An Undergraduate Internship on Homeland

By

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Summer, 2021

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Supervisor's Designation

Department of Computer Science & Engineering

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September 11, 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

This is to certify that the report titled "Homeland Website" is completed by me, Ragib Ibne Hossain (1611049), 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 Mr.Asif Bin Khaled(Supervisor). I also certify that all my work is original which I have learned during my Internship. All the sources of information used in this project and report has been duly acknowledged in it.

11-09-2021

Signature

Date

Write Your Name Here

Name
Ragib Ibne Hossain

Acknowledgement

Above all, I want to convey my thankfulness to Almighty Allah for allowing me to persevere and buckle down. It is to my advantage that I was hired by Aveneur Solutions. I would like to express my heartfelt gratitude to my director, Asif Bin Khaled, Lecturer, Department of Computer Science and Engineering, Independent University, Bangladesh, for his important guidelines, helpful reactions, and, most importantly, a one-of-a-kind mentoring that enabled me to face real-world problems and focus on the growing challenges of the professional sector.
I'd also want to thank Zulker Nien (Project Manager, Aveneur Solutions) and Md. Wasif M.Chowdhury (Product Manager). Similarly, I would want to convey my heartfelt gratitude to all Aveneur Solutions. representatives who assisted me in completing this job report. Last but not least, I'd like to express my gratitude to my parents and other family members for their unwavering support.

Ragib Ibne Hossain
September 2,2021
Dhaka, Bangladesh.

Letter of Transmittal

September 2, 2021
Asif Bin Khaled
Lecturer
Department of Computer Science and Engineering
Independent University, Bangladesh.
Subject: Internship Report submission Autumn, 2021.
Dear Sir,

It is a great pleasure and honor to submit my Internship report on Homeland Website under your guidance. I have tried to present my project work, my experiences and achievements in this report. I have completed my Internship from Aveneur Solutions as a Full Stack Web Developer from the 1st of June 2021 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 immense 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,
Ragib Ibne Hossain.

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

Bangladesh is a rapidly developing country that is quickly becoming a digital nation. Over the last decade, the massive expansion in Internet usage has had a significant impact on the lives of millions of individuals across the country. New technologies are fast transforming our communication methods, instructional approaches, and learning opportunities. Businesses and other platforms began selling their services and products online in response to the rising demand for internet access.

Homeland is an interactive, functional, and revenue-generating website for the real estate business called Shukran. The primary purpose of this program is to aid the company in showing a set amount of property listings on their website.

There are hundreds of Real Estate Websites on the Internet, but the purpose of this project is to develop something unique, inventive, and efficient by leveraging cutting-edge technologies such as React.js and TypeScript. The primary goal is to develop a user-friendly website that successfully displays the required findings on the graphical user interface.

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Chapter 1

Introduction

1.1 Background of the Work

In 2021, everyone will have access to the internet. As a result, it is easier for organizations or businesses to reach out to potential customers.Consumers don't always need to get out of their homes for shopping like before. They can order stuff online and the products are sent to their doorsteps. E-Commerce has changed the picture of business all around the world.

In our country, we have platforms like BProperty and Greeko for buying, selling, and renting flats. This platform just assists you in contacting the owner of properties, but the rest of the job is done manually. Also, to make a booking in areas like Bashundhara, Mahakhali DOHS, people have to go to the flat owners and then make a booking or call. More or less, this procedure of flat booking is still manual. Homeland is going to be a residential area in Gazipur, which is known to be an industrial area. Homeland is for people who want to live in a secure place and around nature on an affordable budget. To make a flat booking doesn't require the hassle of going to their office and then making a booking. You can make the booking while sitting comfortably in your home, through their website, and also make the initial payment with it. You don't need to visit the flat since you'll see the interior of the flat from their website. Also, the site will showcase everything available in the area.

1.2 Objectives

HOMELAND has the client interest on top priority. It is not just committed to offer high quality yet affordable housing but also ensures that the entire acquisition process is fair and equitable for the clients. It will strive to ensure that the clients can truly appreciate the value proposition of the entire offering, thus establishing a long-term relationship with the brand based on happiness and trust.

1.3 Scopes

1.3.1 In Scope

- Develop flat booking web application for a residential area
- Maintain the application

1.3.2 Out of Scope

- We will not create any internal communication automation
- We will not use the admin panel
- No free feature updates after 1 months of delivery

1.3.3 Target Audience

- Middle Class families (Main website)
- Homeland internals (Admin panel)

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

In my undergraduate period, I took many courses. But the knowledge earned from the following courses was implented in this project, which are Intro to programming, OOP, Web App and Internet, Software Architecture, and Database Management.

The fundamentals of programming languages were covered in this course. Variables, conditional statements, loops, and functions are among the concepts covered in C++. To create Restful APIs using Asp.net Core, which employs C# as a programming language, you'll need a firm grasp of the subjects taught in this course.We learned how to use objects and classes in the Object-Oriented Programming course. The application's server-side, or backend, will be built utilizing asp.net core. Object-oriented programming is totally followed by Asp.net core. Every line of code we write is contained within a class.Asp.net core runs on C, which is quite similar to Java, which we learned in the OOP course. In the Database Management course, we learned about Entity Relationship Diagrams and SQL. We will develop an ERD based on business needs in this project, and we will query the database using LINQ, which is a query language similar to SQL.We'll also use EF Core to establish a database by defining models with classes and mapping those models to tables.

In this course, we have learnt the basics of HTML, CSS, Javascript, and PHP. We learnt what the frontend or backend of an application is. In the homeland project, the frontend will be developed with React, which is a Javascript framework. React has a special type of field named JSX, which is almost similar to HTML. And for the backend, ASP.net core will be used, which runs on C

We learned about different software architectures in this course and which one to select based on the application's requirements. In this project, we have chosen a Micro-services Architecture for the entire application, where the client side and server side of the application will be developed, tested, and deployed separately. And for server side or

REST API development, we have followed a clean architecture design pattern.

2.2 Related works

Homeland is the first online flat booking platform for a specific residential area. Though there no such projects exactly like this but there are some similiar real estate projects .

BProperty : Bproperty is a real estate portal for buying,selling and renting flats,apartments.

Greeho : Greeho is similiar to BProperty,the core features are buying,selling,renting properties.Greeho has some other features like cleaning service,repair service and so on.

Transition

Previously, in other residential areas in Bangladesh, the booking related activities were done manually. Customers had to go through the hassle of going to the office of the project to place their booking . which was a time and energy consuming task. The advancement of technology has helped the new real estate companies to get rid of the ancient method of flat booking and put it online instead. Homeland is going to be the first online flat booking platform in Bangladesh. Unlike Bashundhara R/A,Mohakhali DOHS, and so on, people will book their flat through the website and also make payment from there.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

The complete project was broken down in 4 phases .

1. Planning
2. Implementation
3. Montoring and Control
4. Deployment

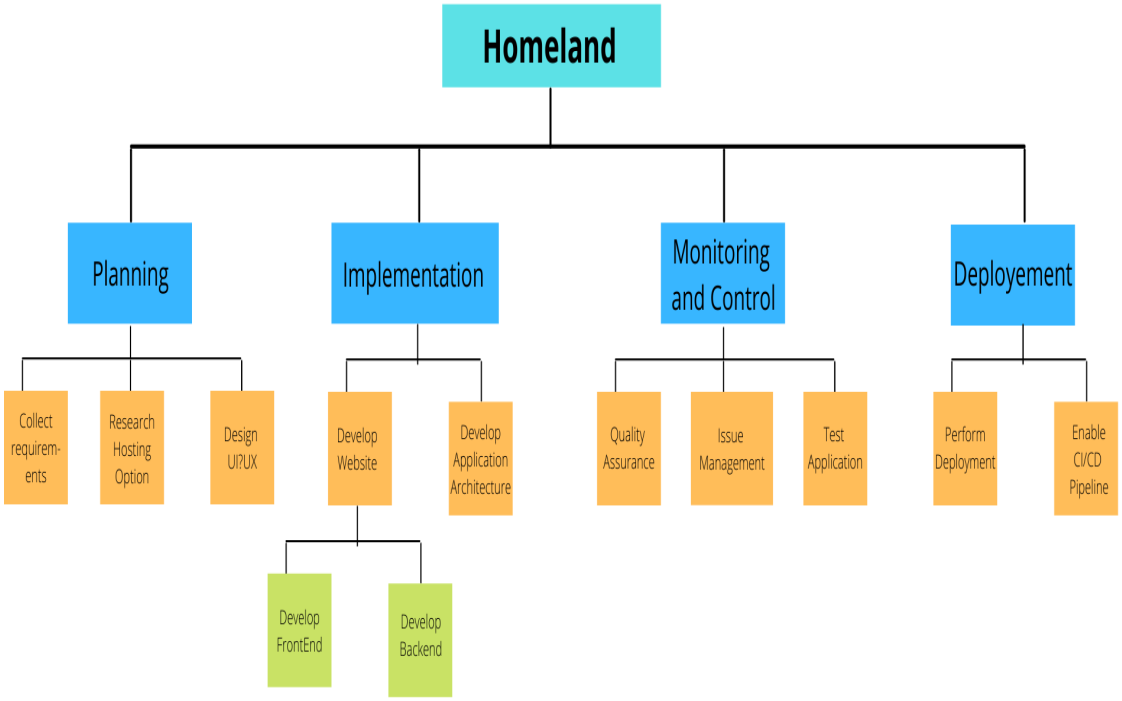


Figure 3.1: Work Breakdown Structure

3.2 Process/Activity wise Time Distribution

Activity	Time
Architecture Planning	3 days
Database Design	7 days
UI/UX Design	7 days
UI Implementation	30 days
REST Api Development	45 days
Deployment	3 days

Table 3.1: Process/Activity wise Time Distribution

3.3 Gantt Chart

The project is to be completed in 3 months . From June to august. Gantt chart is a commonly used graphical depiction of a project schedule. It's is a type of bar chart that shows the start and finish dates of several elements of a project that include resources, milestones, tasks, and dependencies. Gant chart of the project homeland is given below.

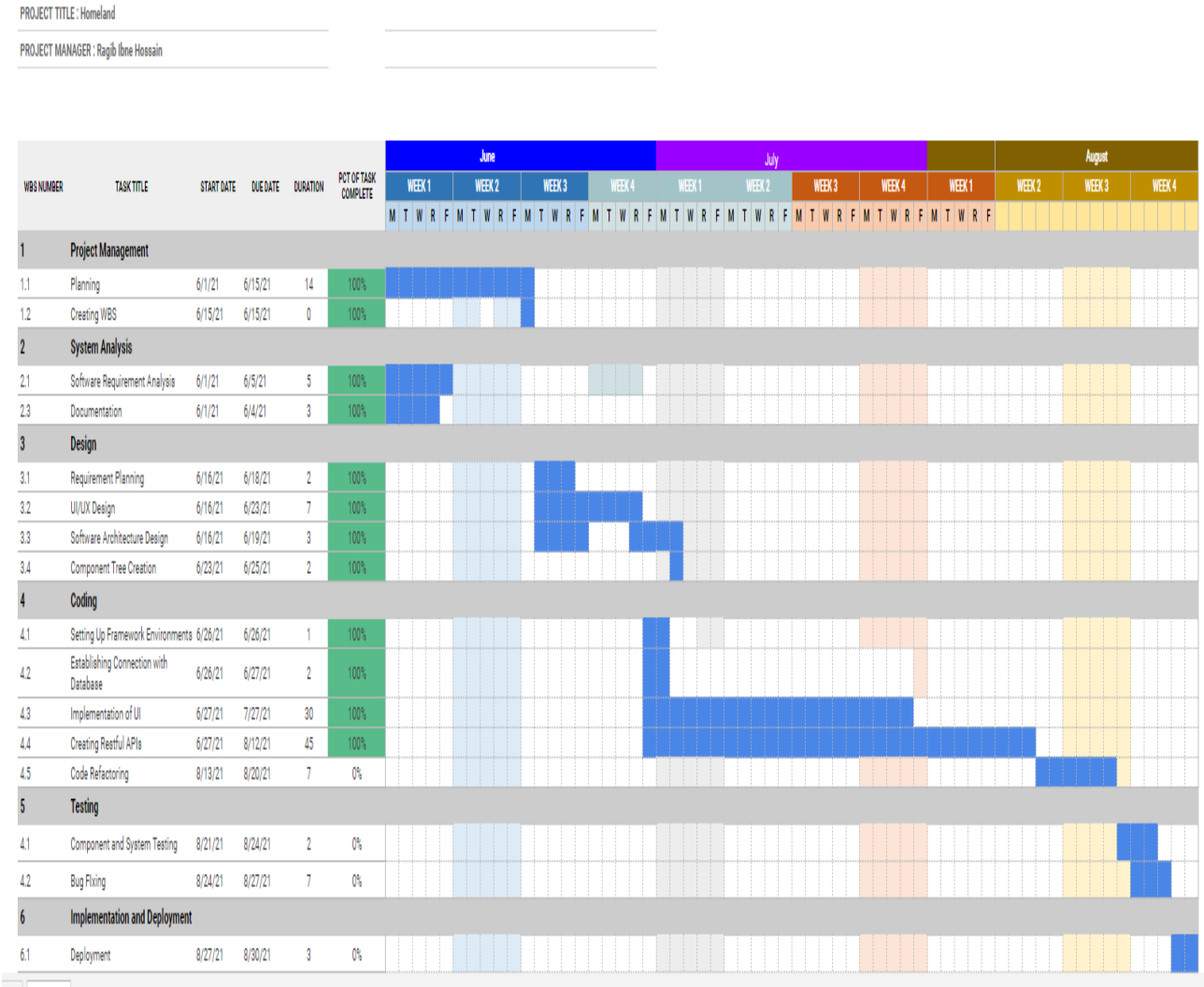


Figure 3.2: GantChart

3.4 Process/Activity wise Resource Allocation

Type of Resource	Name	Description
Hardware	PC	Used to develop the application
	Hard Disk	Used to store the project
	USB Drives	Used to share data offline
	Routers	Used for internet connectivity
Human	Project Manager	Plans and distributes task to devs
	Software Developers	Develops the app based on instruction
	UI/UX Designers	Designs UI/UX based on requirement
Software	VS Code	Code editor, used to write code
	Postman	Used to test APIs
	Windows/Linux	OS
	Github	A version control
Others	Internet	For browsing
	Domain and Hosting	For deploying the site
	SSLCommerz	For payment integration
	SMS Api	For OTP

Table 3.2: Process/Activity wise Resource Allocation

3.5 Estimated Costing

Type of Resource	Name	Price
Human	Project Manager	40000 BDT/month
	Software Developers	350000 BDT/month
	UI/UX Designers	10000 BDT/month
Others	Internet	2000 BDT/month
	Domain and Hosting	5000 BDT/year
	SSLCommerz	20000 BDT
		Total = 286000 BDT

Table 3.3: Estimated Costing

Chapter 4

Methodology

The agile methodology was chosen for this project. It can also be used in iterative development. The selection of agile lead to a successful product delivery. Below I have discussed why we chose Agile over Software Development Methodologies briefly.

Reasons for choosing agile

1. Higher product quality

Because testing is integrated throughout the project development process, the team can perform regular checkups and find areas of improvement.

2. Reduced risk

Working in sprints allowed us get feedback from the client which reduced the risk of project failure.

3. Better visibility into project performance

Agile project management helped the whole team understand the full project . Scrum meetings gave every one a clear view of the entire projcect

4. Increased project control

Team members had the control throughout the project with more opportunities to test and adapt.

5. Better project predictability

Breaking up the project into shorter sprints allowed the project manager to predict the exact cost, timeline, and resource allocation necessary for each sprint.

Chapter 5

Body of the project

5.1 Work Description

Homeland is a web-based application for booking flats for a new residential neighborhood in Gazipur. This application has two different panels, one is for customers and other is for admins who will maintain the website. The entire application was built following the microservice architecture pattern.For the client side development React Js,Semantic UI,Mobx,Axios following libraries were used . My role was to design the database and implement the REST APIs based on the application's business requirements. On the server side, Asp.net core was used. With the support of Entity Framework Core, I used the code first technique to generate a database from models. In development, I used SQLite, while in production, I used SQLServer. Swagger UI, which is included in the newest version of ASP.NET, was used to test the APIs. I utilized github for version control, storing the source code and integrating a CI/CD pipeline in github, allowing for server auto-deployment.

5.2 System Analysis

System analysis is carried out to determine a system's aims and to examine it and its components. This is a problem-solving procedure that determines how effectively the system is performing its functions. Planning, analysis, design, deployment, and maintenance are all included in this phase. It is a method of assessing and gathering data, identifying faults, and dismantling the system into its constituent parts.

5.2.1 Six Element Analysis

Process	Human	Non Computing Hardware	Computing Hardware	Software	Database	Network and Communication
Website Access	Admin ,User	N/A	Dekstop, Laptop, Smartphone	All Browser	SQL Server	WAN
Login /Registration	Admin,User	N/A	Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN
Manage Units	Admin	N/A	Dekstop, Laptop, Smartphone		SQL Server	WAN
Manage Customers	Admin	N/A	Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN
Manage Contents	Admin	N/A	Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN
Manage Bookings	Admin		Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN
Manage Transfers	Admin	N/A	Dekstop ,Laptop ,Smartphone		SQL Server	WAN
Book unit	User	N/A	Dekstop ,Laptop ,Smartphone		SQL Server	WAN
Transfer Unit	User	N/A	Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN
Make Payment	User		Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN
Update Profile	User	N/A	Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN
View Units	Admin, User	N/A	Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN
Manage My Units	User	N/A	Dekstop ,Laptop ,Smartphone	All Browser	SQL Server	WAN

Table 5.1: Six System Analysis

5.2.2 Feasibility Analysis

Feasibility analysis is the examination of a proposed project to determine whether it is feasible and should be pursued. The primary goal of this analysis is to confirm the design, plan, and strategy. Assumptions, restrictions, decisions, and methodologies can all be validated using this method. There are a few key components to a feasibility analysis. They are given below :

1) Technical Feasibility : To develop the application we used current latest technologies . For Client side React 17.0.2 and for REST API asp.net 5 (latest version) . The react application is very smooth and interactive . The framework itself is open source and has a vast community and also cross platform . Asp.net core is also cross platform and open source with a vast community . Since two most reliable software frameworks were used to develop the application, it is going to be feasible technically .

2) Operational Feasibility : While designing the UI/UX the designers made sure the application's user experience is top notch. User friendliness of the application makes it easy for the users use the platform. If the tech savy generation today can use it well it's going to be feasible in future.

3) Economical Feasibility : In my opinion I don't think this application is going to be feasible economically. Since this platform is going to be used for a certain period of time . Because once all the flats in the homealand area is sold the application is not going generate as much as money it generated while there were available units. But economical feasibility can be achieved if they decide to updated the application with some other features.

5.2.3 Problem Solution Analysis

Like every other application, homeland has some problems too.

Problems

Not SEO Friendly : We used npx create react app command to create the client application which by default uses client side rendering . Client Side Rendering makes a website less SEO friendly .

Deadlock : If two different users try to book same unit in the same time. Which might create a deadlock situation.

Server Related Issues : We have selected a third party hosting service from a hosting provider company of bangladesh . If in any case the provider's server is down the system is going to be unaccessible.

Solutions

Not SEO Friendly : Later we will convert the total site to Next.js .Next js provides Server Side Rendering. SSR makes a website SEO Friendly

Deadlock : In the later updates we will use socket programming here to solve this problem

Server Related Issues : We will solve this problem later by migrating to cloud.

5.2.4 Effect and Constraints Analysis

A constraint is a limitation on the degree of freedom with which we can come up with a solution. Constraints are effectively global needs, such as restricted development resources or a top management decision that limits how we create a system. Like every other system Homeland had some constraints.While developing the application we had to keep our focus on the constraints.

5.3 System Design

5.3.1 Rich Picture

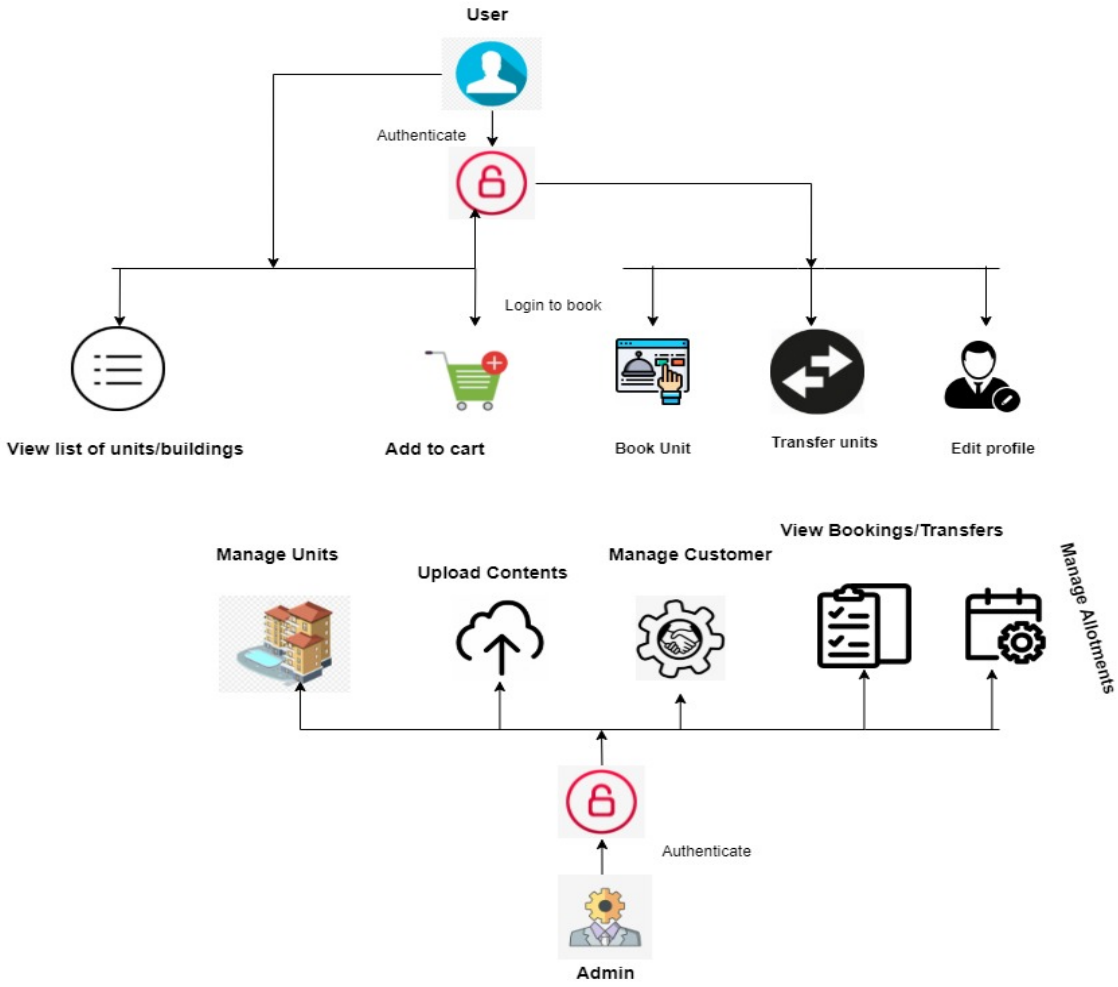


Figure 5.1: Rich Picture

5.3.2 UML Diagrams

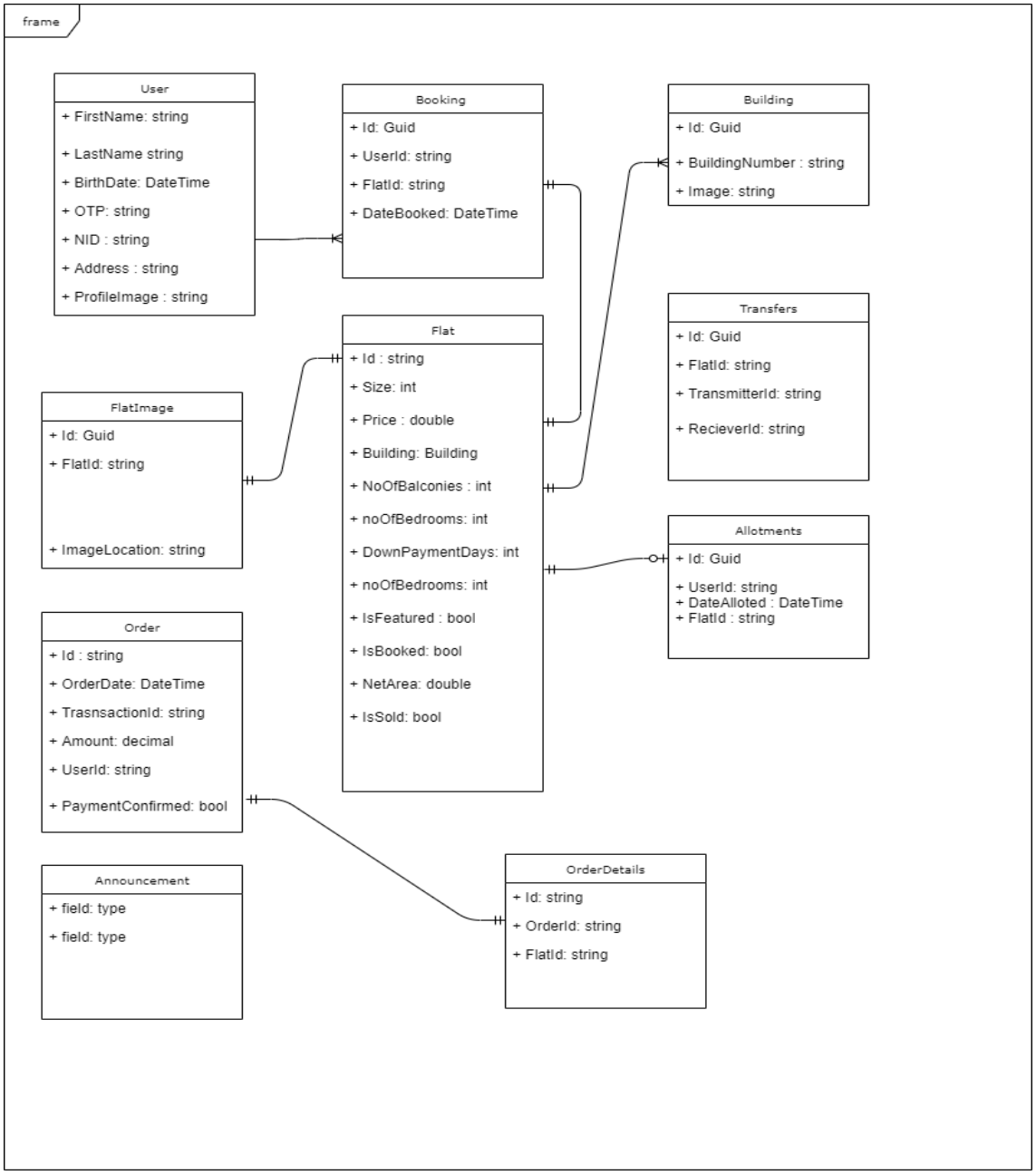


Figure 5.2: Entity Relationship Diagram

Figure 3 : Entity Relationship Diagram

5.3.3 Functional and Non-Functional Requirements

Functional Requirements :

Admin-End			
Functions	Inputs	Process	Output
Login	Enters Credentials and submit	Logs into the account	Gets Redirected to the admin dashboard
Create Units	Enter Relevant data in form and submit	Uploads or updates units and contents	Show Action Successful in a toast message
Delete Units	Click delete button	Deletes the unit	Show Action Successful in a toast message
View Units	Click Unit Management	Fetches desired data from database and renders in client side	Shows data in a table
View Users	Click User Management	Fetches desired data from database and renders in client side	Shows data in a table
View Bookings	Click Unit Management	Fetches desired data from database and renders in client side	Shows data in a table
View Transfers	Click Unit Management	Fetches desired data from database and renders in client side	Shows data in a table
View Allotments	Click Unit Management	Fetches desired data from database and renders in client side	Shows data in a table
Make Allotments	Click make allotment	Turns a booking into allotment	Show Action Successful in a toast message
Search Units	Enter search value and submit	Searches the data from the table	Shows search result in table
User-End			
Login/Registration	Enter Credentials and submit	Logs into the account or creates an account	Gets directed to the landing page
Search unit	Enter Search Parameters	Sends post request with selected parameters	Shows search result in a list
Add to cart	Click on add to cart button	Stores Unit info in local storage and saves in a cart	Toast Success message
Place order	Click on place order button	Makes Post Request to server side	Toast Success Message
Make Payment	Click on Make Payment Button	Calls SSLCommerz API	Redirects to SSLCommerz Payment Window
Transfer Unit	Select Checkbox and Enter reciever's info and submit	Trasnfers Unit to other users account	Toast Success Message
Update Profile	Fill up form and submit	Updates profile record	Toast Success Message
Forget Password	Enter phone number and submit	Sends an Otp to mobile number	Redirects to Set new password Page

Table 5.2: Functional Requirements

Non Functional Requirements : Non-functional requirement specifies the quality attribute of a software system. They judge the Responsiveness, Usability, Security, Portability, and other non-functional standard that are critical to the success of the software system.

- Only Authorized Admins can access admin panel
- Only Authorized users can book or transfer flats
- Reciever must have an account
- One flat can be transferred only once
- Booking will be cancelled in 5 mins if user doesn't make payment
- User can book only 4 flats at a time

5.4 Product Features

5.4.1 Input

Figure 5.3: Unit Form

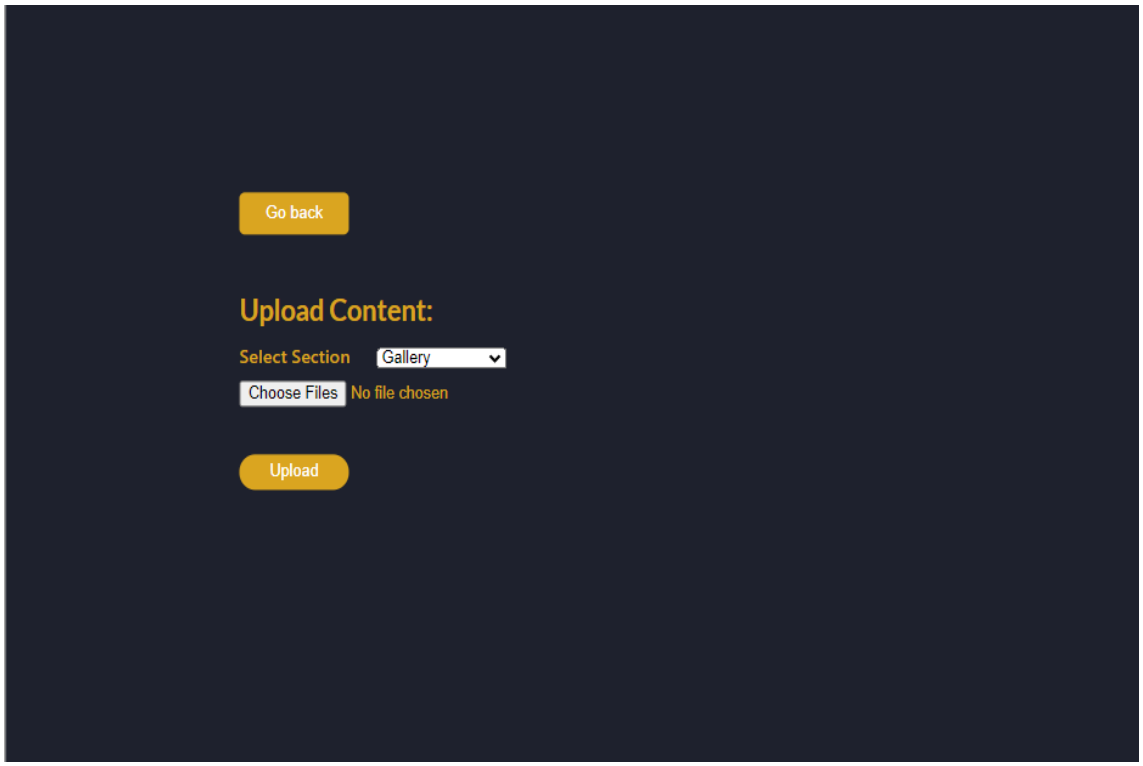


Figure 5.4: Content Upload Form

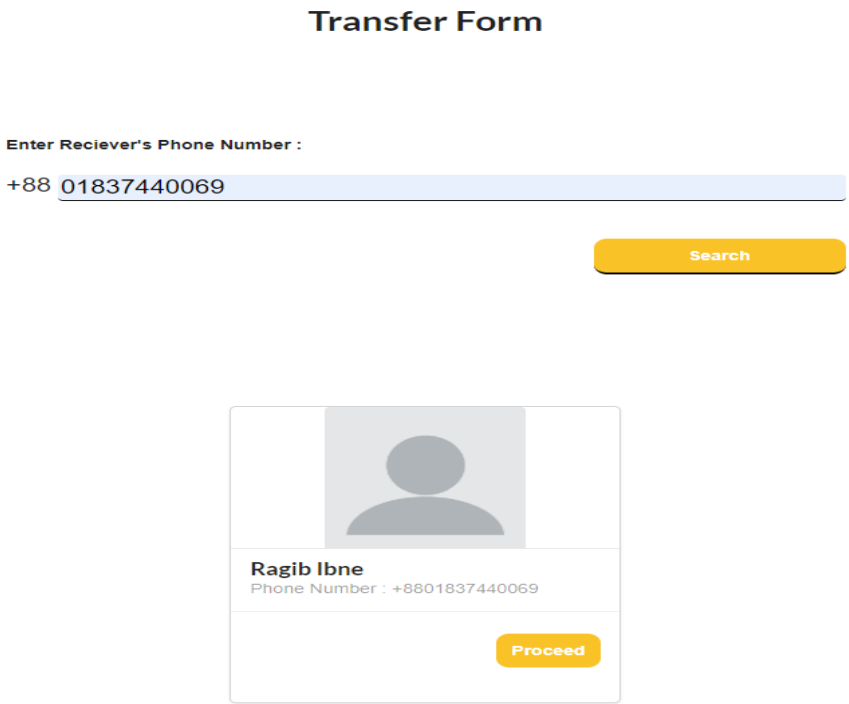


Figure 5.5: Transfer Unit Form

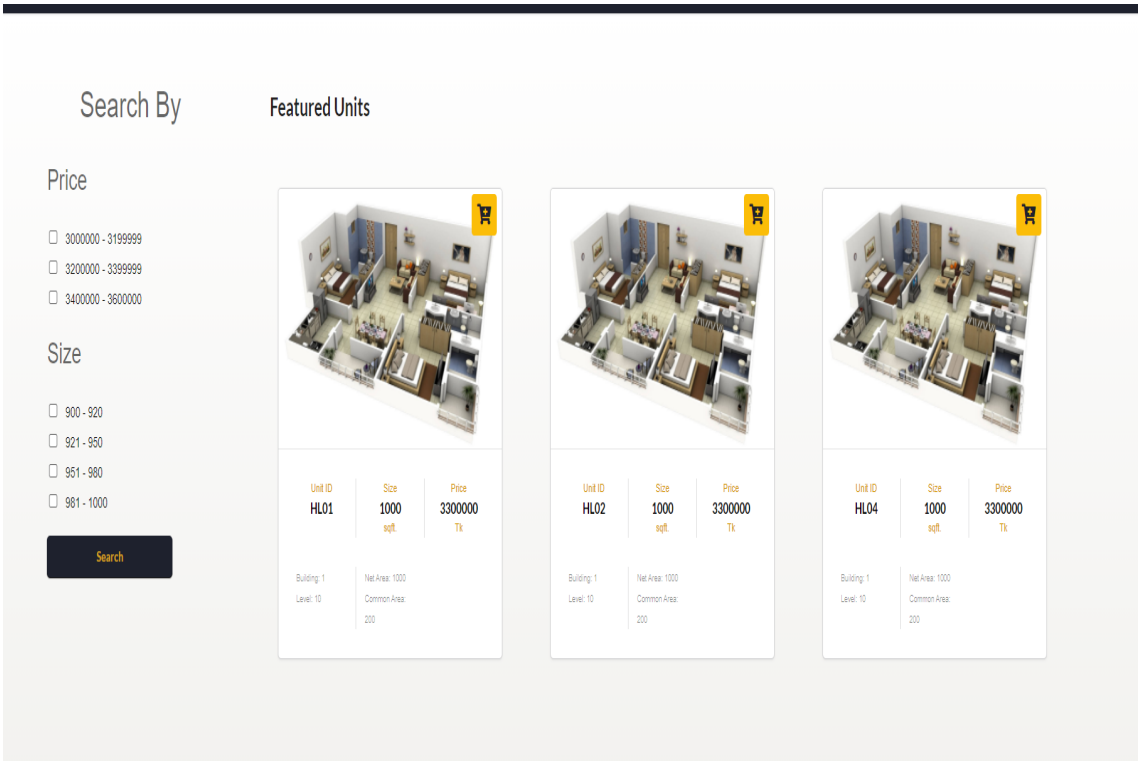


Figure 5.6: Search Unit Form

5.4.2 Output

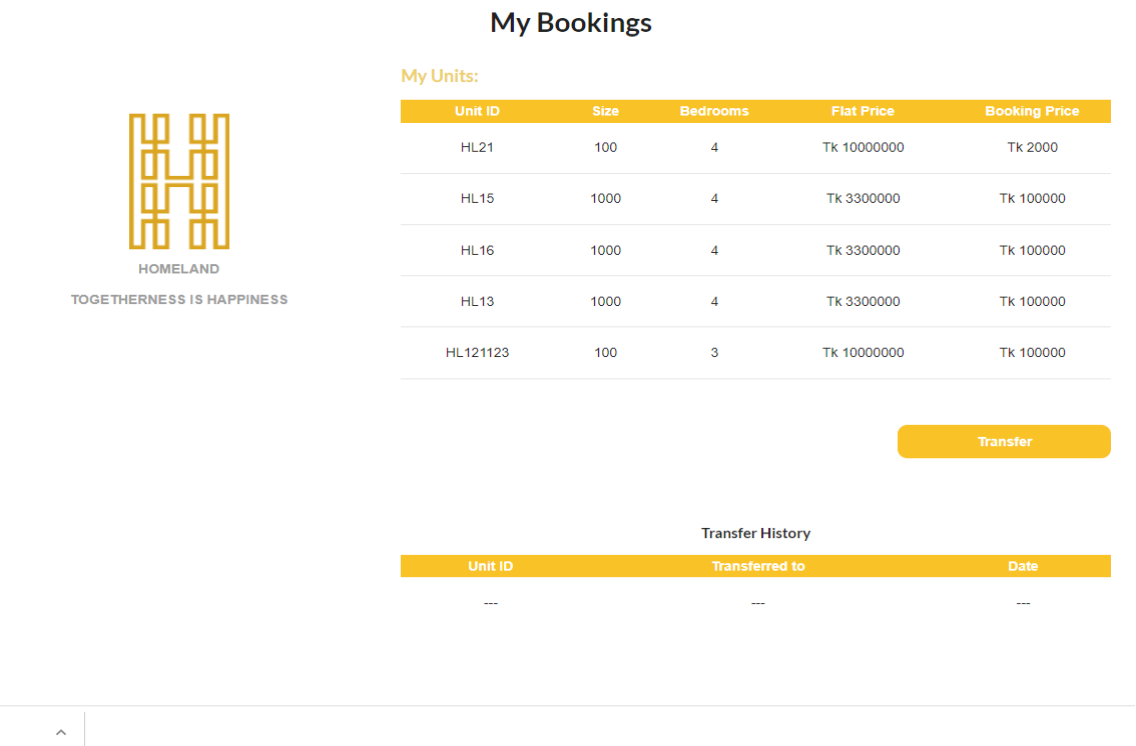
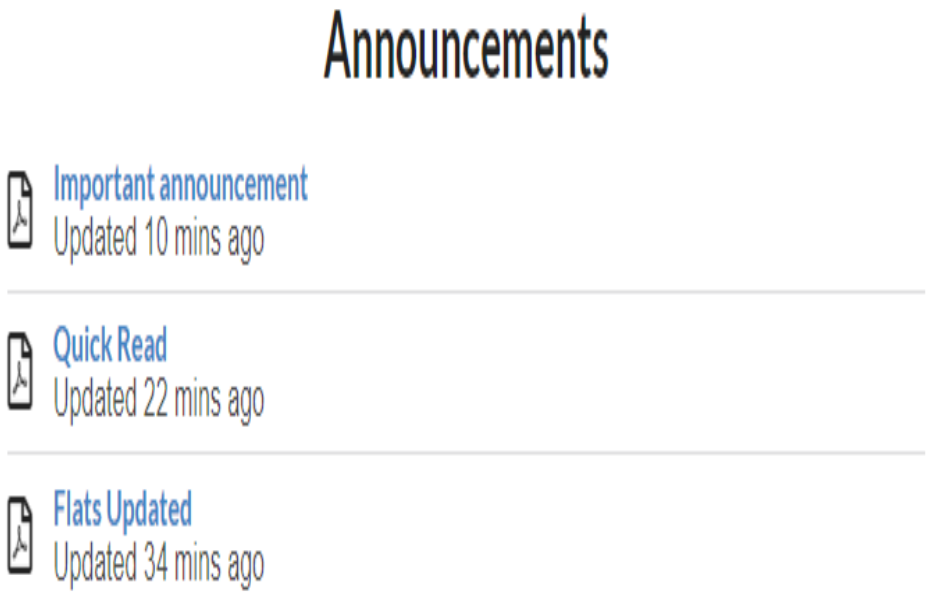


Figure 5.7: My bookings and transfers



5.4.3 Architecture

We chose Microservices Architecture for the entire Application . We designed,developed and deployed the client side and server side independently .

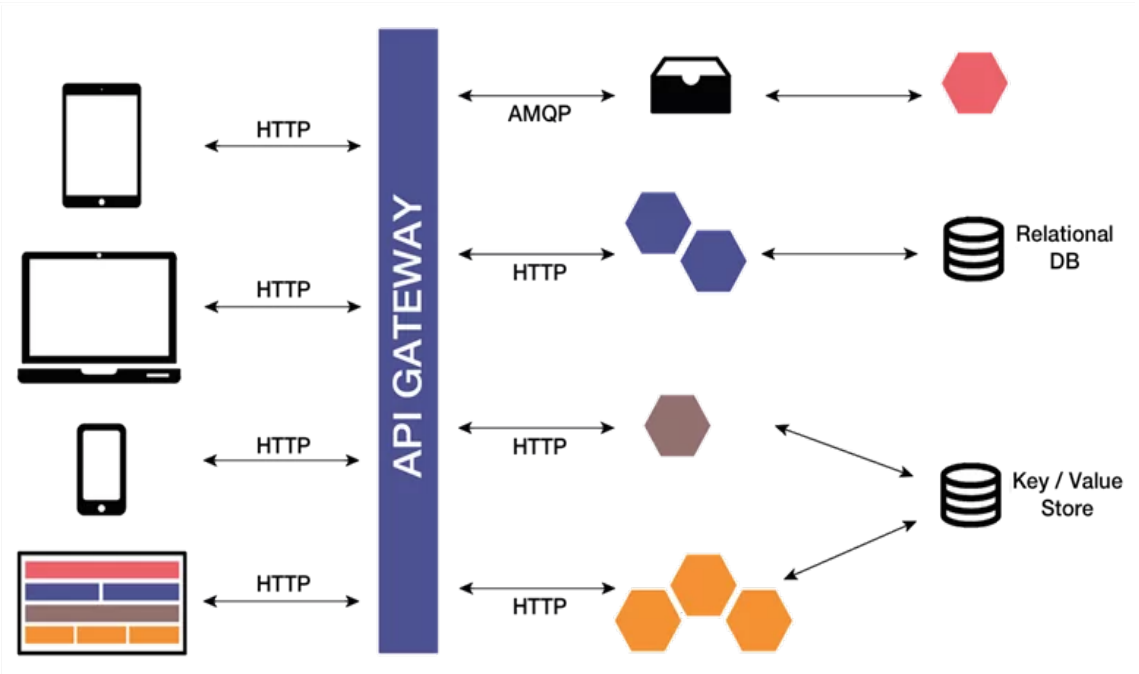


Figure 5.8: Microservice Architecture

Clean Architecture

For developing REST API we followed the clean architecture pattern. Where the entire application has 5 different layers or tiers.

1. **API Layer** This layer contains all the controllers
2. **Application Layer** This contains the business logic of the application
3. **Persistence Layer** This layer contains Models necessary to establish connection with database with the help of EFCore (ORM).
4. **Domain Layer** This layer contains all the models of database.
5. **Infrastructure Layer** This layer contains other security related services

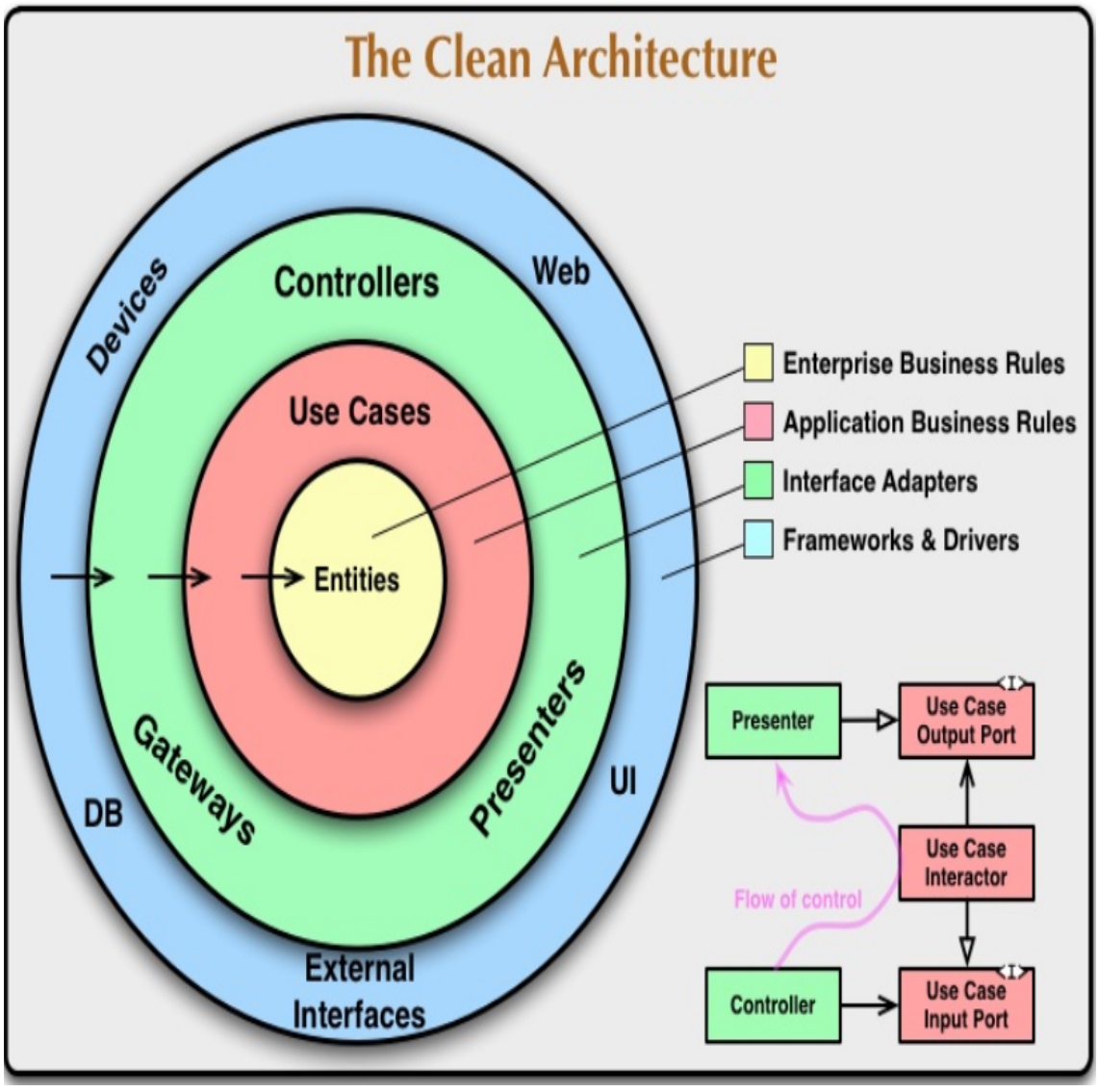


Figure 5.9: Clean Architecture

We Implemented this clean architecture with CQRS plus Mediatr Pattern . CQRS is abbreviation of Command and Query Responsibility Segregation pattern. Command and Query Responsibility Segregation (CQRS) is a pattern for separating read and update actions in a data store.

And Mediatr is a package which helps the API layer to communicate with Application layer.

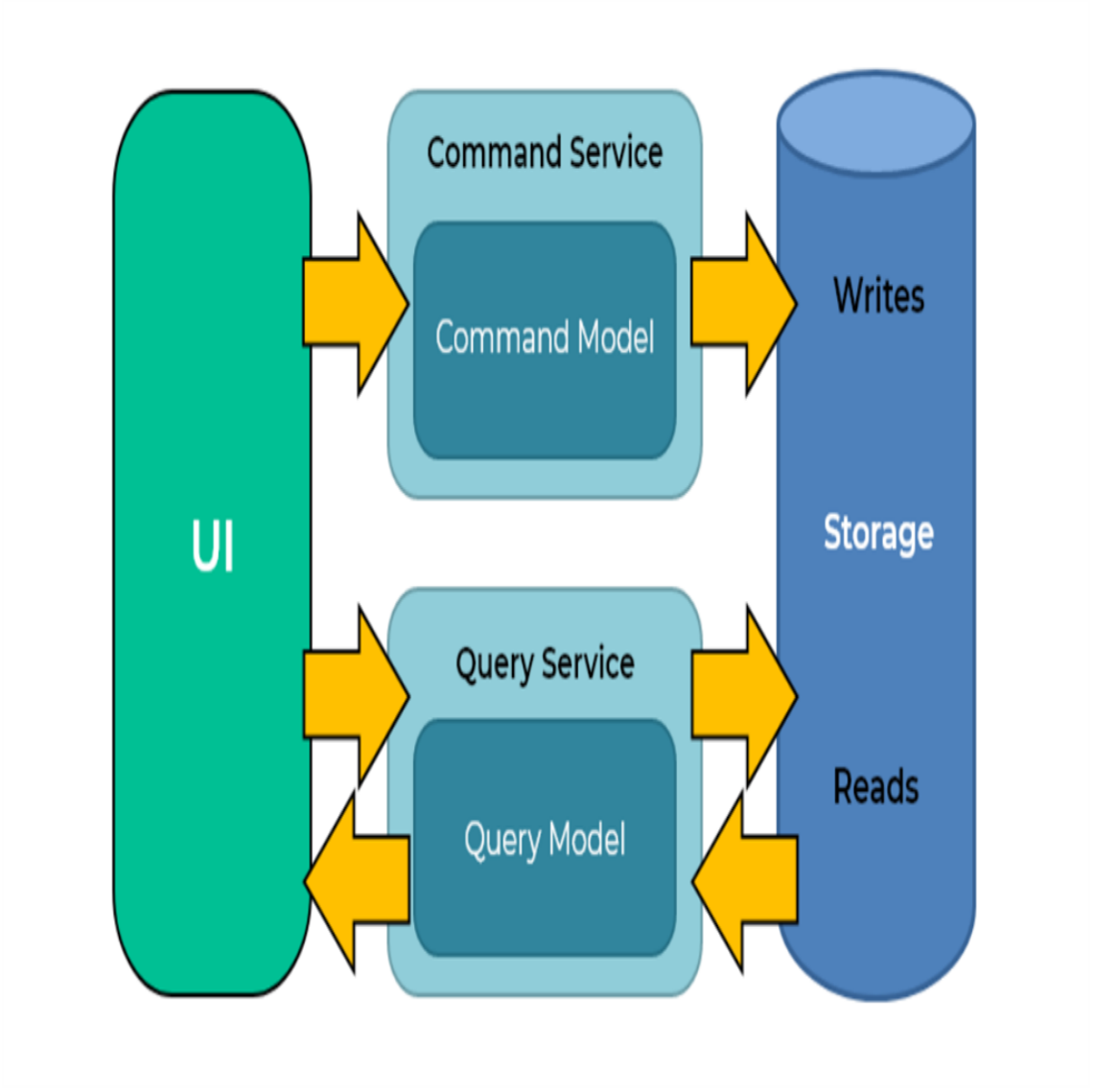


Figure 5.10: CQRS Pattern

Chapter 6

Results & Analysis

Homeland was developed to make flat booking easier for customer . So that customer can make a booking sitting in their home without physically visiting their office . Also an admin can monitor everything with admin panel developed by us.

Some of the features which are already the are discussed below with illustration.

Online Booking

In this page users will see featured and available units. Also they can search units .

Figure 6.1: Online Booking Page

Search Result

This page shows the units based on the search. Here you can select muliple units and view them or add them to cart

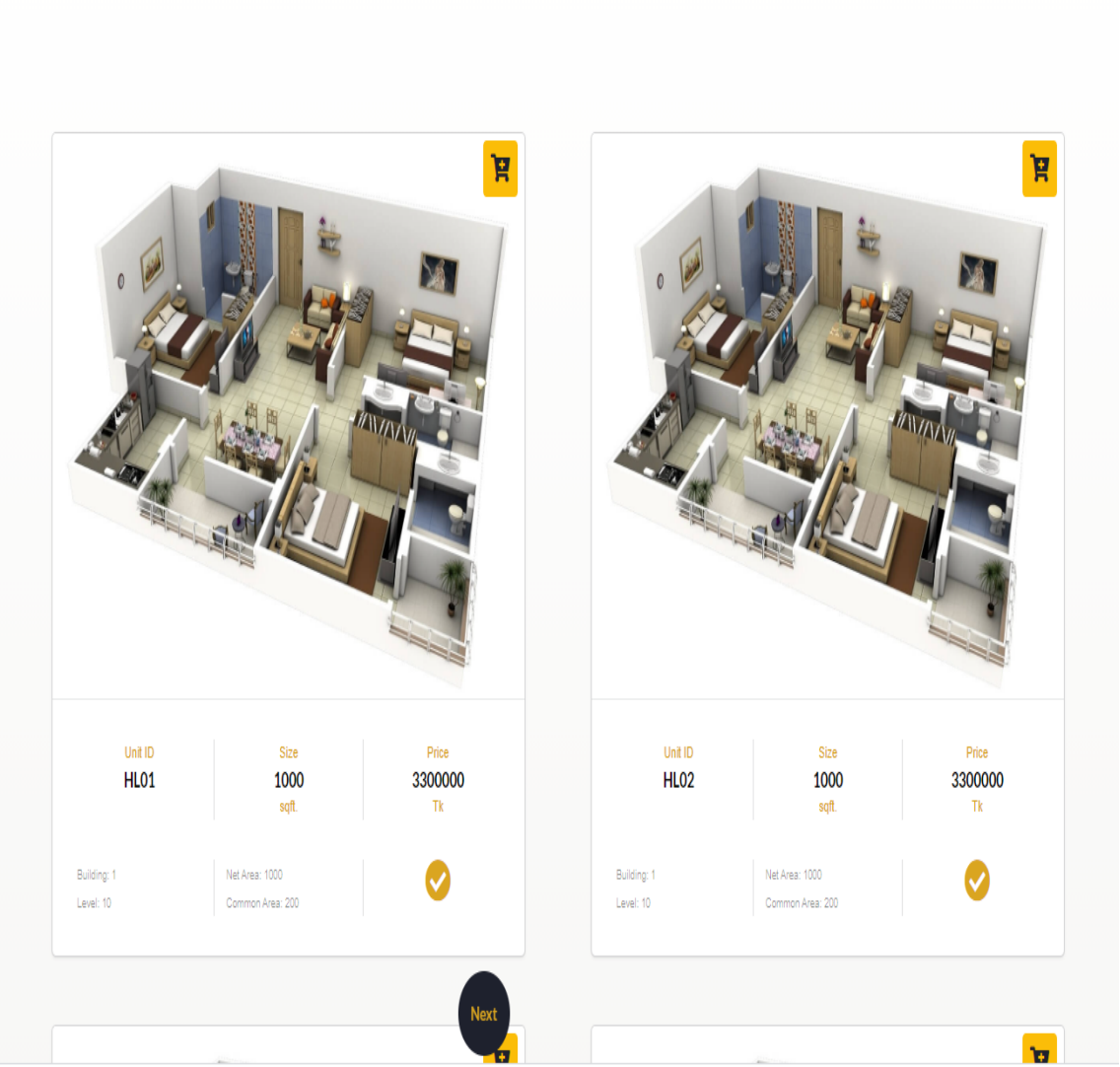


Figure 6.2: Search Result

Cart

This is the cart page after proceeding this page will redirect too SSLCommerz Page.

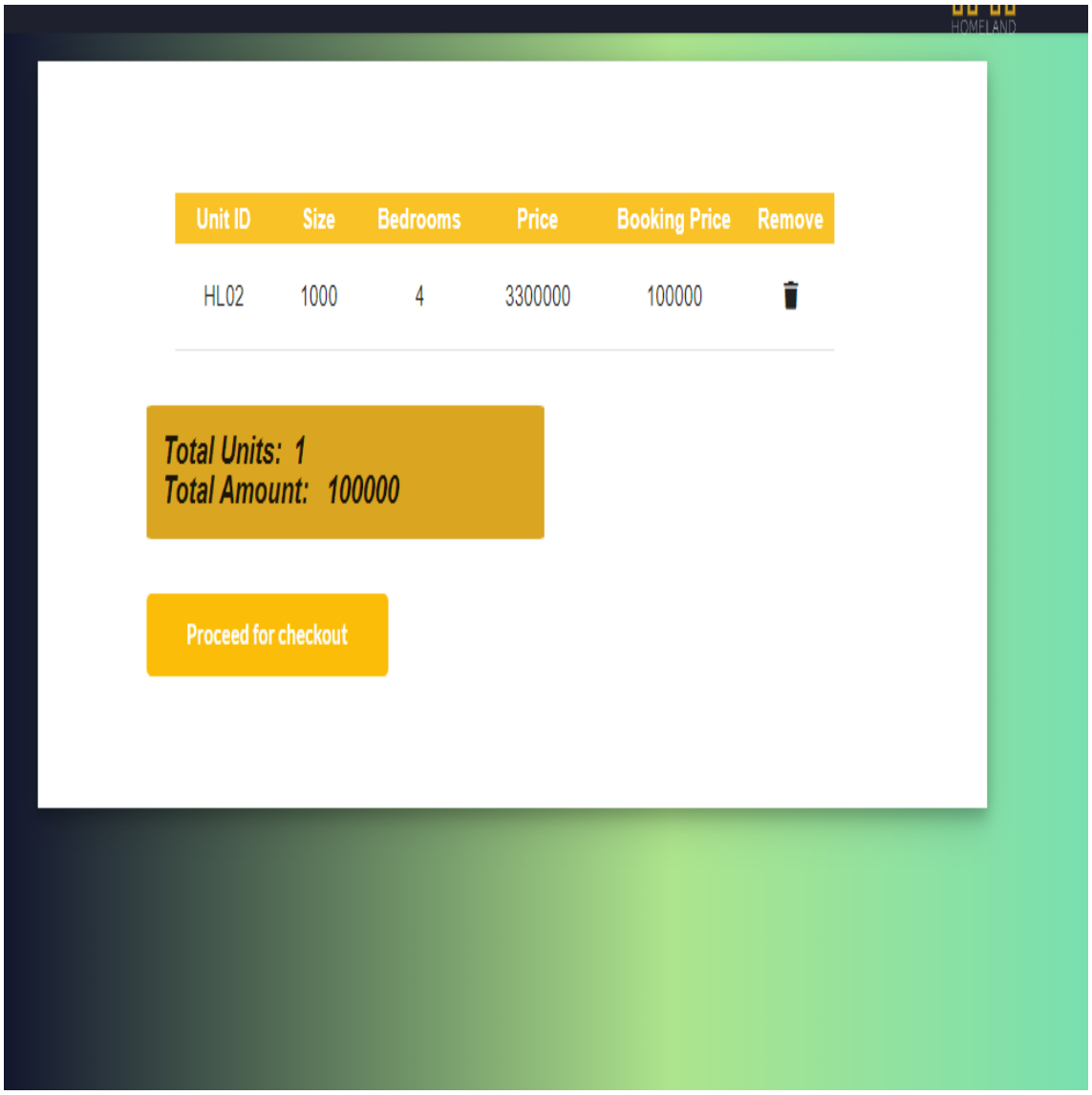


Figure 6.3: Cart

My Bookings

This page shows all my booked units and transfers.

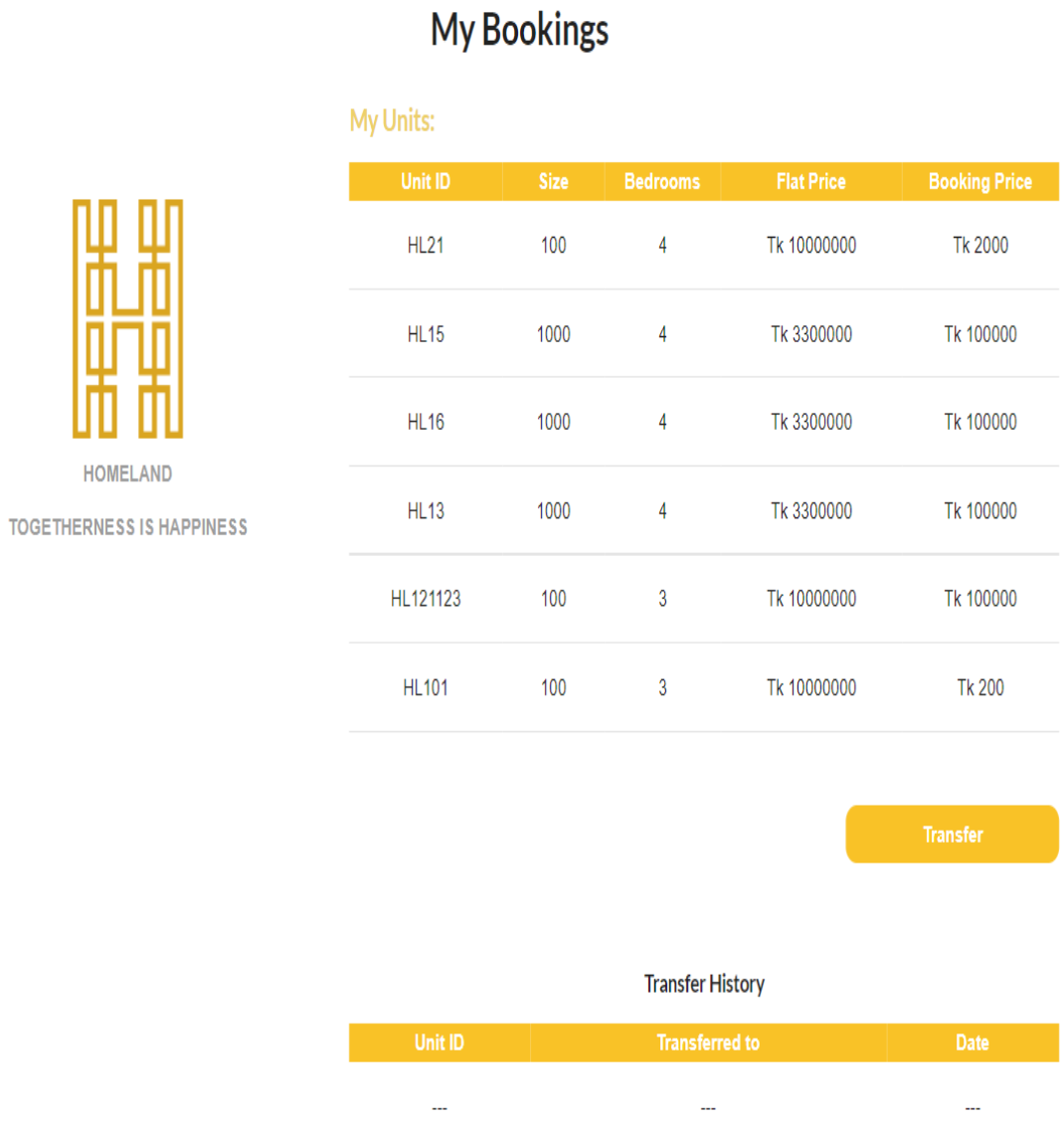


Figure 6.4: My Bookings Page

Transfer Unit

In this page users will transfer their bookings to someone who has an account in this platform.

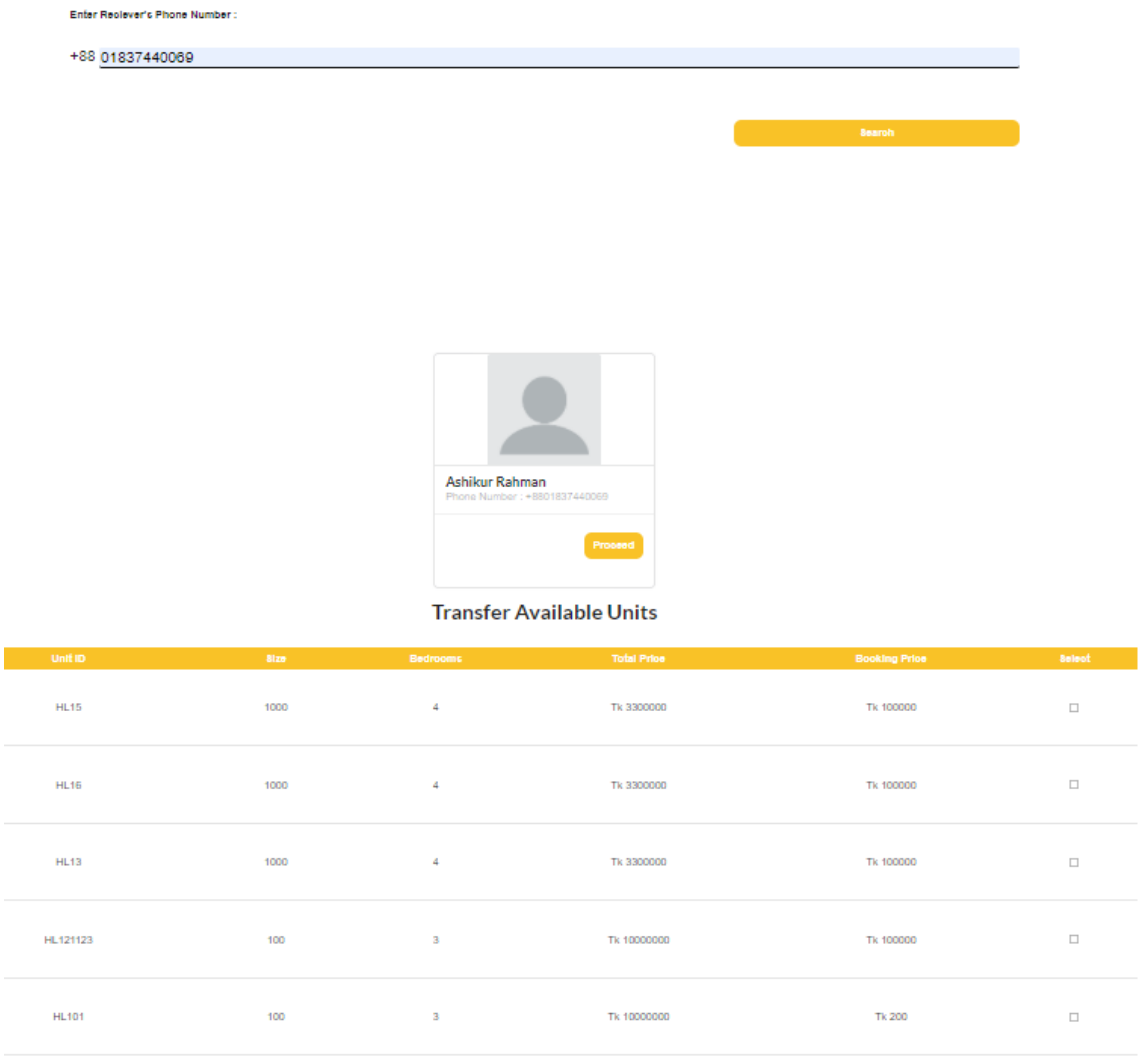


Figure 6.5: Transfer Unit Page

Admin Dashboard

This is the admin Dashboard

Figure 6.6: Admin Dashboard

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

The entire application was built following the micro-services architecture. The client side and server side of the application are two different services. These two services were designed,developed and tested independently. For the client side application we used React Js. React is one of the most popular frontend frameworks out there with huge community. And It is growing and getting better updates everyday . In client side development context I would say this application will sustain since React is not going anywhere in the near future. For Server side we used ASP.NET CORE. Which is a cross-platform,open-source backend framework with a huge community. ASP.NET Core has created trust among the companies because of the top security provided by the framework.

The application's UI/UX was done with professional designer. UI is simple ,interactive and very user friendly. The microservice architecture increases the scalability of the application. So overall we can say the project is sustainable.

7.2 Social and Environmental Effects and Analysis

The project homeland comes with a lot of job opportunities for people. If you think about the application, for managing the admin panel homeland will require 1 or 2 employees. Plus where the housing project is being built many labours,civil engineers will be needed for the project . So many people living near gazipur with no jobs will have jobs.

7.3 Addressing Ethics and Ethical Issues

One ethical aspect of the project is there will be huge amount of user data coming through application . To avoid misuse of these data aveneur made sure most of the sensitive datas are encrypted, not even the developers can read them.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

- Understanding the clients requirement was hard,making sure what they wanted and what we understood is the same was challenging.
- Following the agile method and keeping the full team updated was challenging.
- Integrating the Payment gateway was challenging . Since there were no specific documentation for the latest version of the frameworks we used in the application.
- We were stuck in several points where we had no idea how to implement the specific feature .
- Keeping in sync with the team was hard since everybody is a newbie developer.

8.2 Solution of those Problems

- We took feedback from clients after every sprint.
- Our project manager helped with this whole thing.
- By the help of a senior developer I integrated the payment gateway.
- Google came to rescue in most times.
- Project manager made sure everybody is coperating properly.

Chapter 9

Future Work & Conclusion

9.1 Future Works

There will be some future updates in the project . Future updates are listed below.

- Adding discount feature . Users will get a discount in their next booking if they transfer a booking to someone else.
- Migrating the entire application to cloud .
- Implementation of server side rendering with Next.Js.
- Integration of other payment gateways.

9.2 Conclusion

Working in this project has been a really great experience for myself. I learnt a lot of new things like swagger UI,Github Actions and so on. Also learnt how to finish task in between deadlines. The problems that I wanted solve during this internship period which I mentioned earlier with the Pre-Assessment board,almost all of them were solved. Homeland is the first online flat booking platform in Bangladesh . Working for a project like this has been a great honor for myself. Developing all the restful APIs alone was a challenge but ultimately I did it with time to spare. Overall it was an amazing experience for myself working on this project.

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