Internship Report On

Online Hotel Booking System

By

Sanjib Kumar Paul

Student ID: **1722036**

Autumn, 2020

Supervisor:

Mohammad Motiur Rahman

Lecturer

Department of Computer Science & Engineering

Independent University, Bangladesh

January 27, 2021

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

Department of Computer Science & Engineering

Independent University, Bangladesh

Attestation

I hereby attest that, this report and project on 'Online Hotel Booking' is all my work and has not been copied in part or whole from any other source except where duly acknowledged.All use of previously published work like article, journal, paper, website have been acknowledged within the main report in Bibliography chapter.

Signature	Date
Sanjib Kumar Paul	
Name	

Acknowledgement

I take this opportunity to express my heartiest gratitude to the people who have been instrumental in the successful completion of this report and Internship project. The success depends greatly on the encouragement and guidelines of some special people, which I would like to put on record here with deep gratitude and pleasure.

Firstly, I would like to express my gratitude and respect to my internship supervisor Mohammad Motiur Rahman, Lecturer,Independent University, Bangladesh for his constant guidance, advice, encouragement in the overall preparation of this report and project.

I feel fortunate to work at Rose IT. I would like to convey my sincere gratitude to Mr.Dabashish Saha, Head of Projects, Rose IT limited for giving me the opportunity to work on a real world problem and sharing his wise views with me..

Finally, I feel indebted to Independent University, Bangladesh for providing the platform of learning and wonderful experience.

Letter of Transmittal

January 27, 2021

Mohammad Motiur Rahman
Lecturer
Department of Computer Science and Engineering
Independent University, Bangladesh.

Subject: Internship Report submission Autumn, 2020.

Dear Sir,
It is of immense pleasure and honor to submit my Internship report on Online Hotel Booking System under your guidance. I have tried to present my project work, my analysis and achievements in this report.

I have completed my Internship from Rose IT Limited as a Junior Web Developer Intern from the 1st of November 2020 to date. During this whole time period, I have gathered real life working experience and knowledge in various aspects. This report includes all the project works, experiences and learning that I have achieved during this internship.

I would like to thank you for your constant support, guidance and kindness. I have tried to complete this with utmost honesty and sincerity. I hope and pray that this report fulfills all the requirements and is up to your expectations.

Sincerely,
Sanjib Kumar Paul

Evaluation Committee

.....

Signature

.....

Name

.....

Supervisor

.....

Signature

.....

Name

.....

Internal Examiner

.....

Signature

.....

Name

.....

External Examiner

.....

Signature

.....

Name

.....

Convener

Abstract

Rose IT Limited is a software and ERP solution provider company based in Bangladesh.Rose IT Limited help develop product; by collecting and analyzing data and craft technologies and specialize in implementing technologies. Rose IT experts develop customized technological solution and implement ERP on different domain. They have grown fast by delivering best and professional solutions that provide real business benefits.

An Online Hotel Booking System is basically where customers can view, select and most importantly book hotels. From another perspective, it is a system where Hotel admins can advertise their hotels along with ongoing offers and facilities to attract customers and grow their business.

TravIngo, is an online hotel booking system and the development process is ongoing. So far a customer can view, choose and book hotel but the hotel admin part is still in the process. In the developed part, authentication and authorization was implemented for data security. The analysis done in this report are all my point of view as a project manager and it is not directly related with Rose IT.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

1.1 Background of the Work

The Hotel Industry like any other business opens socioeconomic opportunities for both owner and customer. It has the function of providing hospitality services to customers. These customers can be travelers, foreigners, businessmen, tourists, visitors, etc. Customers are mostly constrained in trying to get a room to pass the night, as the usual practice is to look for a hotel when you have arrived in the location, walk in, and find out whether there is a vacant room. In the case that there is no vacant room, you must move to next closest hotel to enquire once more. So, what happens if you move around sometimes very late in the night in search of a room and all close by hotels are fully booked? Other times you may be lucky to have the contact number of the hotel to reach them to book for a room. But do the hotel attendants really ensure to keep a room for you? You would be lucky to go and get a room booked for you. They are quick to serve those who walk in rather than those who may get access to them on phone to book a room. On other times too, if you have friends or family members in the area you want a room booked, they must go and do the checking for you. There is no system in place that bonds the hotel and the customer that the customer has booked a room and for that matter he is guaranteed a room. This can make customers really stranded especially if it is getting late in the night. [1]

In the past, a travel agent was the person who directed the booking process, taking the research stage out of the customer's hands, but this has evolved. Travel reservations have been made by computers since around 1963 when Trans-Canada Airlines helped develop ReserVec—a simple but fast booking program. This system had many limitations on how it stored data, but it paved the way for more complex multi-tasking booking systems that are used today. This ongoing development of computer reservation systems made the move online a natural leap, and today, every part of the booking process is closer to the user. They are finally in control of their travel plans, and online booking is now one

of the biggest revenue streams for the hotel and travel industry [2]

A hotel booking system works by processing secure online reservations made through a booking website. The data is then passed onto a backend system which can be accessed by hotels to manage bookings. Other features may come with it – for example, the automation of reservation confirmation emails. Small hotel managers and owners recognize that technology is key to growing their business and increasing their bookings over time. To sell rooms to capacity and to appeal to a global audience, a hotel booking system is required [3]

1.2 Objectives

The purpose of the project is to develop an online hotel booking system which is a necessity for today's accommodation providers, both large and small and a great help for all the customers out there. An increasing number of customers are relying solely on online reservations to book their accommodations, and without this capability, hotel owners will lose a significant amount of business. Some high-level purposes are given below:

- Customers can book their desired accommodations through a user-friendly interface.
- Notify the customers about the ongoing discounts on hotels.
- Customers will be able to choose the rooms they want to stay in depending on their budget and comfort level.
- Making Hotel booking easier for both national and international customers.

1.3 Scopes

The scope of the project is to deliver a report covering the functionalities of a suitable 'Online Hotel Booking System' through which customers can find, choose, book their hotel rooms online and the hotel management can reserve the booked rooms for their customers and update along with their stay and to ensure a safe and happy stay. In recent years, people tend to travel a lot than before. People of all ages travels these days. They travel solo, group or with family. Anyone willing to travel must collect information through different mediums and sometimes they face different kinds of problems. It has become a necessity for all kinds of travelers to have a trusted platform through which they can book their hotels without any hassle. A full-fledged trusted online system will reduce the hassle the travelers go through also it will reduce paperwork for the hotel management. Hotels that will be using the online platform will get better exposure to

the customers through the platform which will have a positive impact on their business. Other reasons to consider investing in hotel reservation systems include:

- It gives hotel owners an advantage over your competitors. There are still many small hotels today that do not have online booking capabilities. Few people are staying at those locations, and you can get a competitive edge with an online booking system.
- It improves business efficiency. Hotels availability is updated immediately upon receiving a reservation, not only in hotels system but across all channels. Hotel administration will save time on administrative tasks while also minimizing the risk of overbooking the rooms at owner's property.

Chapter 2

Literature Review

The application of the Internet in the business world has become a major trend in practice and generated a hot stream of research in the recent literature. The Internet, as a collection of interconnected computer networks, provides free exchanging of information. As such, the Internet has been becoming a powerful channel for business marketing and communication and new business opportunities - as it is often called "e-business" or "e-commerce" today. [4] This new e-business or e-commerce virtual marketplace allows small companies to compete with business giants by just having a better web presentation of their products/services. Under the same wave, online customers can enjoy a wider choice of products or services, more competitive prices, and being able to buy their favorite items/services from the sellers located thousands of miles away. It provides communication between consumers and companies and through electronic data interchange (EDI), buyers and sellers can exchange standard business transactions such as invoices or purchase orders with remarkable ease. [5]

In travel and tourism, statistics have shown that two-thirds of Internet users used the Internet to plan trips, and slightly more than one-third of these users have subsequently made a purchase. In the United States alone, more than 64 million people, representing 67% of all travelers, used the Internet in 2003 to search for travel-related information, and more than 42 million of these travelers made an online purchase afterward. This was an 8% increase over the previous year. Lastly, 29% of online bookers made all their travel arrangements online in 2003, and 11 percent of online travelers had made a spontaneous trip because of e-mail promotions or offers. All of these figures indicate a promising demand for Internet applications in travel and tourism. [6]

Online hotel reservations are becoming a very popular method for booking hotel rooms. Travelers can book rooms from home by using online security to protect their privacy and financial information and by using several online travel agents to compare prices and facilities at different hotels. People can book directly on an individual hotel's website. An increasing number of hotels are building their websites to allow them to market their hotels directly to consumers. Non-franchise chain hotels require a “booking

engine" application to be attached to their website to permit people to book rooms in real-time. One advantage of booking with the hotel directly is the use of the hotel's full cancellation policy as well as not needing a deposit in most situations. [7]

Online hotel reservations are also helpful for making last-minute travel arrangements. Hotels may drop the price of a room if some rooms are still available. Large hotel chains typically have direct connections to the airline's national distribution systems. These in turn provide hotel information directly to the hundreds of thousands of travel agents that align themselves with one of these systems. Individual hotels and small hotel chains often cannot afford the expense of these direct connections and turn to other companies to provide the connections. Several large online travel sites are, in effect, travel agencies. These sites send the hotels' information and rates downstream to thousands of online travel sites, most of which act as travel agents. They can then receive commission payments from the hotels for any business booked on their websites.There are many ways of making an online reservation, most of the online reservation systems use the centralized system for making the reservation with the hotel directly. The online hotel reservation through the centralized system is just the tentative reservation, which means that a client does not need to pay at the time of reservation and instead pay at the time of check-in or check out. [8]

2.1 Relationship with Undergraduate Studies

Independent University, Bangladesh offers profusions of courses that help the students to be better in their personal and professional life. There are many courses that were really eye opening for me. Some courses that aided in development of TravIngo are as follows:

- **CSC201 Discrete Mathematics :** This is the first course that gave me idea about computer logic. How logic should be stated and how the statement would be clear. As machine only interprets discrete structure, this course helped me to understand and build my own logic.
- **CSC203 Data Structure :** I was rigorously introduced with different data structures that I now understand by names. Behind the scenes of thee structures were taught in this course.
- **CSC305 Object Oriented Programming :** As most of the data is represented in Object in development industry it is necessary to know the programming oriented to object. This course also taught me the naming convention for variables, functions, methods, classes which made my programming more understandable to me.

- **CSC306 Algorithms :** Late Ali Shihab Sabbir sir was the person who made me realise that **Thinking** is an art. Approach to solve a problem, thinking, unthinking and rethinking helped me lot to solve the problems I faced during development of TravIngo.
- **CSC401 Database Management :** Database Management is the first course in my undergraduate life that introduced me with the real world problems and approaching strategy to solve them. Visualizing what is going on in a system and how to improve it or automate it was the underlying lesson to me.
- **CSC405 System Analysis and Design :** Learnt about various design and designing tools that make a development process smoother. Designing before developing is the key.
- **CSC 445 Software Engineering :** Stepping stone of Industry level course. The overview of each sections and steps to develop a successful software was taught in this course. How industry works and how to act on situations helped me lot to understand office environment.
- **CSC452 Software Marketing :** The main goal of developing a software is always related to involving users to use the software. How to do that and what should be done to reach the goal, different aspects to increase the usage and why a software fails were taught.
- **CSC455 Web Applications and Internet :** Developing a responsive, user-friendly website is the stepping stone for user engagement. The software or the web application is the face, the performance of the website is the impression. The lessons I learnt in this course helped me to create TravIngo.
- **CSC457 Project Management :** Thinking from the perspective of a Project Manager was the whole idea of this course. During writing this report and analysis this course played an instrumental role.

There are also some other courses that are not directly involved in the process but the courses provided by our department has really developed me as a person,developer, project manager. I really appreciate and grateful for these informative and interesting courses.

2.2 Related works

- Booking.com : Founded in 1996 in Amsterdam, Booking.com has grown from a small Dutch startup to one of the world's leading digital travel companies. Part of

Booking Holdings Inc. (NASDAQ: BKNG), Booking.com's mission is to make it easier for everyone to experience the world. Booking.com is available in 43 languages and offers more than 28 million total reported accommodation listings, including over 6.2 million listings alone of homes, apartments, and other unique places to stay. No matter where you want to go or what you want to do, Booking.com makes it easy and backs it all up with 24/7 customer support. [9]

- Agoda.com : Agoda is one of the world's fastest growing online travel booking platforms. From its beginnings as an e-commerce start-up based in Singapore in 2005, Agoda has grown to offer a global network of 2 million properties in more than 200 countries and territories worldwide. It provides travelers with easy access to a wide choice of luxury and budget hotels, apartments, homes, and villas to suit all budgets and travel occasions.Headquartered in Singapore, Agoda is part of Booking Holdings (Nasdaq: BKNG) and employs more than 4,000 staff in more than 30 countries. Agoda.com and the Agoda mobile app are available in 38 languages. [10]

- trivago.com : We are a metasearch engine that compares accommodation prices and offers provided to us by many different online booking sites. From lavish five-star hotels to intimate vacation rentals, accommodation options are endless. We compare and display different offers from many booking sites, and they pay us a fee if a user clicks on their specific deal. We are not a party to any booking agreement between you and the site or hotel you book with. We do not collect any payments for your stay and are not liable for the services offered by the booking site and the accommodation provider. trivago works with many booking sites worldwide, including online travel agencies, as well as hotel chains and independent hotels. In total, trivago's sites cover more than 2.5 million hotels and other types of accommodations across approximately 190 countries. [11]

- Yatra.com : Yatra Online Pvt Ltd based in Gurgaon India, is one of India's leading online travel companies and operates the website Yatra.com. The company provides information, pricing, availability, and booking facility for domestic and international air travel, domestic and international hotel bookings, holiday packages, buses, trains, in city activities, inter-city and point-to-point cabs, homestays and cruises. As a leading platform of accommodation options, Yatra provides real-time bookings for more than 83,000 hotels in India and over 800,000 hotels around the world. [12]

- Amarroom.com : Founded in 2017, Amarrom has grown meaningful over the past year into a leading domestic travel platform. The company says it has the largest collection of domestic hotels across Bangladesh, domestic airlines, bus tickets on its platform, serves north of 4000 bookings per month and generates around 200

million BDT in annual revenue from domestic travel alone. The company aims to be the dominant domestic travel platform in Bangladesh. [13]

- Hotel.com.bd : HOTEL.COM.BD is one of the fastest growing online travel portals in Bangladesh, offering travelers an extensive selection of hotels, activities, and travel services to meet every budget and activities of every kind at competitive rates. With over hundreds of hotel partners around the Bangladesh and a comprehensive offering of flight inventory made available on the website, travelers can book everything they need for a holiday – rooms to meet every budget, activities of every kind and travel services to complement. Our hotel reviews will help you find the best deal in the right location. Whether you are travelling last minute, as a family or need a hotel for business we have the right hotel deal for you. We also have a 24-hour phone line if you would prefer to speak to someone. Find, compare and book great hotels at great prices all at HOTEL.COM.BD [14]

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

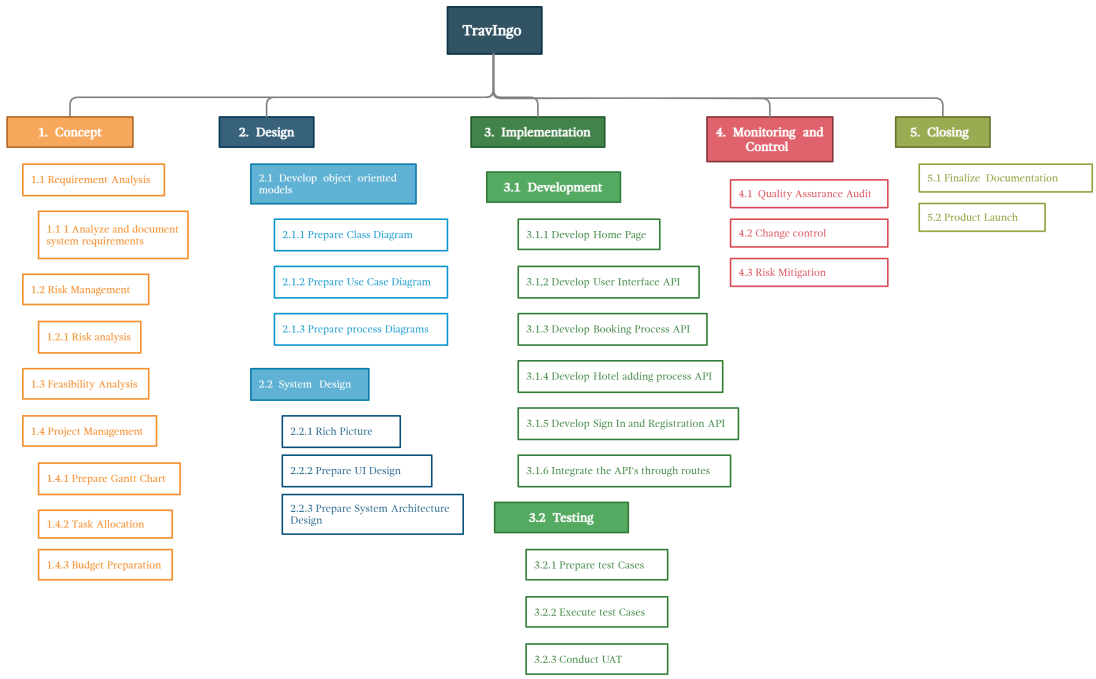

Figure 3.1: Work Breakdown Structure of TravIngo

The Work Breakdown Structure is the principal tool that articulate scope on our project. The WBS of TravIngo is written in a set of activities or task. As a result it became easier for me to find out the activities that need to be done to complete the project. The complete list of activities are given below:

Serial	Activities
1	Analyze and document system requirements
2	Risk Analysis
3	Feasibility Analysis
4	Work Breakdown Structure
5	Prepare Gantt Chart
6	Budget Preparation
7	Prepare Class Diagram
8	Prepare Use Case Diagram
9	Prepare Process Diagrams
10	Rich Picture
11	Prepare System Architecture Design
12	Prepare UI Design
13	Develop Home Page
14	Develop User Interface API
15	Develop Booking Process API
16	Develop Hotel adding API
17	Develop Sign in and Registration API
18	Integrate the APIs through routes
19	Prepare Test cases
20	Execute test cases
21	Conduct User Acceptance Test
22	Quality Assurance Audit
23	Change Control
24	Risk mitigation
25	Finalize documentation

Table 3.1: List of activities

3.2 Activity wise Time Distribution

Before distributing time per activity we need to sequence them first. Then with the 3 point estimation technique we will calculate time taken for each of these activities. The activity sequence and estimated time taken by each activity is as follows:

Serial	Activities	Dependencies	Time Duration (Man-Hour)
1	Analyze and document system requirements		40
2	Risk Analysis	1	16
3	Feasibility Analysis	2	24
4	Work Breakdown Structure	3	32
5	Prepare Gantt Chart	4	8
6	Budget Preparation	5	24
7	Prepare Class Diagram	6	24
8	Prepare Use Case Diagram	7	24
9	Prepare Process Diagrams	8	24
10	Rich Picture	9	6
11	Prepare System Architecture Design	10	30
12	Prepare UI design	11	32
13	Develop Home Page	12	8
14	Develop User Interface API	13	24
15	Develop Booking Process API	14	24
16	Develop Hotel adding API	15	24
17	Develop Sign in and Registration API	16	32
18	Integrate the APIs through routes	17	48
19	Prepare Test cases	18	30
20	Execute test cases	19	120
21	Conduct User Acceptance Test	20	40
22	Quality Assurance Audit	21	18
23	Change Control	22	16
24	Risk mitigation	23	24
25	Finalize documentation	24	40

Table 3.2: Activity wise time distribution

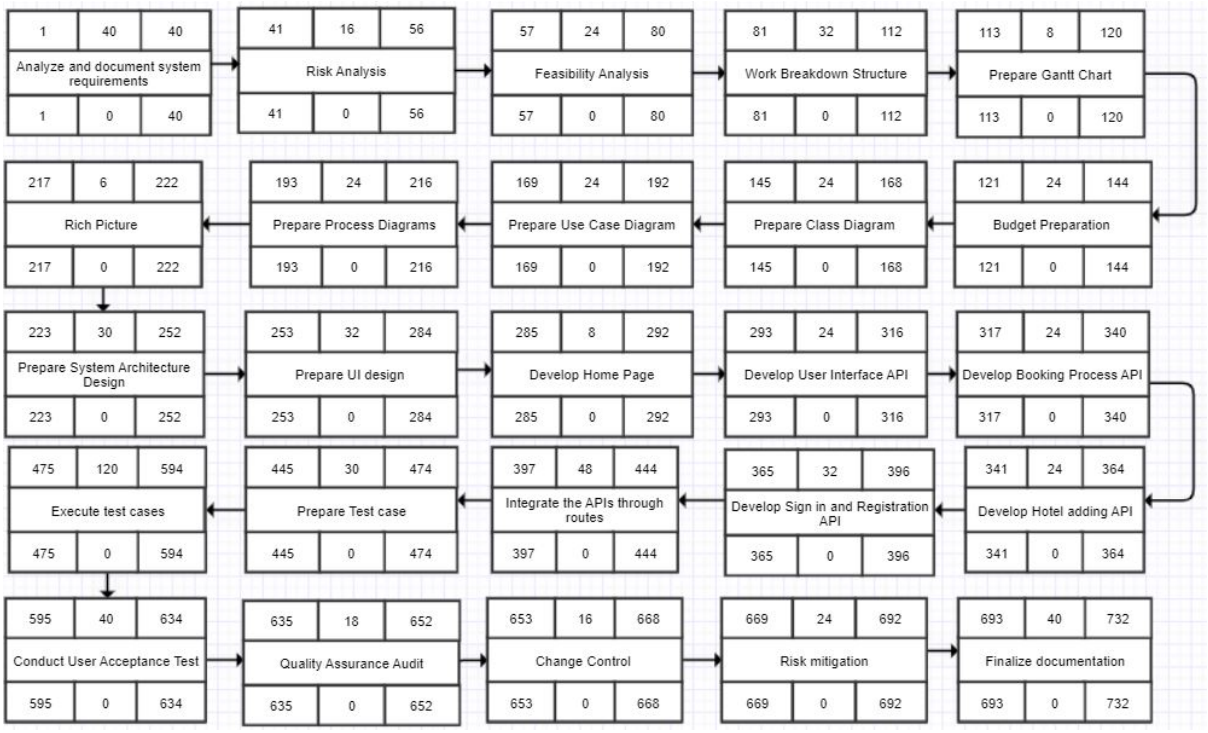

Figure 3.2: Critical Path Analysis from Network Diagram

3.3 Gantt Chart

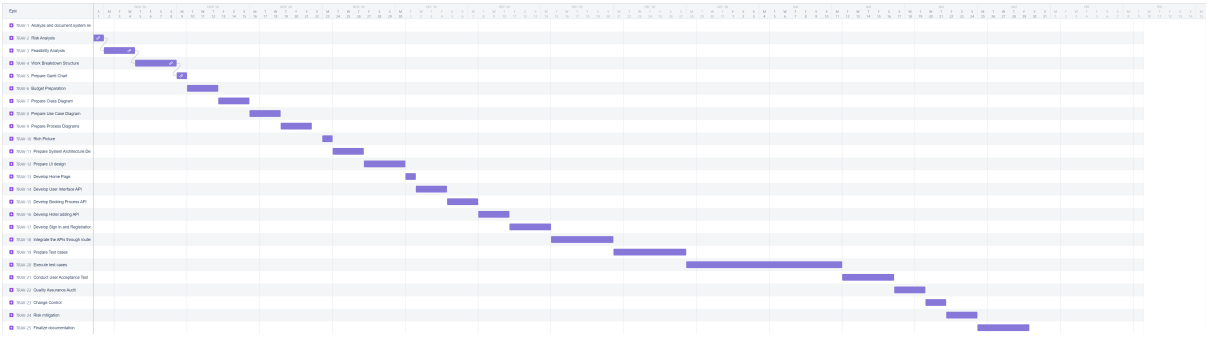

Figure 3.3: Gantt Chart

3.4 Activity wise Resource Allocation

We figured out the activities that need to done to complete the project while developing WBS. Before allocating resource per activity we need to figure out what resources and we have and a way to distribute them so that the project can be completed within the estimated time and follow along the critical path.

Serial	Activities	Dependencies	Resource Allocated
1	Analyze and document system requirements		Project Manager, Business Analyst, Tech Lead
2	Risk Analysis	1	Project Manager, Tech Lead
3	Feasibility Analysis	2	Project Manager
4	Work Breakdown Structure	3	Project Manager
5	Prepare Gantt Chart	4	Project Manager
6	Budget Preparation	5	Project Manager
7	Prepare Class Diagram	6	Business Analyst
8	Prepare Use Case Diagram	7	Business Analyst
9	Prepare Process Diagrams	8	Business Analyst
10	Rich Picture	9	Business Analyst
11	Prepare System Architecture Design	10	Tech Lead
12	Prepare UI design	11	Developer
13	Develop Home Page	12	Developer

Serial	Activities	Dependencies	Resource Allocated
14	Develop User Interface API	13	Developer
15	Develop Booking Process API	14	Developer
16	Develop Hotel Adding API	15	Developer
17	Develop SIgn In and Registration API	16	Developer
18	Integrate the APIs through routes	17	Developer
19	Prepare Test Cases	18	Quality Control Engineer
20	Execute test cases	19	Quality Control Engineer
21	Conduct user acceptance test	20	Project Manager, Tech Lead, System Admin ,Quality control Engineer
22	Quality Assurance Audit	21	Quality Assurance Engineer
23	Change Control	22	Project Manager, Quality Assurance Engineer
24	Risk Mitigation	23	Project Manager, Tech Lead
25	Finalize Documentation	24	Project Manager

Chapter 4

Methodology

4.1 Web Application Methodology

Web applications have grown very unexpectedly in these recent years but due to difference between web applications and software applications, their development methodologies differ in many ways. Application development methodologies are promoted as a means of improving the management and control of the application development process, structuring and simplifying the process, and standardizing the development process and product by specifying activities to be done and techniques to be used.

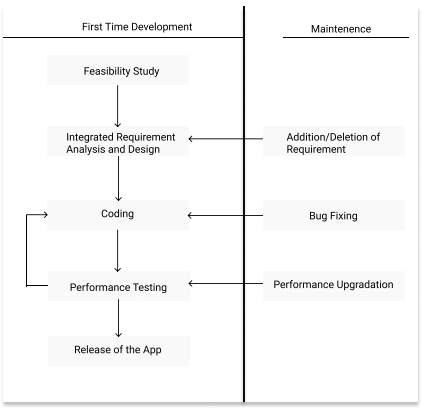

Figure 4.1: Development of Web Application Integrating Requirement Analysis and Designing Phase.

Extreme Programming (XP) is one of the most popular agile approaches to develop the web applications. Figure shows over all process of development of web application for SMEs (small and medium enterprises) integrating requirement analysis and designing phase using XP practices. XP concentrates on delivering executable code and automated test drivers rather than spending effort on paper based requirement and design documentation part. Building small teams for development helps in avoiding documentation part as face to face communication can take place effectively. [15]

4.2 Development Tools

In the process of development of TravIngo several modern development tools were used namely Bootswatch theme for bootstrap, Node.js, Express, MongoDB to make the process smoother we mostly followed MVC (Model View Controller) pattern. Each of these powerful technologies provides the developers with different frameworks and modules which help their development flexible and smooth. We also used HTML, CSS, JavaScript in some page design.

- **Bootswatch:** Bootswatch is open source and developers are welcome to modify the themes. Each theme consists of two SASS files. _variables.scss , which is included by default in Bootstrap, allows you to customize the settings. _bootswatch.scss introduces more extensive structural changes.It is easy to install and customize which offers a great deal of opportunity by including bootstrap, google fonts and font awesome icons by default to the developers to build responsive websites. [16]

- **Node.js:** Node.js is a JavaScript run-time built on Chrome's v8 JavaScript engine. As an asynchronous JavaScript run-time Node.js is designed to build scalable network applications.Node.js applications are event-based and run asynchronously. Code built on the Node platform does not follow the traditional model of receive, process, send, wait, receive. Instead, Node processes incoming requests in a constant event stack and sends small requests one after the other without waiting for responses.Node pack manager i.e. npm allows the user to choose from thousands of free packages (node modules) to download. [17]

- **Express:** Express is a minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications. Rather than writing the code using Node.js and creating loads of Node modules, Express makes it simpler and easier to write the back-end code. Express helps in designing great web applications and APIs. Express supports many middle-ware which makes the code shorter and easier to write [18]

- **MongoDB:** MongoDB MongoDB is a cross-platform document-oriented database program. Classified as a No-SQL database program, MongoDB uses JSON-like documents with optional schema. [19]

- **Git:** Git is a free, open-source distributed version control system. It is used for tracking changes in source code during software development. It is designed for coordinating work among programmers, but it can be used to track changes in any set of files. Its goals include speed, data integrity, and support for distributed, non-linear workflows. Version control is a system that records changes to a file, or set of files, over time so that specific versions can be recalled later. [20]

Chapter 5

Body of the Project

5.1 Work Description

TravIngo is a web application for booking hotels with ease. The goal of this project is to build a user-friendly platform through which users can book their hotels before arriving their destination and build a community of like minded people. TravIngo will also act as a bucket list for fancy travelers who want to travel around the country.

5.2 System Analysis

5.2.1 Six Element Analysis

Process	**Human**	**Non-Computing Hardware**	**Computing Hardware**	**Software**	**Database**	**Network & Communication**
Visit Home screen	User	N/A	Smartphone /PC	Web browser	MongoDB	WAN/LAN
View hotels	User	N/A	Smartphone /PC	Web browser	MongoDB	WAN/LAN
View single hotel	User	N/A	Smartphone /PC	Web browser	MongoDB	WAN/LAN
Search for hotels	User	N/A	Smartphone /PC	Web browser	MongoDB	WAN/LAN

Table 5.1 continued from previous page

Process	**Human**	**Non-Computing Hardware**	**Computing Hardware**	**Software**	**Database**	**Network & Communication**
Sign in/up	User	N/A	Smartphone /PC	Web browser	MongoDB	WAN/LAN
Reserve hotels	User	N/A	Smartphone /pc	Web browser	MongoDB	WAN/LAN

Table 5.1: Six Element Analysis

5.2.2 Effect and Constraints Analysis

- The individual user API should work independently. They should not have any dependency on each othe.
- There cannot be any outage or downtime while integrating features into the system or while integrating other third-party API in the system.
- While new features are being added, the users will still be using some third-party solutions side-by-side. So, data consistency needs to be maintained with the third-party applications.

5.3 System Design

5.3.1 Rich Picture

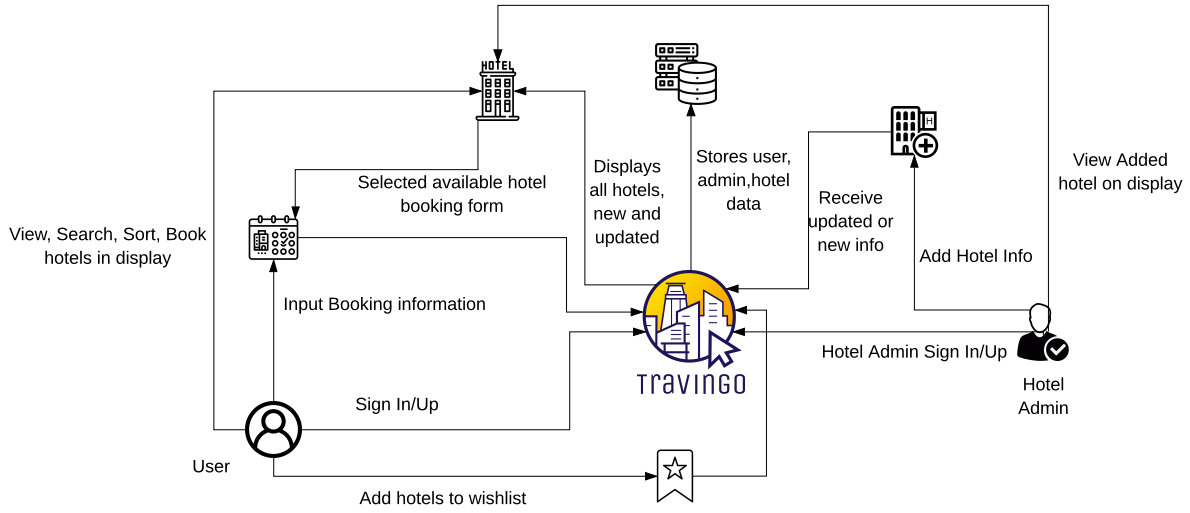

Figure 5.1: Rich Picture

5.3.2 UML Diagrams

Structural Diagram: Class Diagram

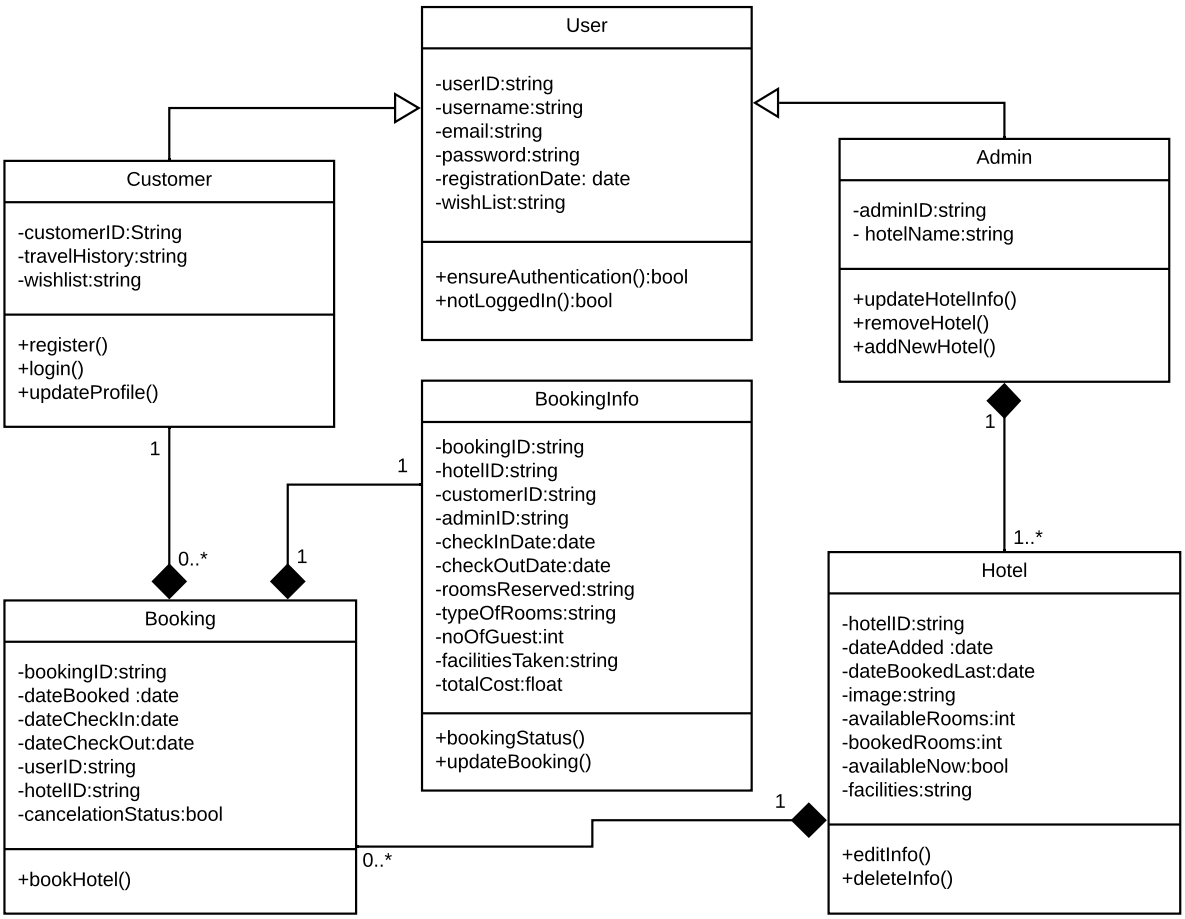

Figure 5.2: Class Diagram

Behavioral Diagram: Use Case Diagram

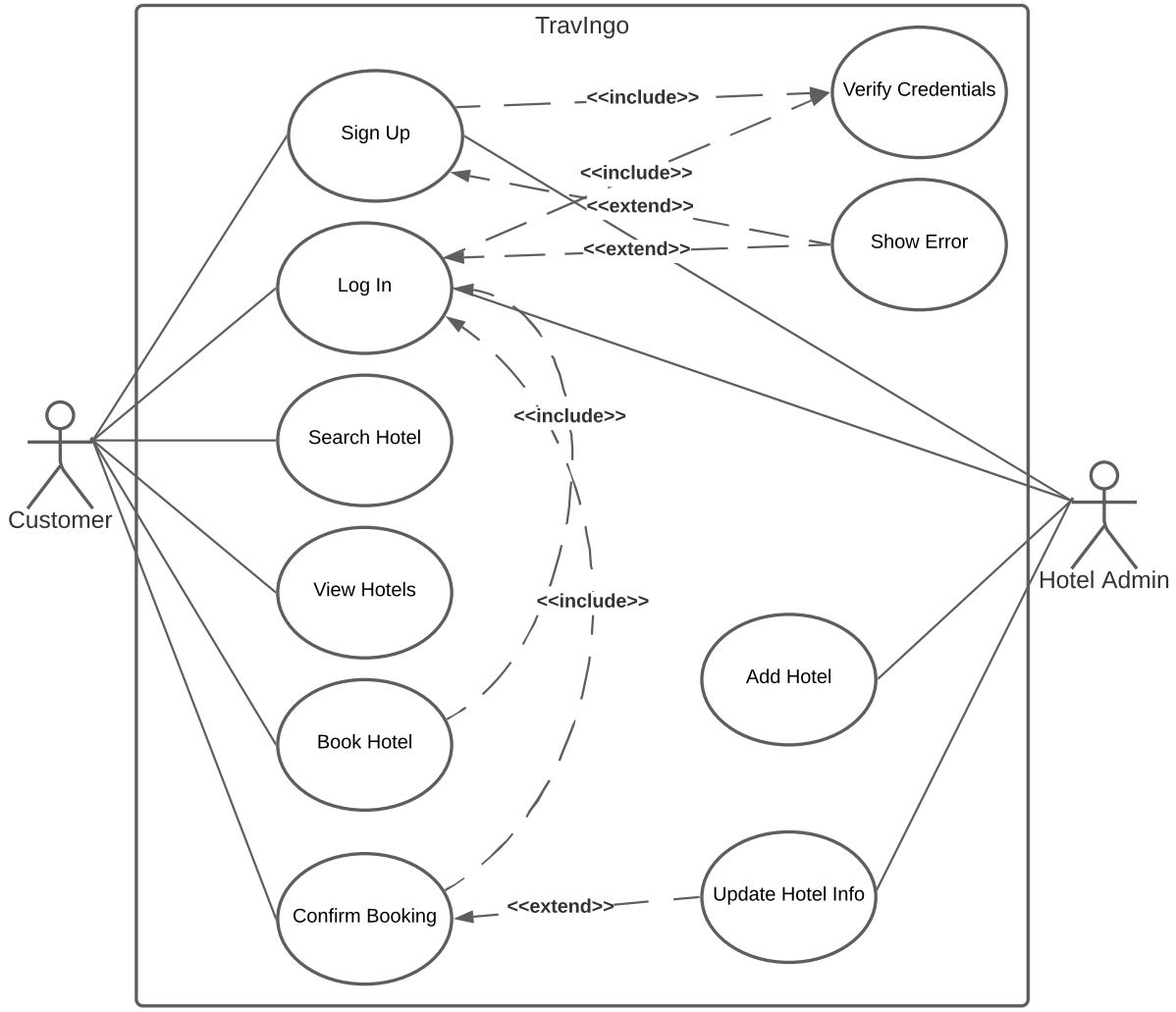

Figure 5.3: Use Case Diagram

5.3.3 Process Diagrams

Sign Up Process

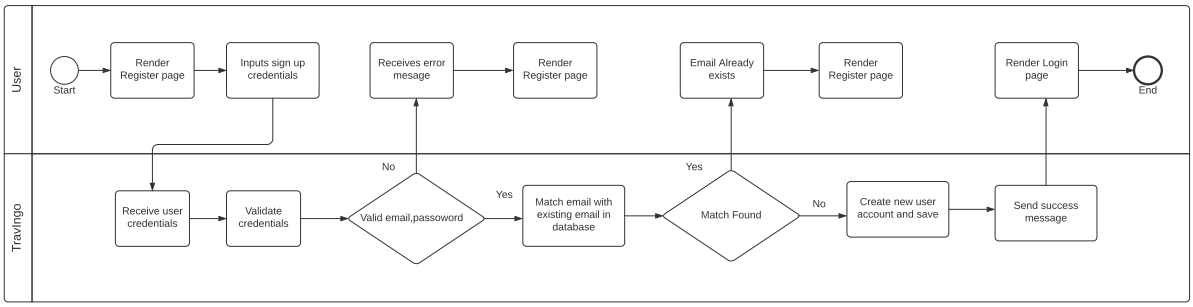

Figure 5.4: Sign up process

Sign In Process

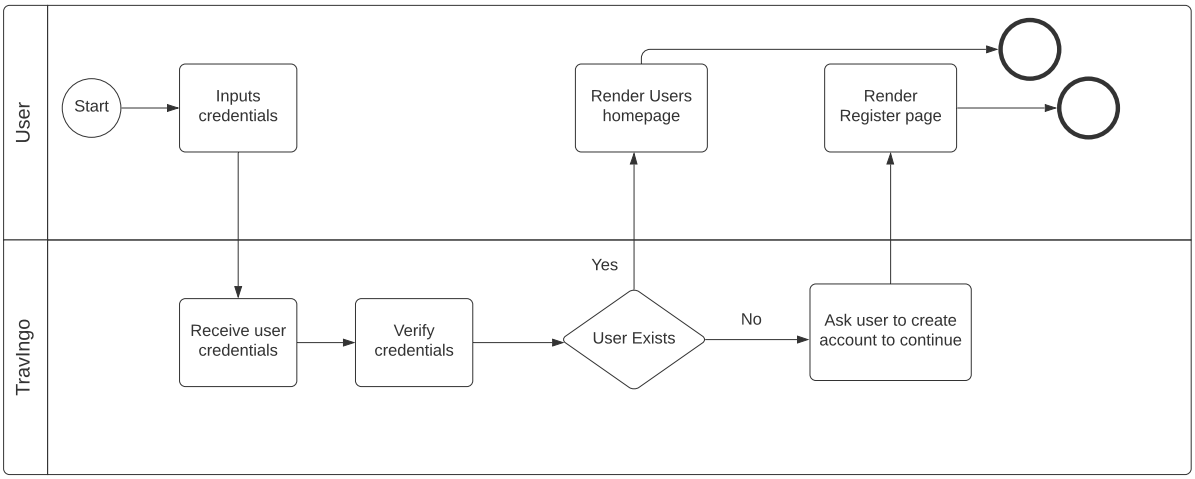

Figure 5.5: Sign in process

Hotel Booking Process

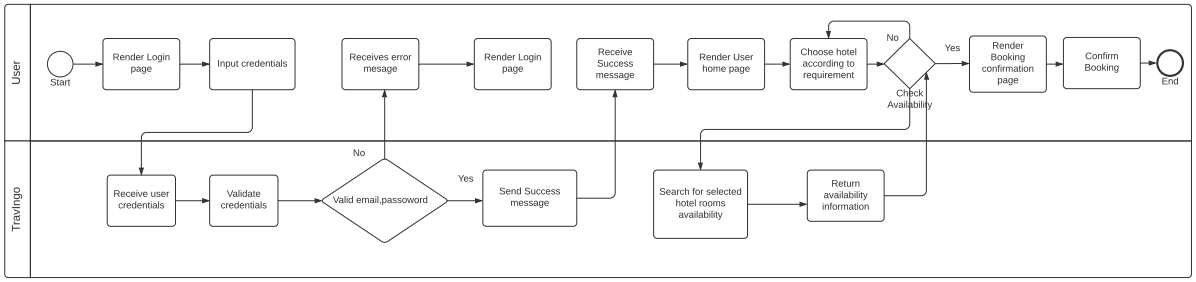

Figure 5.6: Hotel Booking Process

5.3.4 Functional and Non-Functional Requirements

Functional Requirements

Name of the function: User sign up		
Precondition: User must be connected to internet		
Input: 1. Username 2. Email 3. Password	Process: An API will be called by server to save the user to the database	Output: New User will be created and added to the users collection in database
Alternate options: 1.If the user does not input username, email or password, the system will warn and user will not be added. 2. If password length is less than 6 characters, system will warn and user will not be added. 3. If the email does not match valid email format, the system will warn the user and account will not be created.		
Post-condition: User will get a success message and redirected to login page.		

Table 5.2: User Sign up function

Name of the function: User sign in		
Precondition: User must be connected to internet and should have existing account		
Input: 1. Email 2. Password	Process: An API will be called by server to match existing users in database to find the user	Output: User will be logged into the system
Alternate options: 1.If the user does not input email or password the system will warn and user will not be added. 2. If password does not match, system will warn and user will not be added. 3. If the email does not match existing email, the system will warn the user and account will not be created.		
Post-condition: User will get a success message and redirected to home page.		

Table 5.3: User Sign in function

Name of the function: User booking hotel		
Precondition: User must be connected to internet and must have existing account		
Input: 1. Number of rooms 2. Check-In and Check-out date 3.Number of guests 4.Preferred room type	Process: An API will be called by server to match existing hotel in database to find the availability	Output: Selected hotel room will be booked for the user
Alternate options: 1.If the user is not logged into the system it will warn before booking and booking will be unsuccessful. 2. If the hotel is unavailable, system will show the an error message and the booking will be unsuccessful.		
Post-condition: User will get a success message and redirected to confirmation page.		

Table 5.4: User booking hotel

<table>
<tr><td colspan="3">Name of the function: Hotel admin adding hotel</td></tr>
<tr><td colspan="3">Precondition: User must be connected to internet and must have existing account</td></tr>
<tr><td>Input:
1. Hotel Name
2. Location
3.Hotel photo
4.Available rooms
5.Rooms category
6.Facilities provided
7.Price per room
8.Rating</td><td>Process:
An API will be called by server to match existing hotel in database. If there is no existing data, hotel will be added to database.</td><td>Output:
Added hotel will be shown in home page.</td></tr>
<tr><td colspan="3">Alternate options: 1.If the user is not logged into the system it will warn before adding and hotel addition will be unsuccessful.
2. If the hotel already exists, system will show the user an error message and hotel addition will be unsuccessful.</td></tr>
<tr><td colspan="3">Post-condition: User will get a success message and redirected to homepage page.</td></tr>
</table>

Table 5.5: Hotel addition by hotel admin

Non-Functional Requirements Non-functional requirements of TravIngo are briefly discussed below:

- **Performance:** represents the performance of the system which is required to exhibit and to meet the needs of users. Performance describes the acceptable throughput rate and acceptable response time. This application should provide a smooth experience for the user and should have no input lag if the device has a certain minimum hardware specification.
- **Efficiency:** represents the system's ability to produce outputs with minimal waste. We have tried to eliminate duplicate steps in the processes and to use the resources in an efficient way. Keeping our code non repetitive by using reusable code and components is how we achieved efficiency.
- **Security and Control:** Security and administrations are always a concern for any system. All information on the server side and client side is secured. Only the application administrators and developers have access to core code of the application to be able to directly manipulate any sort of information. In this project, node.js and express.js have been used for back-end technology, which have various layers of security, where security requirements for this system have been taken care of. Control requirements represent the environment in which the system must operate,

as well as the type and degree of security that must be provided. Access to the system or information must be controlled with the privacy requirements.

- **Scalability:** There is one standard User interface designed for the look and feel of the application. The application can be expanded to accommodate many further modules without making any changes to any existing modules. The application is created in such a way that the developers can easily maintain both the server and client sides.

5.4 Product Features

5.4.1 Architecture

Software architecture is what defines and structures a solution that meets technical and operational requirements. Software architecture optimizes attributes involving a series of decisions, such as security, performance, and manageability. It describes the organization and interaction of software components. There are many types of architectures that are used among them. the **Client-Server Architecture** was used for the "Slice and dice" Web application. To make the User Interface code easier to maintain and test MVC (Model View Controller) pattern was partly used.

Chapter 6

Project as Engineering Problem Analysis

6.1 Sustainability of the Project

Sustainable development is a systematic concept relating to the continuity of economic, social, institutional, and environmental aspects of human society as well as the non-human environment. It is characteristic of a process or state that a business can be maintained at a certain level indefinitely. The definition of sustainability may vary depending on the area of studies or interaction or the context or situations over many scales of space and time from small ones to global balance of production and consumption. It is a proven truism that most projects are failing because of the lack of an appropriate sustainability plan. It is therefore very necessary for a comprehensive analysis of the social, economic, legal, cultural, educational, and political environments for project implementation. [21]

Some sustainability measures are as follows:

- **Social Desirability :** Due to COVID-19 people are not travelling much either for work or entertainment. But the rate is not that low. It is better to stay in hotel rather than relatives these days due to safety issues. Neither the guest nor the host knows who is the carrier. So more people will be interested to stay in hotels to reduce the outspread of corona.
- **Economic Sustainability :** With future updates and feature TravIngo will be a full fledged website with huge user base. Hotels putting their information will have more exposure to the clients which will increase their chance of getting more customers.More customers means better business. The initial release will be free of cost for advertising hotels but as the user base grows we plan to introduce premium features for hotels to get more exposure which will help to grow revenue.

- **Technical Feasibility :** As we are planning to grow TravIngo into a full fledged website there are more features to be added which will make the project heavy and there are technologies out there to be adapted in those scenarios. No matter what amount of users interact the quality of service will not deteriorate. Thus the project is Technically feasible and sustainable.

6.2 Social and Environmental Effects and Analysis

- **Social Effects and Analysis:** TravIngo aims to engage more people on travelling by providing list of affordable hotels and exciting offers.Thus a chance of growing local business around hotel vicinity will help more locales economically. A platform for like minded people will grow with the upcoming features like comments and rating, writing blogs. People will be interested in sharing their experience which will help to exercise their freedom of speech in a healthy way.

- **Environmental Effects and Analysis:** Out of the 17 billion cubic feet of trees deforested each year, over 60% are used to make paper. [22] As most of the transactions and all of the booking, checking in/out process will be done through TravIngo, it will reduce pressure on paper by taking the amount of printing near to zero through which it will grow into a greener business model which the world currently needs most.

6.3 Addressing Ethics and Ethical Issues

In 21st Century data breaching affecting millions of users are far too common. Many renowned websites and organizations collects user data but intention is not same for all. While developing TravIngo into a bigger platform, we will try to follow some ethical guidelines so that the user data remains safe with us and also the user should feel safe. Some ethical guidelines that will be follwed are as follows:

- **Relevant Data Collection:** The application will only collect relevant user data to provide them customize feed for better user engagement.

- **Strict policy of not sharing or selling data:** As payment gateway will be introduced so the data collected will not be entertained for any third-party.

- **User Data security:** As most user data are saved on cloud only the application administrator can access them so they can be opined secure.

- **Strict policy on Third party services and API usage:** TravIngo does not violate any rules of the third party services or API that have been and will be used in development stage.
- **Relevant advertisements:** Advertisements related to hotels and offers provided by the hotels will be entertained. No other advertisements which are irreverent fellow customers will not be shown in any way.

Chapter 7

Future Work & Conclusion

7.1 Future Works

TravIngo, is continuing to evolve as we plan to add more feature to make it full-fledged website. Some of the key feature that we want to include are:

- Add more hotels
- Improve existing features
- Add more features for users
- Add rating feature
- Add hotel admin feature so that the hotelier can update existing hotel information along with room availability
- Include payment gateway to monetize the application
- Add vehicle service
- Add foreign hotels
- Include participation of hotel management all over the country

The current version is a primary version of a Online hotel booking system which needs a great deal of development to be a full-fledged website.There are so many competitor out there and to compete them so much needs to be done. Our final goal is to make the website to be one of the best hotel booking sites of the country.

7.2 Conclusion

It was a great pleasure and wonderful experience for me to working with Rose IT. During this period I learnt a lot. I learnt about some cutting-edge technology during this period and I was pushed to adapt rapidly to come up with better solution to complete the project. This opportunity to work has paved the way for me to investigate the development environment and a taste of real world work experience. I would like to thank Rose IT again for giving me this opportunity and people who supported me during this time.

Bibliography

[1] R. Bemile, A. Achampong, and E. Danquah, "Online hotel reservation system," *International Journal of Innovative Science, Engineering & Technology*, vol. 1, no. 9, pp. 583–588, 2014.

[2] E. McVicar, "Hotel booking, from start to finish," 2011.

[3] L. Hotelier, "How do hotel reservation systems works?."

[4] J. W. Palmer and L. B. Eriksen, "Digital newspapers explore marketing on the internet," *Communications of the ACM*, vol. 42, no. 9, pp. 32–40, 1999.

[5] G. Schneider and J. Perry, "Electronic commerce thomson learning," *Boston MA*, 2001.

[6] R. Law and A. Cheung, "A study of online hotel reservations on asia pacific-based, european-based, and north american-based travel websites," *Hospitality Review*, vol. 24, no. 1, p. 4, 2006.

[7] Wikipedia, "Online hotel reservations."

[8] G. A. Delizo and M. A. Esguerra, "Online hotel reservation and management system for the college of international tourism and hospitality management (cithm)," *International Journal Of Computers & Technology*, vol. 10, no. 1, pp. 1201–1229, 2013.

[9] Booking.com, "About booking.com," 1996.

[10] Agoda.com, "About agoda," 2005.

[11] trivago.com, "Our story," 2005.

[12] yatra.com, "About yatra," 2006.

[13] F. S. Future Startup, "Building the largest domestics travel platform in bangladesh: An interview with md. imrul hasan, founder and ceo, amarroom," 2019.

[14] hotel.com.bd, "About us."

[15] S. R. Kumar, R. Sharma, and K. Gupta, "Strategies for web application development methodologies," in *2016 International Conference on Computing, Communication and Automation (ICCCA)*, pp. 160–165, 2016.

[16] T. Park, "Bootswatch."

[17] OpenJS, "Node.js."

[18] OpenJS, "Express."

[19] I. MongoDB, "The database for modern applications."

[20] B. S. Scott Chacon, "git–distributed-even-your-workflow-isnt."

[21] J. Morfaw, "Fundamentals of project sustainability," in *PMI® Global Congress 2014—North America*, Phoenix, AZ. Newtown Square, PA: Project Management Institute.

[22] C. D. Solutions, "Cutting down paper, not trees," 2018.