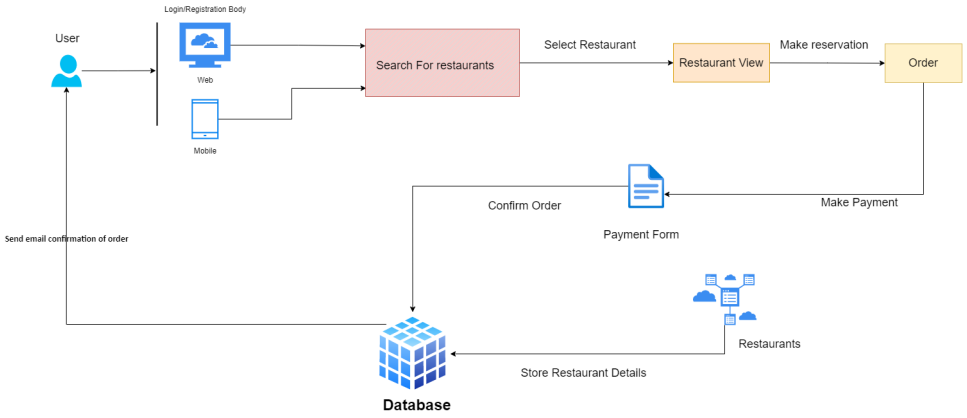

Figure 5.1: Rich Picture

5.3.2 UML Diagrams

A UML diagram is a diagram based on the UML (Unified Modeling Language) with the purpose of visually representing the system along with its main actors like actors, roles, actions, artifacts or classes, in order to better understand, alter, maintain, or document information about the system. Like users placing orders or restaurants accepting the order or confirming the order. Frequently, the semantics of a UML behavior diagram depends on the topic and the aspect that is modeled and on the designer that created it. In addition, UML behavior diagrams usually model only example scenarios and do not describe all possible cases and possible exceptions. We overcome these problems by restricting the UML notation to a subset of the language that has a precise semantics. In addition, we define which kind of diagram should be used for which purpose and how the different kinds of diagrams are integrated to a consistent overall view.[2]

Activity Diagram

User making reservation

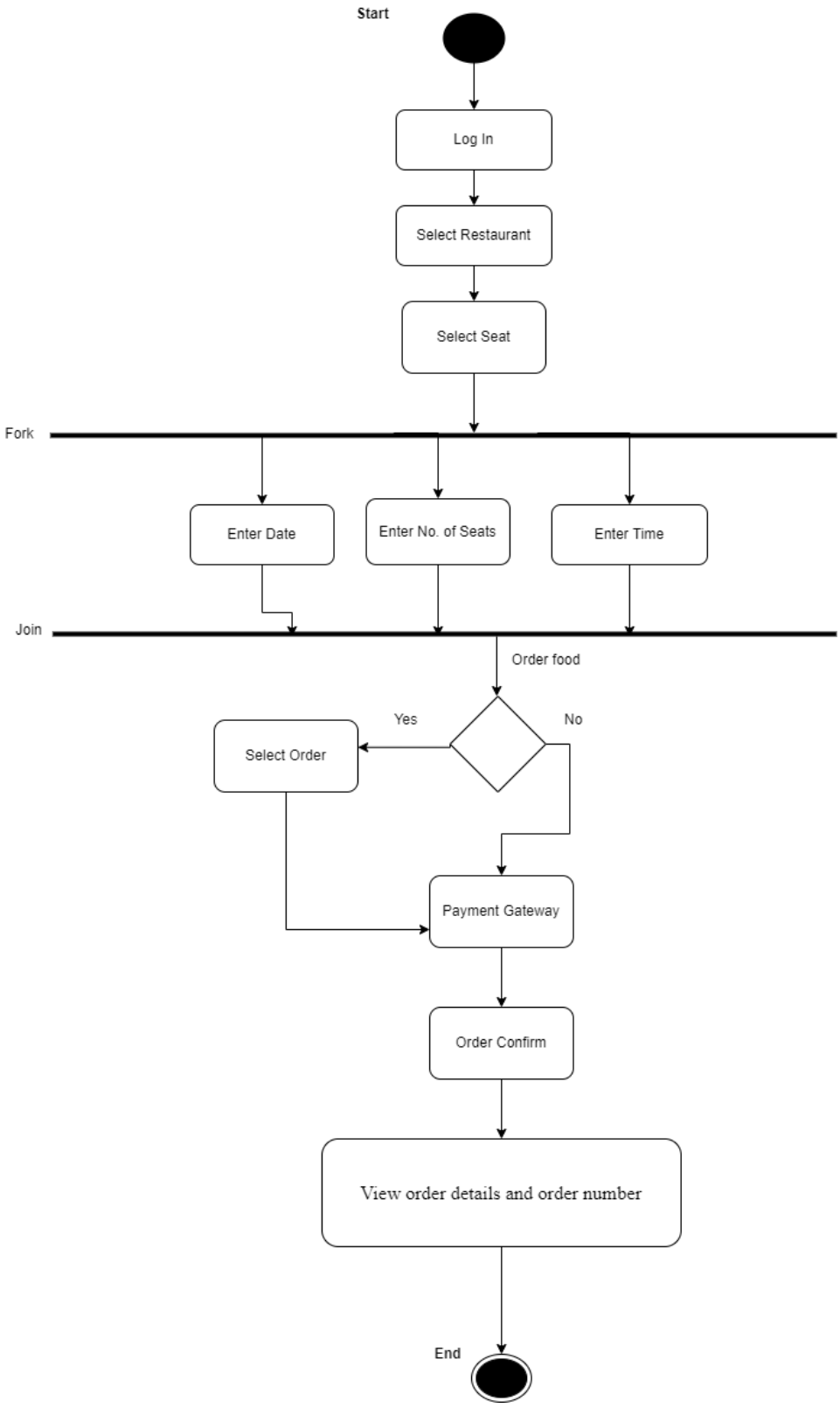

Figure 5.2: Activity Diagram for making Reservation

Cancel Order

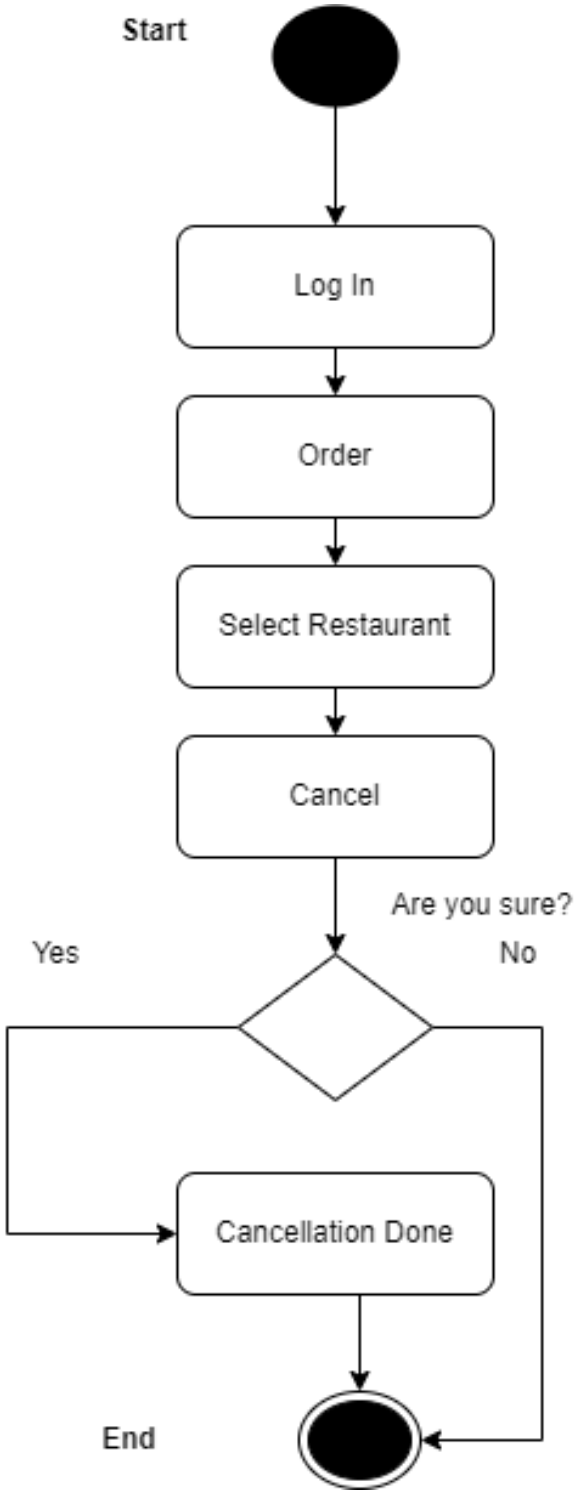

Figure 5.3: Activity Diagram for Cancelling Order

Review

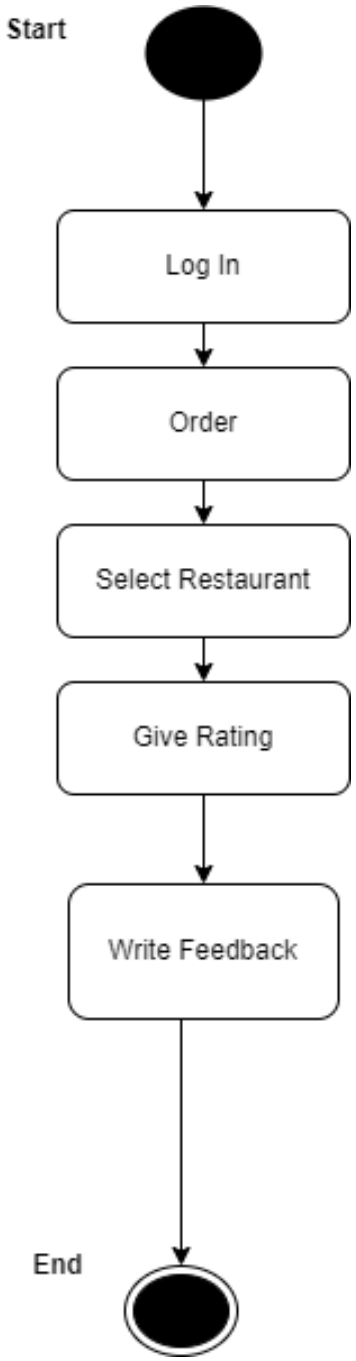

Figure 5.4: Activity Diagram for giving Review

ERD

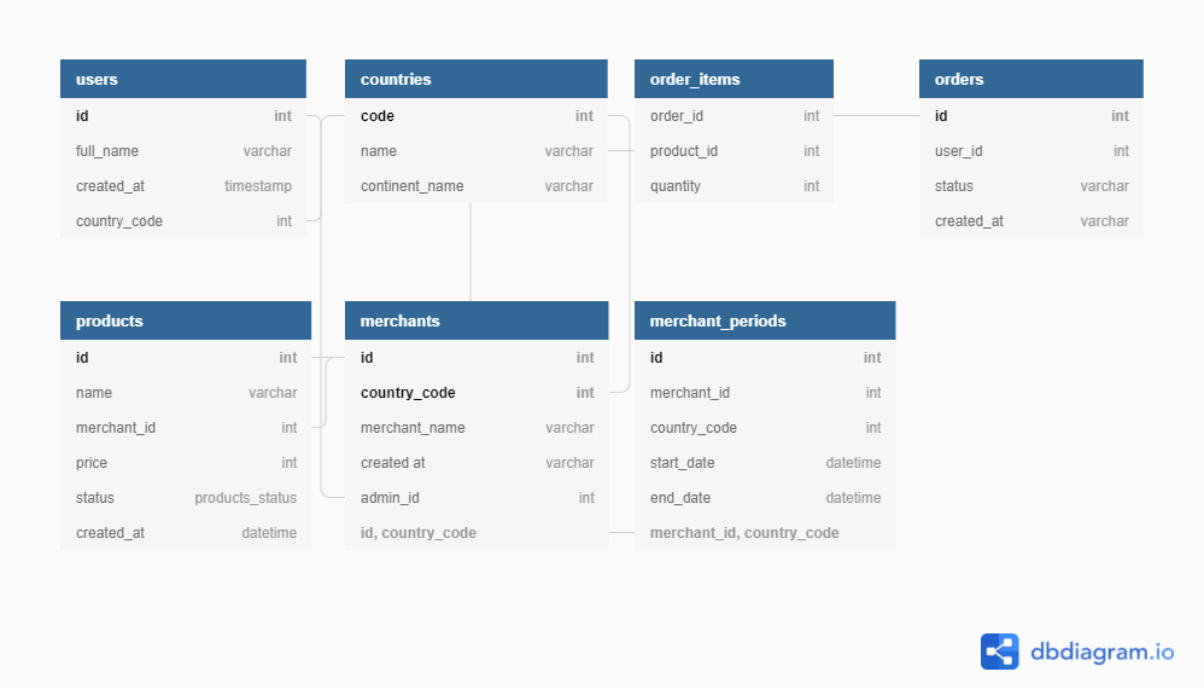

Figure 5.5: ERD

Class Diagram

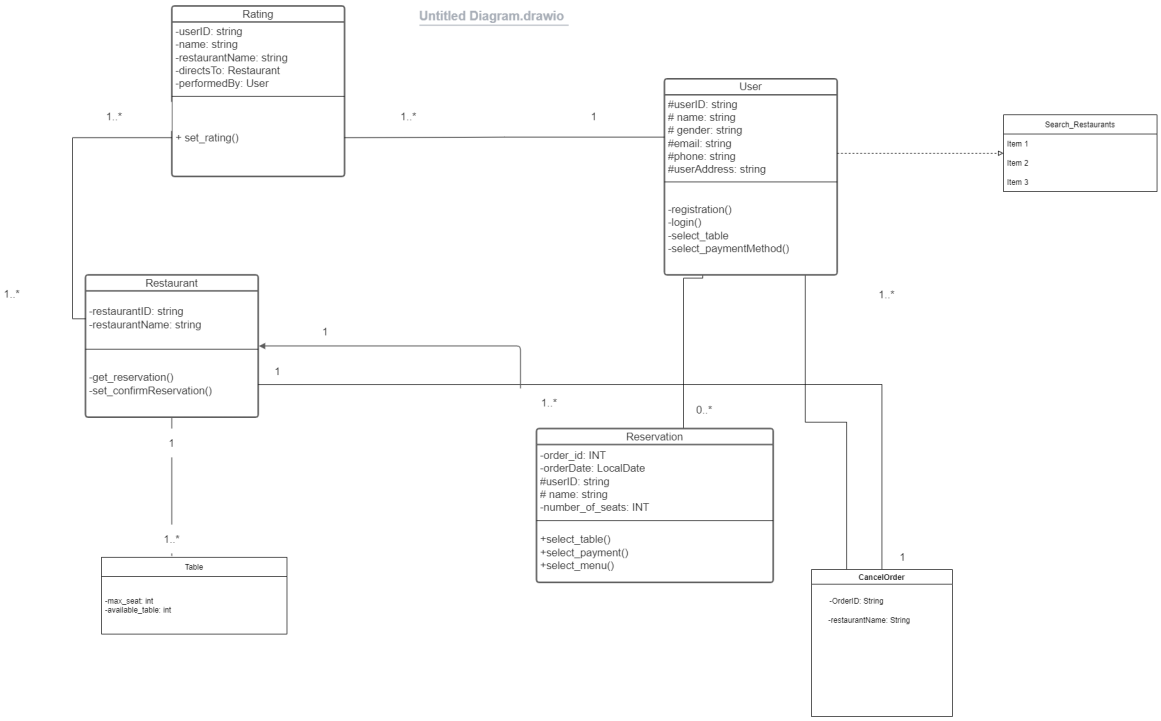

Figure 5.6: Class Diagram

Use-Case Diagram

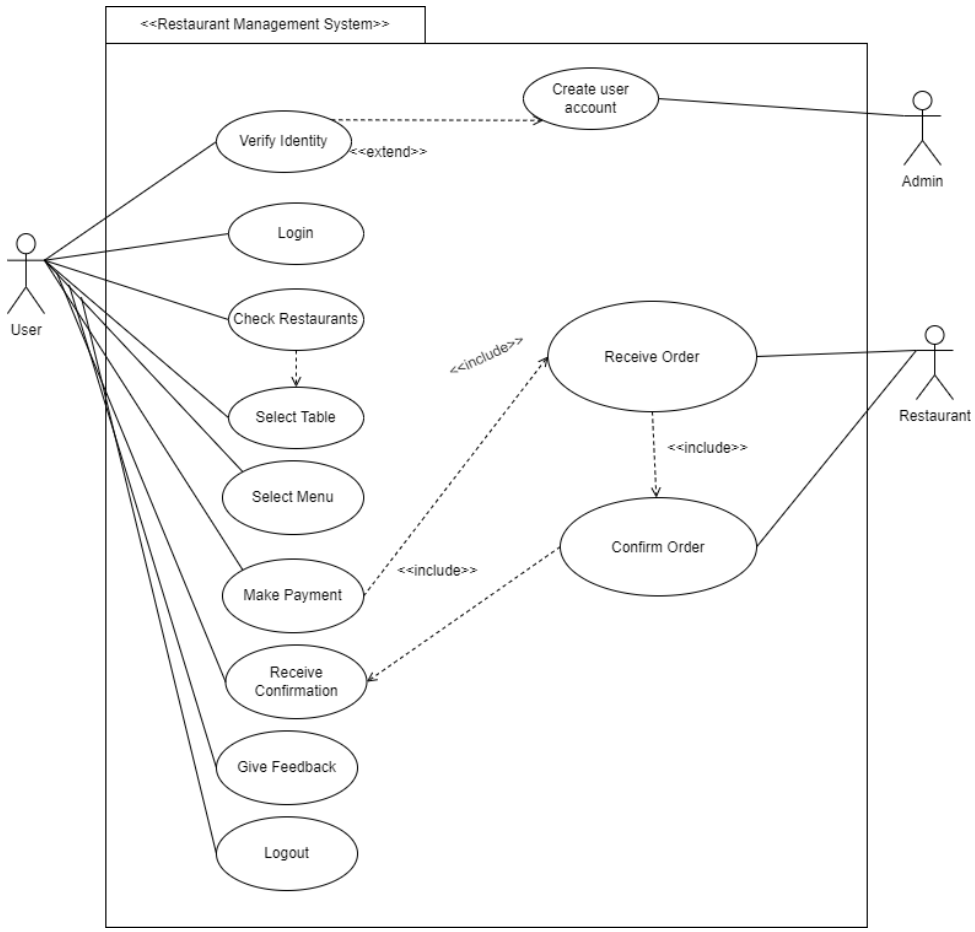

Figure 5.7: Use-Case Diagram for making Reservation

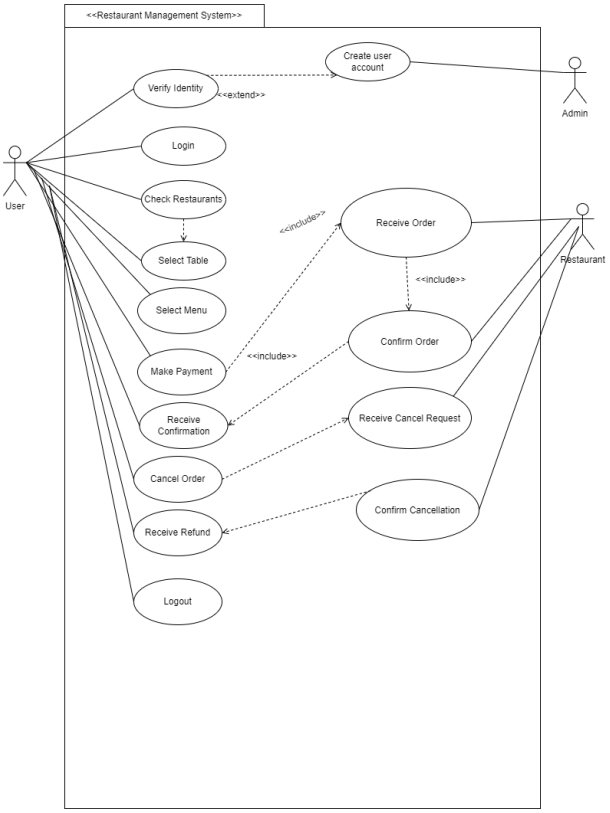

Figure 5.8: Use-Case Diagram for Cancelling Order

5.3.3 Functional and Non-Functional Requirements

Functional Requirements:

- The authentication system will validate the user's name, email, phone number and password when the user logs into the system after registering to generate an account.
- Every user will get a under ID.
- The system will always review the user details if they already exist in the system or not.
- The system will request for password recovery if the user ID and password does not match.
- The system will send confirmation through mail once a user successfully creates an account.
- The system will let user search different restaurants through the search engine.

- The system will keep a record of the reservation details by users.
- The system will only allow orders to be confirmed after the verification of payment through online.
- The system will send notification to users for any updates.
- The system will always keep the user's Dashboard updated.

Non-Functional Requirements:

- Usability: The system will be user friendly.
- Every user will get a under ID.
- Maintenance: This system will be maintained by developers according to the contract between the company and client. So that the bugs can be fixed and the system won't lag.
- Valid Data: No false information about the restaurant will be added in the system. If any information is changed it will be updated immediately.
- Scalability: The system will be accessed by computers and smart phone with active internet connection.
- Performance: Performance will be smooth and easy to understand. Such as browsing or searching for restaurants, booking a table, or submitting payment forms, etc. The whole experience will be hassle free.
- Service: Restaurants all over Dhaka city will be available in the system.
- Reliability: The system will be backed-up with adequate safety measures so that every data/information is secured.

5.4 Product Features

5.4.1 Input

Login Page

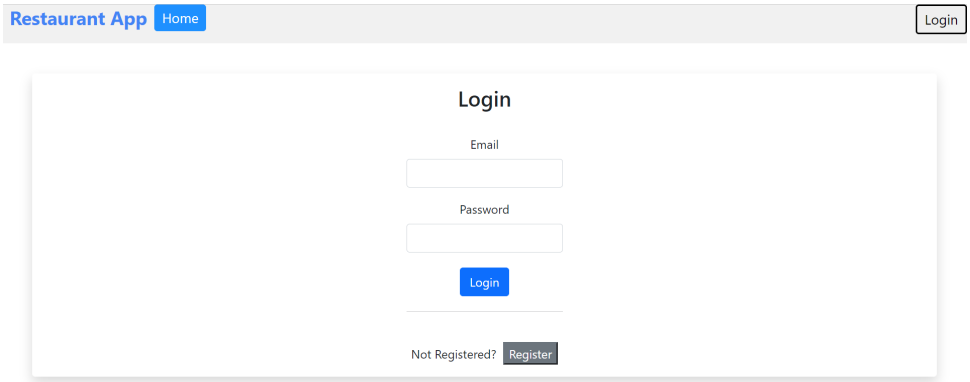

Figure 5.9: Login

Reserve Table

Figure 5.10: Enter Reservation Details

Payment

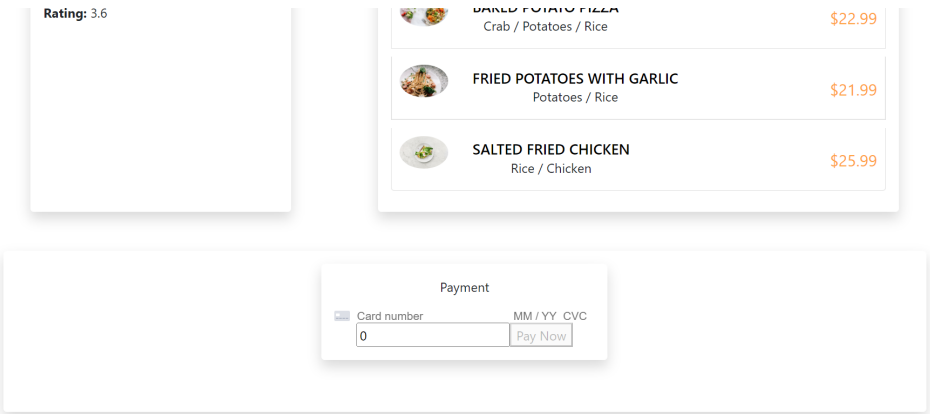

Figure 5.11: Enter Payment Details

5.4.2 Output

View Orders

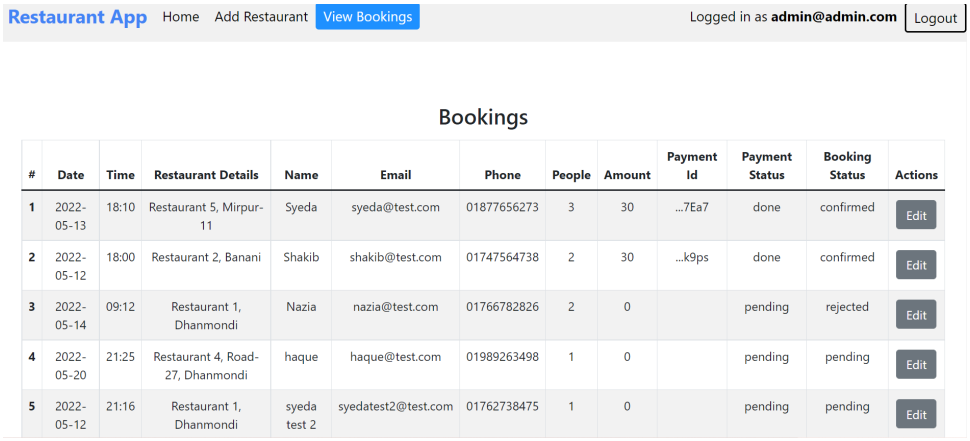

Figure 5.12: Admin Detailed View

Booking Details

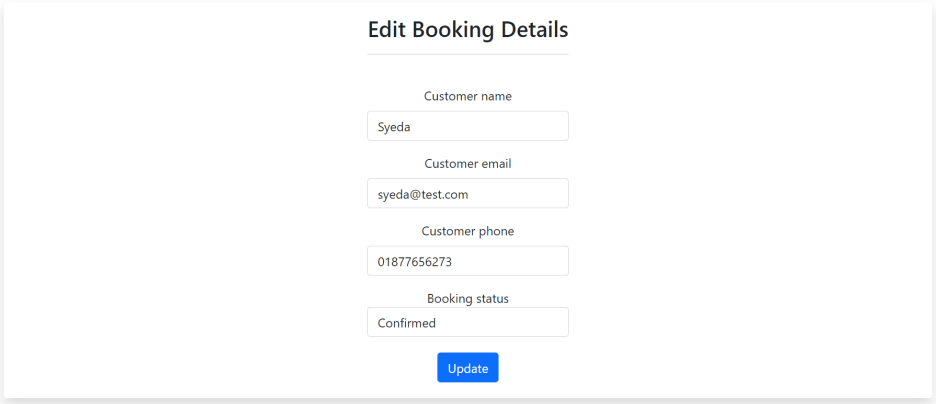

Figure 5.13: Booking Confirmation

5.4.3 Architecture

Every project has its own architecture. In our project we have used Single Page Application Architecture (SPAA). It has been introduced to overcome the traditional limitations to achieve smooth app performance, intuitive, and interactive user experience. The main advantages of using the frameworks mentioned in this article are the performance bonuses (one can avoid the code duplication and send to the client only the data that has been changed or the data that is needed to generate the requested view) and the modular and dynamic architecture (pages / components are dynamically created from other components, without duplicates). Further on, the components can be designed to be responsive based on each other and the layouts to change based on the parameters taken into account (screen-size, screen resolution, etc.). By using such architecture, adding responsive components and various other layouts is

easily done. The testing possibilities for the platform modules represents an important advantage of using this modular structure. Automated tests can be written for each component, together with integration tests for wider scoped structures.[3] Through this architecture I am able to shift the entire logic to front-end, for which I am using React Js. For any requested data the selected page will be dynamically updated without effecting other web-pages, for which the database I used is Firebase.

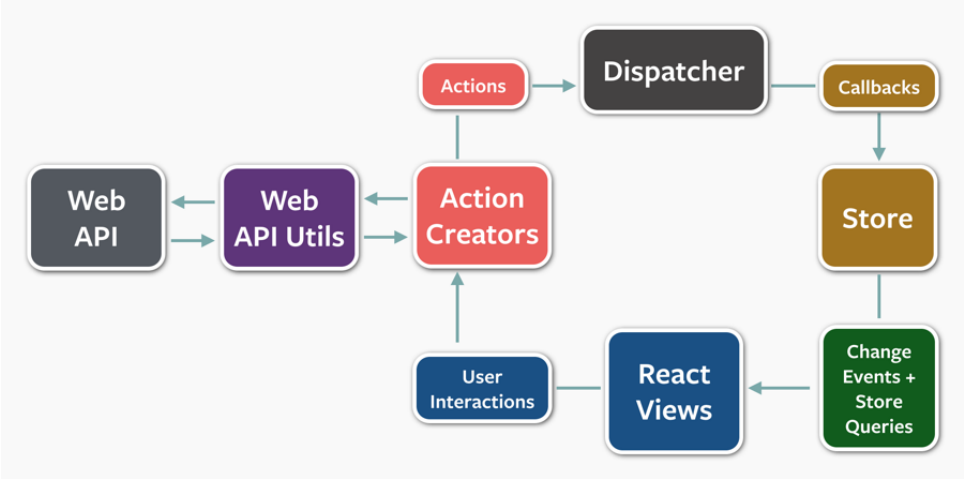

Figure 5.14: Architecture of the system

Chapter 6

Results & Analysis

The restaurant management web application is based on the vision to make dine-in experience better in Bangladesh. The web app is supposed to let user reserve seats in their desired restaurant. It aims to minimize the hassle to go through social media or google to find the perfect place to eat with friends and family. This application will have all high-end restaurants under one roof and all users have to do is scroll and pick. Currently, the proposed system is an MVP. There is admin and restaurant's login available where they can see bookings. A restaurant can see their specific orders and make decision accordingly. The user will get email confirmation after confirming the order. The user dashboard is not available at the moment as user login is not yet completed. Hence, users at the moment will not be able to cancel reservation or receive order confirmation from the web app. Also, because of time constraints the UI isn't responsive yet.

- Homepage

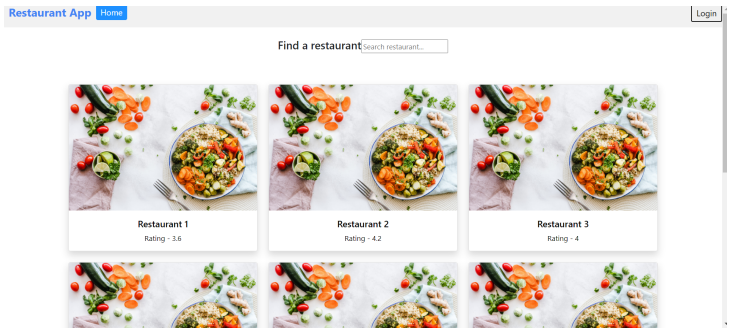

Figure 6.1: Public Homepage

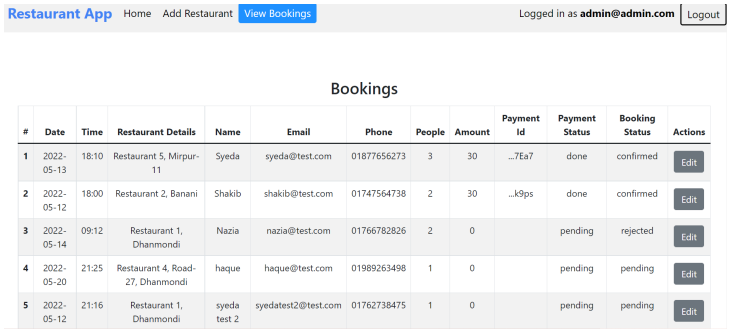

Figure 6.2: Admin Homepage

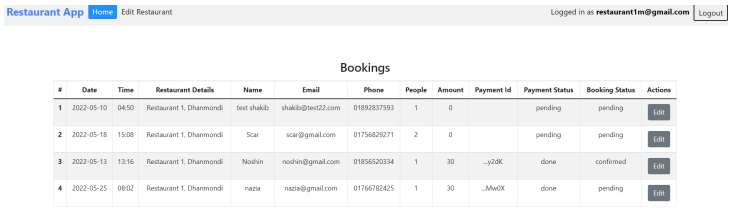

Fig.6.3: Restaurant's Homepage

A restaurant will see only its own order details and can edit its restaurant's information which will be updated for all. Whereas, admin will have access to see all restaurant's information with booking details.

- Reserving and Making Payment

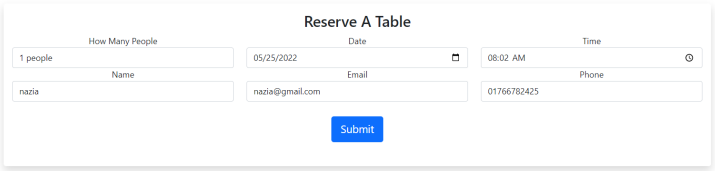

Figure 6.3: Restaurant's Homepage

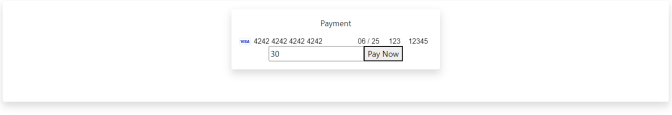

Figure 6.4: Add Reservation Details

- Confirming orders

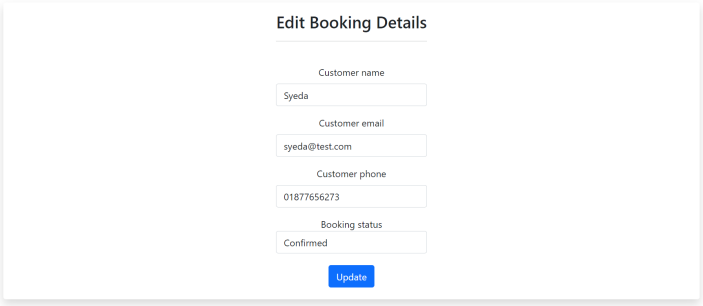

Figure 6.5: Confirm Order

The user can place a reservation and pay the reservation fee. The restaurants can view that order after logging into the system. The restaurant can thereafter cancel or approve the order in the booking status field.

Also, at the moment the front-end and back-end run separately. There is a back-end which is tooled by Node Js and Express for the payment stripe. And all the other data is stored in Firebase cloud.

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

Sustainability in the project profession is an approach to business that balances the environmental, social, economic aspects of project-based working to meet the current needs of stakeholders without compromising or overburdening future generations.[4] Moreover, the software will be maintained and supported by a professional team. It will be updated for a certain time in a year according to the requirements of the customer's needs and all the bugs and problems are regularly updated.

7.2 Social and Environmental Effects and Analysis

Social Effects

The main goal of the web app was to bring up all the restaurant business under one platform so that the customers could get and process all the information even from home during the pandemic rather than personally visiting the restaurant or calling them. In just a matter of a few clicks of the mouse button customers can book a table in their desired restaurant and enjoy the best dine experience. In short, the platform made the task easier of restaurant booking, searching, and dining much easier for the customers and the stakeholders.

Environmental Effects

Although COVID-19 has slowed down a lot in Bangladesh, it's still here. So, we can never be too safe, hence even if we now can enjoy all the pre-pandemic activities, we still have to take every step with safety measurements. So, this application can help the overcrowding in a restaurant and people can enjoy a

secured dining experience with loved ones. Moreover, the hassle of calling a restaurant and manually booking a table will also be solved. They will find all the information within the comfort of their homes rather than going out in this pandemic [6].

7.3 Addressing Ethics and Ethical Issues

In the world of smartphones with so much data collection, hacking, cyber-crime, etc. There are some unspoken rules and ethics guidelines that need to be followed when working on creating and releasing a web app. The developers made sure there was no breach of conduct and all the points were taken into serious consideration. Some of them are as follows:

Data Storage: All the data is stored in the Firebase. It is a reliable and extensive database with fast and safe hosting.

Data Security: Data in the Firebase cloud is secured with much less chance to get hacked. The admin will only have access to other accounts and the server.

Data Storage Security: Only the lead developer has access to the back-end server and database. Since they are hosted in the cloud and can only be accessed via the lead developer's login credentials; the data stored can be deemed safe and secure.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

Although, internship is also a course but it definitely isn't like any other courses. Doing office as well four other courses in just 4 months of time was a difficult task. Nonetheless, I always tried to give my best in my internship as well as my other courses. One of the most challenging things I faced was the constant requirement changes and also the tech stack had also changed thrice. Because I was asked first to work with a mobile app but I wasn't provided with appropriate tools to deliver the application, as the company is also starting out. So, after a lot of time management issues and miscommunication I was tasked to work on the MVP of the web app version.

8.2 Solution of those Problems

The solution to every problem is to be a sportsman and accept the challenge because that mindset can take us halfway through the problem. I had 4 months to do my internship but it was only after 1.5 months had passed that I was tasked to build the MVP model with React Js. And by the grace of Allah, I did the task though there are some changes to be added. Regardless, now I know how to work with requirements and make a project successful. I have joined as a software developer but I have learned how system analysts work as well as how the business sectors of the project works. My tech skills and communication skills have improved a great deal that will help me in future endeavors. One of the most important things I learned was to understand the feedback from my superiors and implement that in my work. In short, the internship was a good platform to find my weaknesses and strengths.

Chapter 9

Future Work & Conclusion

9.1 Future Works

As the project is still evolving, the company plans on adding a lot more features and modules to the web app to make it even more helpful for the users to use and to make it look more appealing. Moreover, every year there will be a number of updates in the software according to the stakeholder's needs and requirements.

9.2 Conclusion

It's definitely been an experience to work as an intern at OS IT Solutions Ltd. As this internship was my first exposure to the corporate world, it has taught me many valuable lessons. Plus, I was introduced to new technologies and I had to keep pushing myself to do even better. It definitely was not easy, and I did face many criticisms and hardship but I made sure to adapt to the new environment and make a better version of myself. Throughout the project, I took help from my seniors to solve problems - that has been a learning experience as well since it taught me to work in a team and understand how mentorship works. In conclusion, I will always cherish my internship experience because even in university I had to do assignments in pressure to meet the deadlines, but working in a corporate environment is completely different.
some say [1]. [2]. [3]. [4].

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