

RentTime: A Web Application for Home Renting Made Simple

by

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

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20 October 2022

DECLARATION

I hereby declare that the report of the project **titled RentTime: A Web Application for Home Renting Made Simple** is done by me to submit to Computer Science and Engineering, University of Liberal Arts Bangladesh in partial fulfillment of the requirements for the degree of Bachelor of Science under the supervision of Dr. Farhana Sarker. I also declare that my effort to make this report and project is solely done for this degree and it was never been submitted elsewhere for any kind of award.

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CERTIFICATE OF APPROVAL

The Project report entitled “RentTime: A Web Application for Home Renting Made Simple” is submitted to the **Computer Science and Engineering**, University of Liberal Arts Bangladesh, Dhaka in partial fulfillment of the requirements for the degree of Bachelor of Science.

Dated: 20 October 2022

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ACKNOWLEDGEMENT

Above everything, initially, I would like to show my gratitude and offer thanks to the Almighty, Allah for showering me with abundant patience, strength, and dedication, and to open my insight to grab opportunities, so I can complete this project.

I would like to bid my heartiest thanks to my project supervisor Dr. Farhana Sarker, for showing patience and professional guidance in academics. Further, I am delighted to be supervised by her, as she inspired me to see things positively and advised me in every step to bring out the best outcome in me.

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ABSTRACT

This paper intends to give a clear idea about RentTime, a website that primarily bridges the gap between owners who are willing to rent out their properties and students who are looking for accommodations or roommates. The website aims to develop into a resource center for anyone confronted with problems in the housing industry. The pivotal motivation behind the creation of this website is a real-life problem that is waiting to be fixed. The primary object of this project is to be a bridge between flat owners and students as well as digitize the process of house renting itself. The paper further sheds light on the objectives and expected outcomes of the project. In addition, it discusses the management and finances of the project. Further, the following chapter discusses the background of the project where both foreign and local contemporary websites are argued. Furthermore, the writer then gives a comparative analysis of these websites. Along with explaining the scope and problems of the website. The paper talks about the methodology applied to the website. Furthermore, it talks about the design specifications behind RentTime. Before providing the conclusion, this paper aims to provide the readers with the sustainable social and environmental impact of RentTime the website is not just a need but a requirement for the mass migration of students happening each year.

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PRELIMINARIES/TERMINOLOGIES

Owner: This user is going to advertise their vacant place for tenants.

Students: This user is going to look for accommodation or another user to become a roomie.

Admin: The admin of the system will look after the background works and can modify, or delete user information, add new admin, and for the time being write blogs.

Send Request: This option allows the student to request the owner to communicate further or to repost the vacant place.

Gen: It's the acronym for a generation.

Ad: It's a short form of advertisement.

UC: Use case

TC: Test Case

HTML: It is a standard markup language for websites and it is an acronym to express HyperText Markup Language.

CSS: This language is used to style an HTML document and it is an abbreviation of Cascading Style Sheet.

JS: It is a programming language of the web and it's the short form of JavaScript.

Django: It's a python-based web framework, open-sourced.

Python: It's a programming language.

Web Page: A particular page on the website.

Web Site: a group of pages to run a business.

XAMPP: Open-source cross-platform, web server solution stack package, Apache, MySQL, and PHP.

CHAPTER ONE: INTRODUCTION

This chapter will give you a quick overview of the project's introduction, motivation, objective, expected outcomes, project management, and report layout.

1.1 Introduction

The housing stands to show the significance of a standard lifestyle on expressing economic, social, cultural, and personal levels. Coupled with this, finding accommodation or a good roommate can be very hectic. It consumes abundance of time and efforts. The housing sector faces heaps of challenges which needs a solution. However, in the gen of one click away, people look for a quick solution of everything. In the Bangladesh, digitalization has been promoted vastly, even in the rural area internet usage has increased more than before. People are getting comfortable in online presence and they are trying to take the fullest advantage out of it. Here the RentTime; a web system put a move to bring ease in home renting. This system is designed to fulfill the need of the targeted users. It will help owner to advertise their vacant apartment and students to find accommodation or roommates according to their preference. Further, this system can also improve customer retention and simplify commuting to variety of places in search of empty flats. Additionally, it will also help two students to get connected who has the same preferences for their accommodation. In the system, there are mostly two types of users; Owners and Students. Both of the user has different type of activities inside the system. The owner provides information about their vacant space, where they can include the Pictures of the place, Location Details, Space Rent, Space Size, and other Amenities, and that can include Utilities, Wi-fi, Bathroom facilities, etc. Similarly, the students have to set some kind of parameters to introduce themselves to find likeminded people so that they can share the room or space. Therefore, none of the users need to spend huge amount of time on the speak to find right place or person. Further, the search option is suitable to find desired possibility by providing some filtered option, which is quite user friendly. Additionally, this system is operated to quickly detect the preferable place by saving time, labor, and cost. Analyzing all these reasons makes RentTime a comprehensive web system.

1.2 Motivation

Sheltering is one of the key indicators of a country's development, and it is not different for Bangladesh either. Hence, I desired to consolidate it with the nation's significant dream of Digital Bangladesh. My motivation influenced by two real life scenarios. Firstly, in the big cities of Bangladesh like Dhaka, Chattogram, Khulna, etc., there are numerous renowned public and private universities available, and students from different social stage goes there with a dream of pursuing their education in better context. It's not always possible to avail university accommodation, neither every university offers that. However, it gets quite challenging for a student to move to a totally new place and searching for accommodation near the university. Sometime it is also on a level laborious to find likeminded roommates to share the accommodation with. During my bachelor studies, I have seen many of my fellow mates coming from rural area to avail an excellent education from ULAB, suffering from the same problem. Since, flat owners usually don't follow effective advertisement method, but mouth to mouth communication, and this is slightly related to my second motivation. My father and uncles have tenements which they usually put on lease, but I have seen them to struggle to find

tenets on required timeline due to lack of advertisement. Since, they still use the cutting-edged method of mouth-to-mouth ad, however it gets time consuming. Likewise, my father and uncles there are many flat owners who are struggling to find tenets according to their preference. This system will help both the students and flat owners by building a bridge between them, so that they can rent house in happy go lucky mood. Online based house renting for students has been popular in western country, but this facility is unavailable in Bangladesh context. All these facts motivated me the most to develop this web system to home renting made simple.

1.3 Objectives

My objects are quite precise and following are my project objectives:

- Developing a web-based system for users to registers and login to avail facilities.
- Developing a bridge between flat owners and students.
- Saving time, cost and labor of my users.
- Eco-friendly: less paper wastage.
- Transforming manual process of house renting into digitalization.
- Preparing a documentation of the project.

1.4 Expected Outcomes

Project RentTime is expected to solve few of the social problems such house renting and finding similar minded people to share the room for reasonable pricing. Making this project successful is my ambition and these can be done by:

- Easy registration option for individual user type like flat owner and students.
- Easy login.
- Ensuring with flexible and user-friendly design.
- Ensuring privacy safety by authenticated login to access few data.
- Modify, update or delete option.
- Owner will get request from students for reposting ads or connecting to rent space.
- One student can send email to another student for collaborating to rent a space.
- Both the users can set parameters to find their required result according to their preference.
- Blog content to help users to learn a few tricks and tips regarding accommodation and understanding.

1.5 Project Management and Finance

Implementing and scheduling a project are the main concerns of project management. Its main objective is to control the timeframe so that the project may accomplish its objectives and satisfy the requirements.

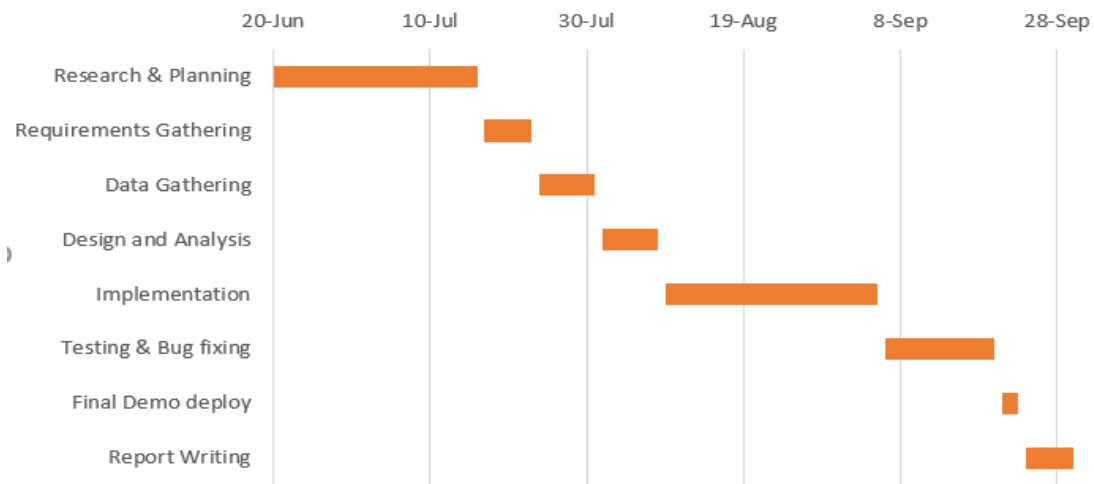


Figure 1-1: Gantt Chart

The Gantt chart for the project may be seen in the image above. The project's development during the past three months is shown in this diagram. It is a web-based application, no expenses were incurred in its creation.

It's difficult to estimate the actual cost of this system. Since, average research (Georgiou, 2022) shows that it may cost USD 1,000 to \$95,000 depending on the features and complexity. [16] There are a few phases which can sum up to analyze the whole costing such Front End, Back End, CMS development, and Marketing. However, none of this estimation can go perfectly accurate while actually implementing the website.

Table 1-1: Cost distribution table:

Category	Costing (BDT)
Domain & Hosting	2,000-3,000
UI/UX phase	25,000
Backend phase	70,000
CMS (Content Management System)	20,000
Marketing	50,000
Small group of human resources	35,000

Initially I assume, the cost of the cheapest domain & hosting price will be around BDT 2,000-4,000. Later to UI/UX phase may take up to BDT 25,000 for research, analysis, wireframing and designing purpose, Further, the implementation or back-end phase arises where it may cost approximately BDT 70,000 and for content management system at about BDT 20,000. Furthermore, without marketing it's going to be very difficult to reach the goal or achieve fruitful customer's hence, a digital campaign will be essential. In that campaign and future marketing, a fixed amount has to be invested which I believe will be around BDT 50,000. Additionally, a small group of manpower will be working on other necessary activities to run the system smoothly, where I must invest minimum BDT 35,000.

1.6 Report Layout

This report has seven chapters and the report layout described down below:

Chapter 1: An overview of the "RentTime" project is provided here, alongside information on its motivation, objectives, and expected outcomes, project management is also covered.

Chapter 2: This chapter compares similar platforms from around the world and analyzes their advantages and disadvantages. further, describe the project's scope and challenges.

Chapter 3: Dedicated to creating data flow diagram, use case diagrams, activity diagrams, and ER diagrams as well as finding requirements of business model and design.

Chapter 4: Includes Design Specifications, description of the Django framework, front-end, and back-end.

Chapter 5: Dedicated to implementing database, testing and reporting.

Chapter 6: This chapter identifies the project's social and environmental impacts, ethical considerations, environmental effects, and sustainability.

Chapter 7: In the final chapter, I'll wrap up the entire project's work and describe a few of its future goals.

1.7 Scope of the Problem

The web system discussed in this report includes a number of distinctive qualities that set it apart from other apps on the market, making it better and more useful. This program will help build a bridge between landlords and tenants in Bangladesh, making it easier for students to locate housing. However, this project spans a wide range of topics, from management theory to the realm of computing, and it necessitated doing abundant studies in order to meet its goals. These are the areas covered:

- An investigation entails into the procedures, steps, and chances for improvement in the real estate sector. This is one of the crucial parts to understand the market.
- Website hasn't been published on the remote server yet.
- Because it is a website, the system needs to be accessible around-the-clock, except for any foreseeable minor transitory server issues.
- Evaluating the current systems and discovering their flaws is essential in order to create a new system and address the issues for better results.
- Optimized methods and languages need to use for better performance.
- Ensure high security of the system.
- To ensure the verified account, an auto-generated confirmation code is needed.

CHAPTER TWO: BACKGROUND

This chapter outlines some instances of relevant work that has been done on the subject, some comparable projects and their features, as well as the scope of the problems and difficulties encountered throughout the project.

2.1 Related Works

In Bangladesh there are real estate marketplace or vacation hotel renting websites available but not alike one. However, in overseas there are few numbers of website available similar to this concept. In this section of the report, the similar work has been described.

2.1.1: International Websites

Roomster

Roomster is a multinational company with offices in both London and New York. With over 4 million active listings, Roomster is the largest online social network for roommates in the world. Living together is becoming more popular all across the world, and we think it's a fantastic way to both live comfortably and make money. It helps to make home sharing safer, simpler, and more secure. With the strong footprint, it is able to match one with their ideal house or roommate. Since its establishment in 2003, Roomster is proliferation around 192 countries with 24/7 customer support. [8]

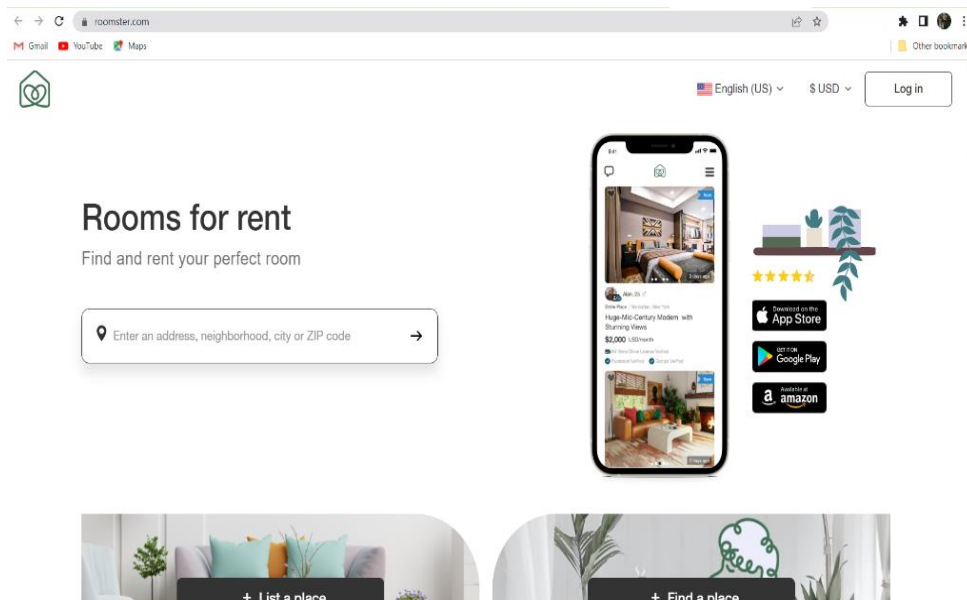


Figure 2-1: Roomster website

Besides with the ever-expanding group of users are getting the greatest approach to make additional space profitable and accessible to a membership of authentic people. Further, they also take cryptocurrency to modernize their payment method. Roomster show around the

neighborhood as well as give in details information about all the facilities they provide. Besides the web system they are also available in google play store and apple store.

SpareRoom

It is the brainchild of Rupert Hunt, and the journey started since 200. Alongside with 2 million visitors to 12,126,971 people registered, SpareRoom is the leading UK roommate site for finding roommates or sharing empty houses or apartments. [9] In fact, SpareRoom helps someone locate a roommate on average once every 3 minutes from the biggest selection of ads. Motivation of SpareRoom is to let one find their dream roommate whom one not only share the space but the life too. It's all about helping people to find like-minded people to make this experience fantabulous. [10][11]

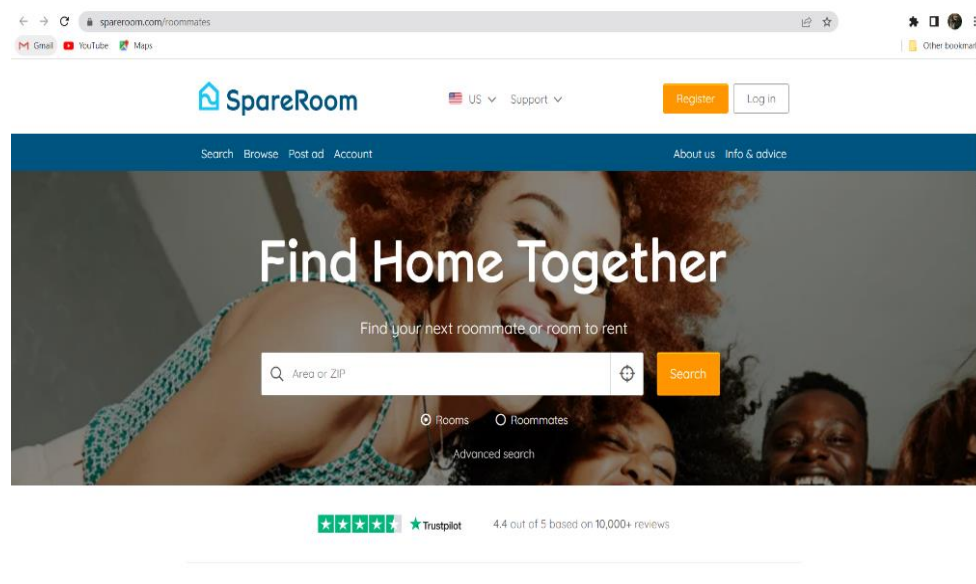


Figure 2-2: SpareRoom website

They also believe the personalities come together to share the space. People find another based on their desired criteria and to make this experience joyful the team of SpareRoom work 7 days a week to go through ads and content. they also support 24/7 customer service with the calls or email within the shortage time. [25] Besides this, they also offer face to face meetup with the potential roommates. It has mobile application too.

iROOMit

The HQ of this app is in Canada and they launched it on 2022. They claim to be more than just a roommate finder or room listing site but a helping hand to link people despite of the situation. They offer help to anyone who is new to the town or local just needed a change. Individual can find a group of people on iROOMit that are in the situation. Further, they also offer diverse range of option of budgets, or other facilities. They also believe, extra room means

another scope to make money, and they make it secure through verified ID and updated credit report.

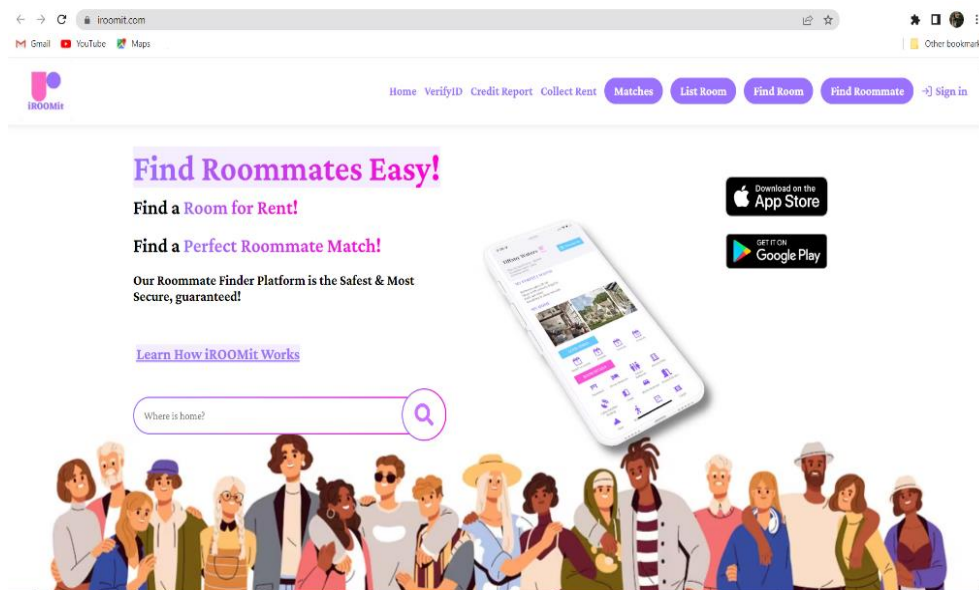


Figure 2-3: iROOMit website

Beside this they also provide an option to collect rent and security deposit with the stripe partnership. iROOMit not only think of the tenants but also think about the owners too. Through the in-app messaging and video calling option makes it safer before in person meetup. It does have mobile application. [5]

Roommates.com

A roommate locator and room search service are available at Roommates.com. one can use it to efficiently find roommates and rental properties. The HQ of this site is in USA, and the annual revenue is \$5m to \$10m with a total visitor of 551.5k. They provide multiple identity verification option to make the user feel confident and without worry. They have list of parameters which need to be given during profile creation and they will be used later on to find specific type of people/place as desired. Further with the in-app connection, the system allows to connect in a convenient way.

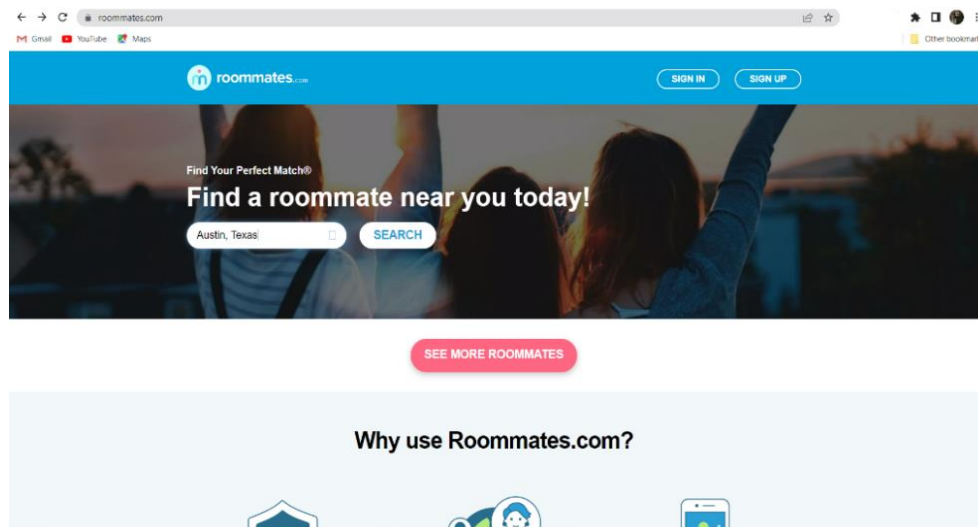


Figure 2-4 : : roommates.com website

Many people got benefited by using this system. They not only have mobile apps, but web app too. Additionally, they also have other socials appearance for better marketing. [7]

Diggz

Whether an individual is seeking an empty room to rent, has a room to rent, or is ready to share a search for an apartment with someone, one can browse through a plethora of potential roommates. Your personality, lifestyle, and tastes will be compared to those of potential roommates by the in-house algorithm, which will then show your tailored top matches. Using our options, you can further tailor the roommate search to meet the needs.

One can show interest in people who appear on a profile and think they'd make ideal roommates by clicking "Like" on their profiles; if the feeling is mutual, they'll become "Matches." they will be notified when a prospective roommate "likes" them, and they'll also be listed on the page of "Likes" so that they can determine whether they feel the same way and "Like" them back. [15]

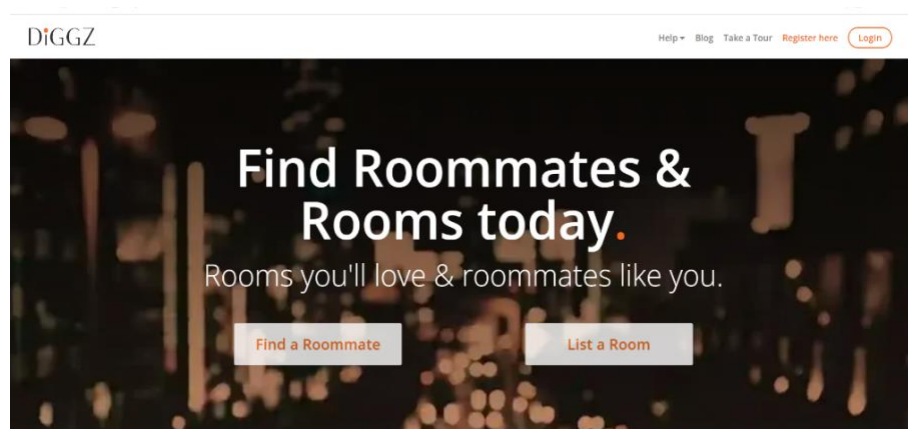


Figure 2-5: Diggz website

Within the Diggz app, they can safely and directly contact the potential roommate "Matches." They don't have to divulge their personal contact information until they are prepared because all the potential roommate matches are gathered in one location.

2.1.2: National Websites

The Tolet

It was established on 2016 and got promoted differently through local newspapers. Anywhere in the world can access this website online. By placing a high value on time, landlords can find tenants quickly, and tenants may locate the home of their choosing while saving time and needless labor expenditures. In every part of Bangladesh, one can post ads for houses for rent. By employing Thetolet, leaflets won't be stuck to any walls or roads. The website is quite lucrative and simple to use. It has different type of options like family house, sublet, mess, etc., and the global ranking of the website is around 2,459,805. People has visited this website approximately 11.3k through a direct market method. Furthermore, the company uses 19 different technology based sub-software to function the business properly. [13]

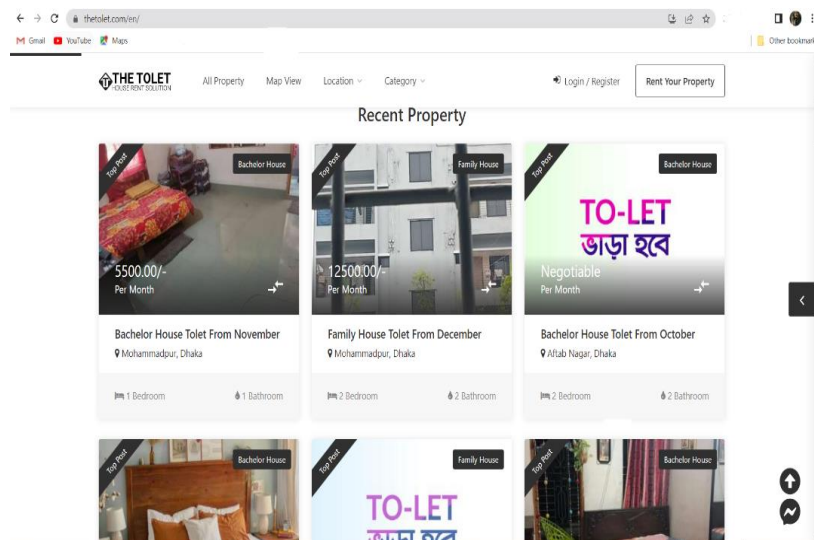


Figure 2-6: The Tolet website

Logging in or registering is necessary and free in order to rent or find the house. It's available for installation from the Google Play Store so that one can easily use the mobile app system.

BdHousing.com

Founded on 2006 and for more than 17 years, bdHousing.com has maintained its leadership position by giving property owners a traditional and well-respected platform to develop their assets for rent, sell, and allow homebuyers to find their prized residences. Correspondingly, it has been recognized as Bangladesh's biggest online real estate marketplace. People can find land and deal with a home or business space on the internet thanks to bdHousing.com. They strive to provide the most accurate information in the marketing

currently available to their esteemed clients and make it as easy as possible for them to get in touch with brokers, developers, and landlords. [1]

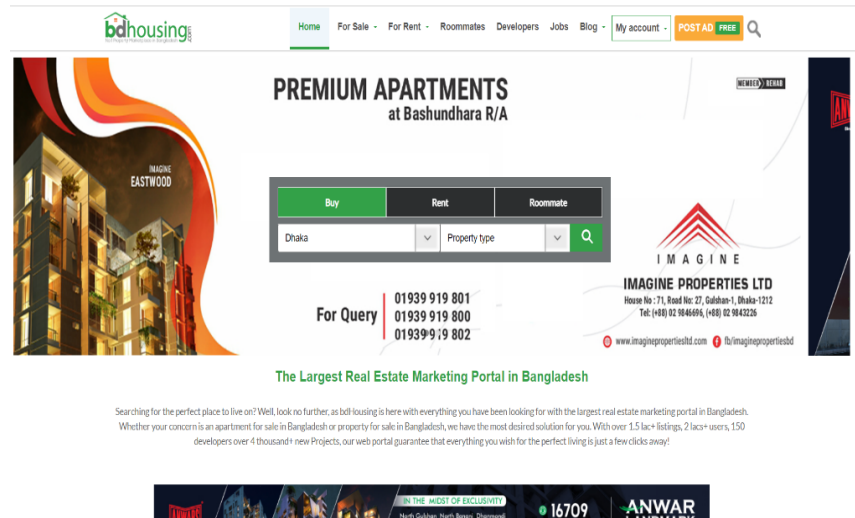


Figure 2-7: bdHousing.com website

Being the largest ready flat buy selling platform in Bangladesh, they have designed their website to offer customers with a wealth of info about their selected property whenever they need it.

Whether individuals are looking to sell a flat in Bangladesh or bored with all the ready flat trading websites that are now available, let the most renowned online property selling site in Bangladesh, which is endorsed by specialists and developers, assist them. Bdhousing offers a huge selection of homes for those looking to buy, including agencies, private buyers, and other third parties. In order to provide consumers with a greater selection of properties across all divisional cities and Bangladesh, their staff of committed professionals works tirelessly to raise the standard of their service. A person looking for a ready apartment buy sale portal can get all the assistance they require from bdHousing. The website is one place to find variety of necessary features related to house renting or selling. The global ranking of the website is around 982,074. People has visited this website approximately 35.5k through a direct market method. Furthermore, the company uses 26 different technology based sub-software to function the business properly.

Pbazaar.com

A virtual real estate market place where local and foreign clients may easily transact to purchase, sell, or rent properties throughout Bangladesh was the goal when pbazaar.com was founded in 2011. Pbazaar wants to develop a scalable platform and business model that can accommodate millions of daily contacts and transactions while also increasing accountability and efficiency in the real estate market in Bangladesh. It links online traders of real estate, as well as owners and tenants, and offers professional real estate agency services in Bangladesh, first in Dhaka and later in all of the country's main cities. Additionally, provide a user-friendly

platform for developers and real estate agents to market and rent out their properties by providing free tools and services to potential renters and buyers. [6]

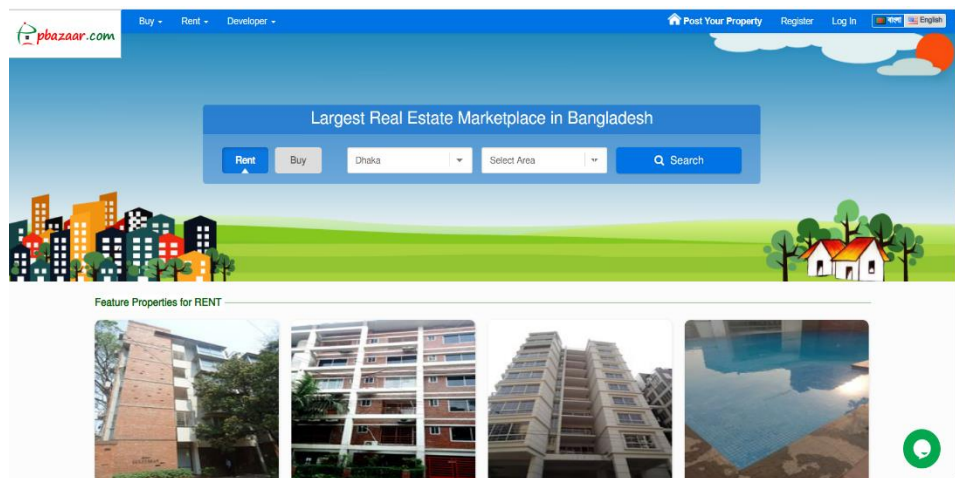


Figure 2-8: Pbazaar.com website

The website is Provide real-estate agency services. The global ranking of the website is around 1,736,522. People has visited this website approximately 24.3k through a direct market method. Furthermore, the company uses 14 different technology based sub-software to function the business properly.

Flatmate.com.bd

The first platform for shared accommodations in Bangladesh is called Flatmate.com.bd. They assert that someone finds a roommate for them every five minutes. They think that because there are so many individuals, you have more options for finding adequate housing or a better chance of finding flatmates you get along with. The story of Flatmate.com.bd, a Bangladeshi company situated in Dhaka, began in January 2018. Conquest Infotech is the owner and operator of this website.

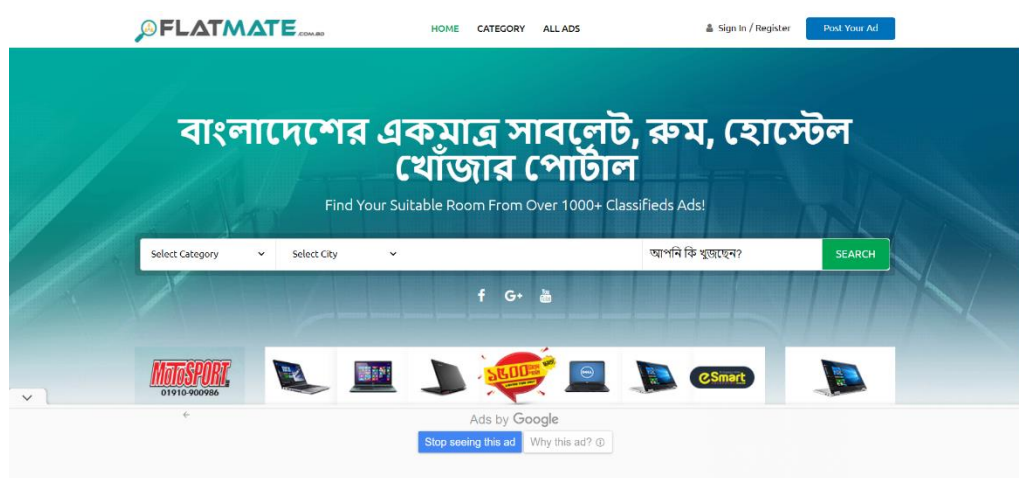


Figure 2-9: Flatmate.com.bd website

The website is a share only accommodation portal. The global ranking of the website is around 3,079,573. People has visited this website approximately 9.2k through a direct market method. Furthermore, the company uses 26 different technology based sub-software to function the business properly. [4]

2.2 Comparative Analysis

In this section of the report, there will be some comparison with my project idea and similar existing system in Bangladesh down below:

Table 2-1: Comparison table

Categories	RentTime (mine)	The Tolet	pbazaar.com	Bdhousing.com	Flatmate.com
Description	Help to find roommate and housing at the same time provide house leasing opportunity.	Helps to solve house finding or renting problem	Help to find all kind of commercial or residential lodging services	Real-estate marketing portal, help to sell, rent and to find roommate.	Share only accommodation portal
Type	Housing service for specifically students and owner.	Housing services	Estate Agent	Estate Agent	Housing services
Key Features					
Register	Available	Available	Available	Available	Available
Login	Available	Available	Available	Available	Available
Post ads	Owner	Owner	Agent	Agent	Agent
Find roommate	Available	N/A	Available	Available	N/A
Housing	Specifically, to students	All type people	Find/sell house, property, garage	Find/sell house, property	All type people
Read blogs	Available	N/A	N/A	Available	N/A
Set parameters to search	Available	Available	Available	Available	Available
logout	Available	Available	Available	Available	Available
Disadvantages	Still under development, many features to add.	Mapping doesn't work and doesn't have diverse option	Real estate company doesn't have specific concentration. And it has a bad UI & UX	Roommate feature doesn't work	Not a functioning website, lots of virus alert keeps coming.

2.3 Challenges

Throughout the development of this project, a handful of difficulties have been faced. However, I was fortunate to overcome most of them at some point. The challenges I faced were:

- I tried to make this website responsive. Though I faced challenges to make it since it has to work with different resolution and it was time consuming. However, I could make it at some instance.
- It was hard to handle large of files.
- Sending email without exposing details.
- Uploading pictures.
- Had to learn new language only for this project. Which was most challenging and I am still catering into it, and would like to work more in the future.
- Hardware constrains.
- Deadlines, requirements analysis, code quality, and system efficiency and performance were other common obstacles.

CHAPTER THREE: REQUIREMENT SPECIFICATION

The requirements analysis for completing the suggested model is covered in detail in this chapter. The logic data model, use case diagram, and description are all described.

3.1 Methodology

For every system there should be a model or process steps which it needs to follow to start from the scratch to end with a functioning app. In this project, the below process has been used to complete it. Every stage has the crucial involvement in the end result.

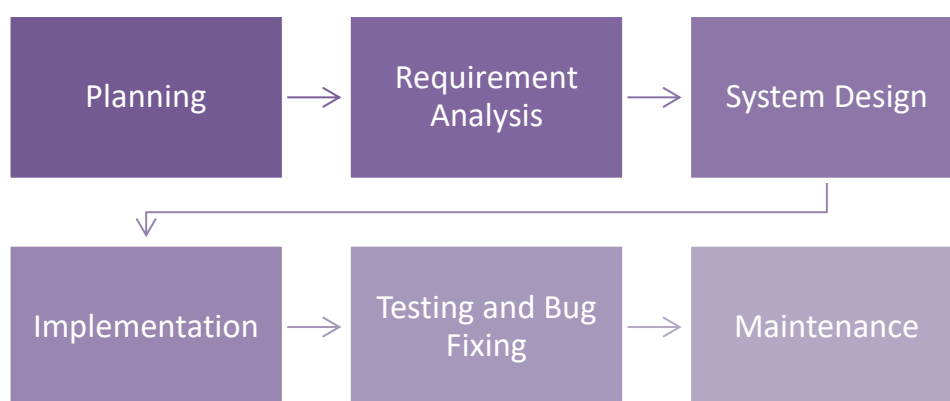


Figure 3-1: Methodology

3.2 Requirement Analysis

Organizations can identify the genuine demands of their clients with the use of requirement analysis. At the same time, it makes it possible for the development team to speak with clients in a language they can comprehend as opposed to using long passages of text. The phase of system requirements analysis might be difficult because all of the important customers and their interests are considered while determining needs.

3.2.1 User Based Functional Requirement

In this section we can see different type of users and their functional requirements.

3.2.1.1 Student Functional Requirement

Table 3-1: Student Functional Requirement

Descriptor	Requirements
REQ-1	Students can register for the system
REQ-2	Student can login for the system
REQ-3	Student can see vacant house ads using this system

REQ-4	Student can search according to their need using this system
REQ-5	Student can send email to another student to communicate
REQ-6	Student can send request to owner for reposting the house renting ads
REQ-7	Student can send request for renting a house
REQ-8	Student can update their profiles
REQ-9	Student can see requested list send to owner
REQ-10	Student can accept or cancel their own house requests
REQ-11	Student can see their booking list
REQ-12	Student can logout

3.2.1.2 Owner Functional Requirement

Table 3-2: Owner Functional Requirement

Descriptor	Requirements
REQ-13	Owner can register for the system
REQ-14	Owner can login for the system using
REQ-15	Owner can post ads for vacant house using this system
REQ-16	Owner can see house listing
REQ-17	Owner can update their profiles
REQ-18	Owner can see the requested list sent by students
REQ-19	Owner can accept or cancel house renting requests from students
REQ-20	Owner can logout

3.2.1.3 Admin Functional Requirement

Table 3-3: Admin Functional Requirement

Descriptor	Requirements
REQ-21	Admin can register
REQ-22	Admin can login for the system
REQ-23	Admin can delete any listing from the system
REQ-24	Admin can modify any listing from the system
REQ-25	Admin can delete any user from the system
REQ-26	Admin can modify information of a user using the system
REQ-27	Admin can help to reset password
REQ-28	Admin can update their profiles
REQ-29	Admin maintain the blogs
REQ-30	Admin can logout

3.2.2 Non-Functional Requirement

- Reliability
- Efficient Performance

- Availability
- Maintainability
- Capacity

3.2.3 Hardware Requirement

- Processor: intel core i5, 1.19 Ghz speed
- Memory: 8 GB RAM
- Pendrive

3.2.4 Software Requirement

- Operating System-Windows 10
- Visual Studio Code
- SQLite Extension
- Adobe XD – prototype design purpose
- Microsoft Visio – to design diagrams
- Microsoft Word – to make the documentation
- Microsoft PowerPoint – for the presentation

3.3 Design Requirement

RentTime system will allow users to set the specific requirements to find roommates, vacant places, or tenants according to their needs. additionally, they can also select the preferred location. Most of the website's content will be managed by the system using a relational database. Potential consumers can explore the different spaces offered in the chosen area via the website. Classified info, including passwords, will be secured via encryption and a SQL database. There are some other designed requirements written below:

- Excellent UI design
- Secure authenticity
- Protect user data by only accessible by authentic profile.
- Accessible from all over the country
- Instructions are simple to read and comprehend
- Text style type and size are effectively coherent
- The site written in English

CHAPTER FOUR: DESIGN SPECIFICATION

This chapter demonstrates how it functions and engages with the system's user. The project's front-end design, back-end design, user interface design, and UX are all covered in the Design and Implementation chapter.

4.1 System Design

In this section we can see all the necessary diagrams to understand the system appropriately, and precisely. Using defined symbols, we can express the data flow diagram for mapping out the flow of the system. Besides that, use case diagrams shows the encapsulate idea of the all the user details.

4.1.1 Data Flow Diagram

Data flow diagrams offer enterprises a simple, effective way to comprehend, optimize, and implement new procedures or systems. They make it simple to comprehend and prune because they are visual representations of the system or process. It describes all the entities and its flow to the processes. [22]

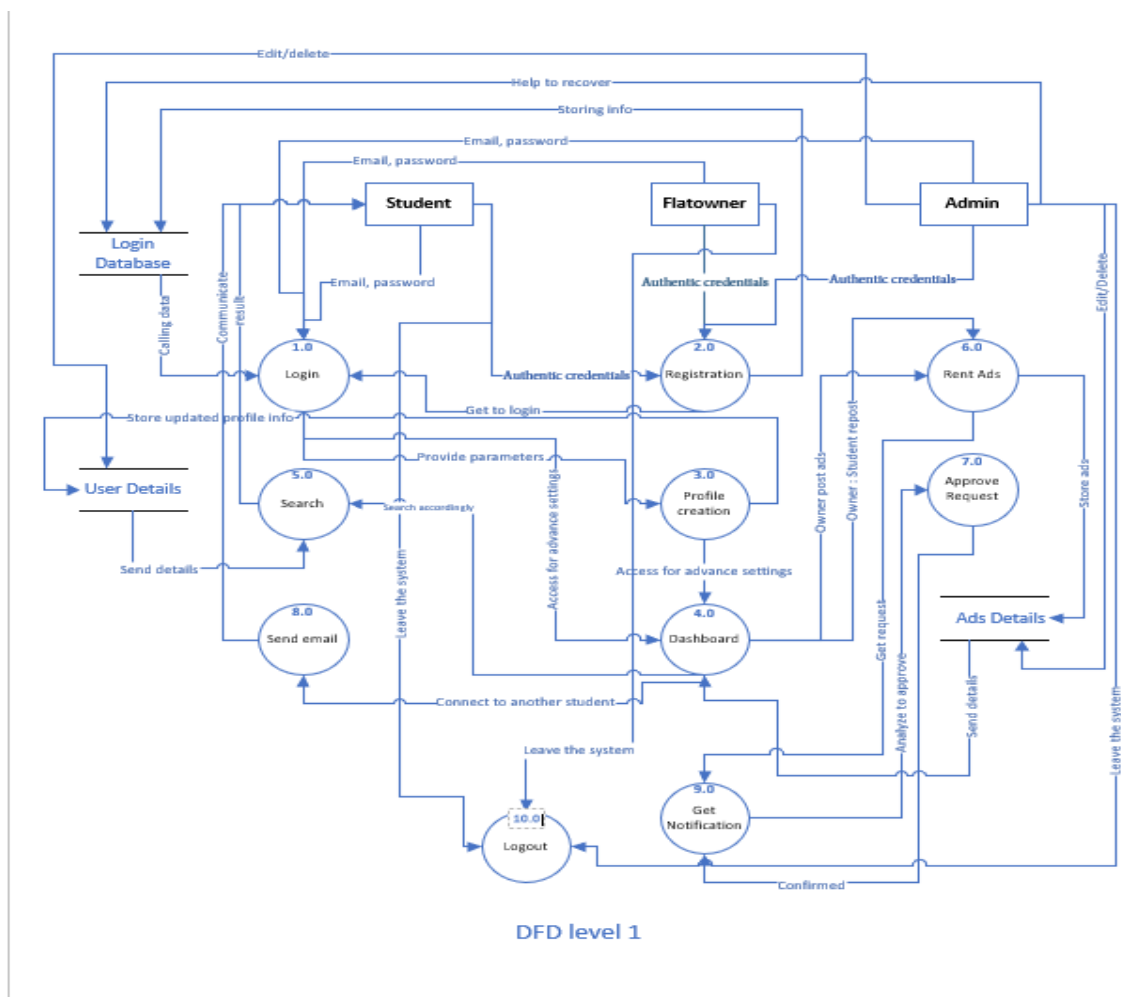


Figure 4-1: Data Flow Diagram

4.1.2 Use Case Modeling and Description

In this section of the report, Use Case diagrams of the users (student & owner) and admin are attached separately. The use case model specifies the user's objectives, the system-user interactions, as well as the functions of the system that is necessary to accomplish those objectives.

User end use case diagram:

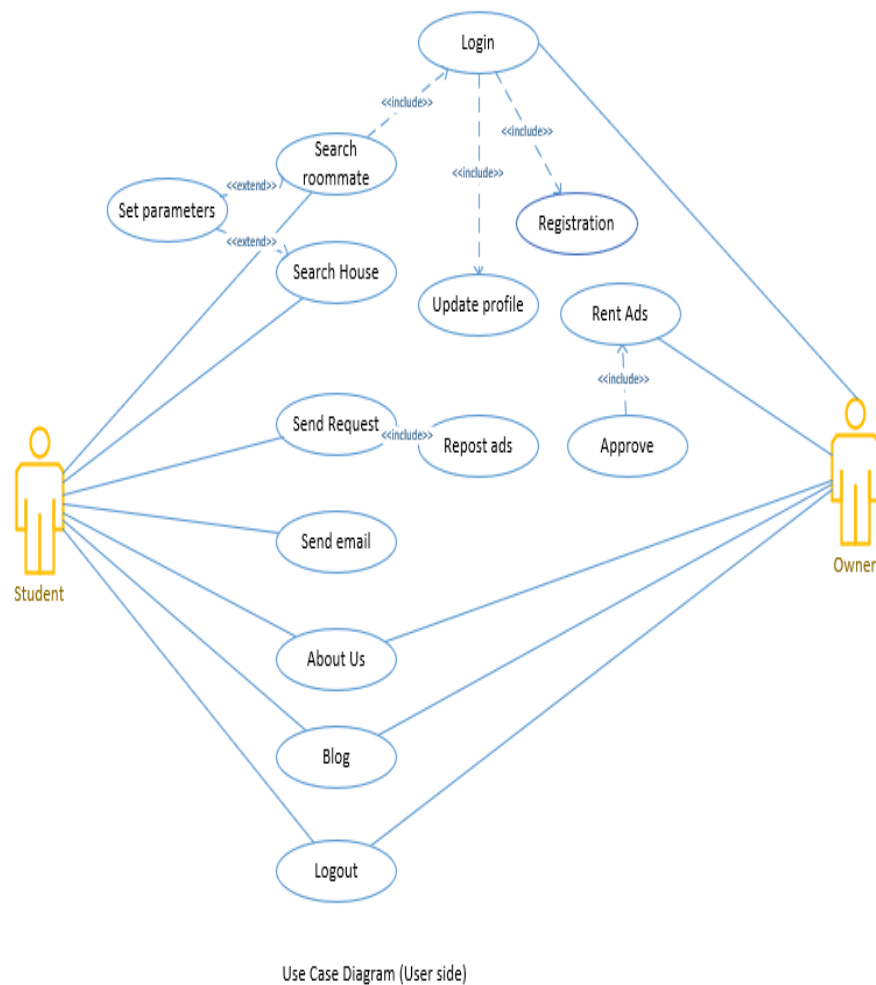


Figure 4-2: Use Case Diagram (user end)

Admin end use case diagram:

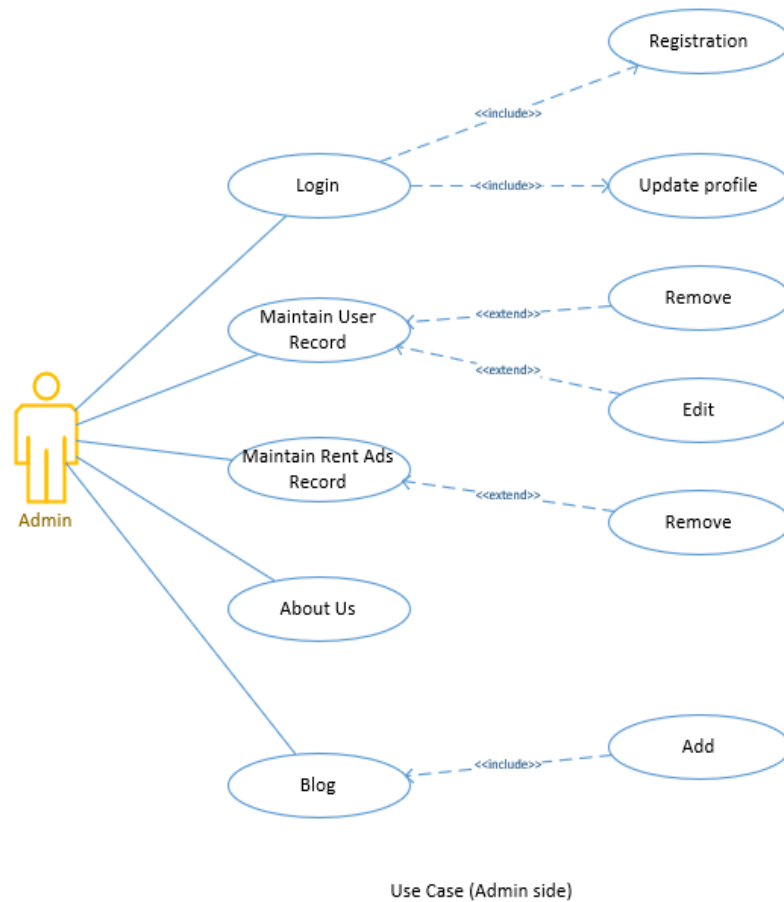


Figure 4-3: Use Case Diagram (admin end)

UC1: Registration

Related requirements: REQ-1, REQ-13, REQ-22

Initiating actor: new users

Actor's goal: is to register properly to get into the system

Pre-conditions: Provide correct information to register

Postconditions: successfully registered for the system

UC2: Login

Related requirements: REQ-2, REQ-14, REQ-23

Initiating actor: owner, student, and admin

Actor's goal: Successfully login

Pre-conditions: already registered to get access

Postconditions: able to browse inside the system

UC3: Profile

Related requirements: REQ-8, REQ-11, REQ-17, REQ-20, REQ-28

Initiating actor: owner, student, and admin

Actor's goal: be able to update own profile

Pre-conditions: has to be logged in

Postconditions: able to see updated informative profile

UC4: Search

Related requirements: REQ-3, REQ-4, REQ-5, REQ-6, REQ-7,

Initiating actor: student

Actor's goal: search to fulfill their need

Pre-conditions: has to be logged in and availability of their required needs

Postconditions: successfully found roommate, house, send email and send request

UC5: Post ads

Related requirements: REQ-15

Initiating actor: owner

Actor's goal: post advertisement for seeking tenants

Pre-conditions: has to be logged in.

Postconditions: successfully post an ad and can see it in the list.

UC6: Requests incline

Related requirements: REQ-9, REQ-10, REQ-18, REQ-19

Initiating actor: student, owner

Actor's goal: to see the list of requests sent by students to owner, and student to student.

Pre-conditions: has be logged in

Postconditions: able to see the requests list and be able to take actions

UC7: Listing

Related requirements: REQ-16

Initiating actor: owner

Actor's goal: see the listing of houses

Pre-conditions: has to have some previously listed house.

Postconditions: successfully be able to see the listing.

UC8: Administration

Related requirements: REQ-23, REQ-24, REQ-25, REQ-26, REQ-27, REQ-29,

Initiating actor: admin

Actor's goal: modify, delete, help to reset password

Pre-conditions: has to be logged in to the admin panel.

Postconditions: successfully completed admin responsibilities

UC9: Logout

Related requirements: REQ-12, REQ-21, REQ-30

Initiating actor: owner, student, admin

Actor's goal: to end the session

Pre-conditions: needed to have a registered account in the system.

Postconditions: successfully end the session

4.1.3 Activity Diagram

Developers use an activity diagram to grasp the high-level flow of programs. They can also utilize it to identify the limitations and circumstances that lead to specific incidents. If complicated decisions need to be taken, a flow chart converges into an activity diagram. The user-side data flow is represented by the below activity diagram. It also represents user's communication method with the system. This web application has a very straightforward and user-friendly front-end design. (What is Activity Diagram?, 2022) [19]

Here all the entities and their activities in the system has been explained through a diagram.

Student side activity diagram:

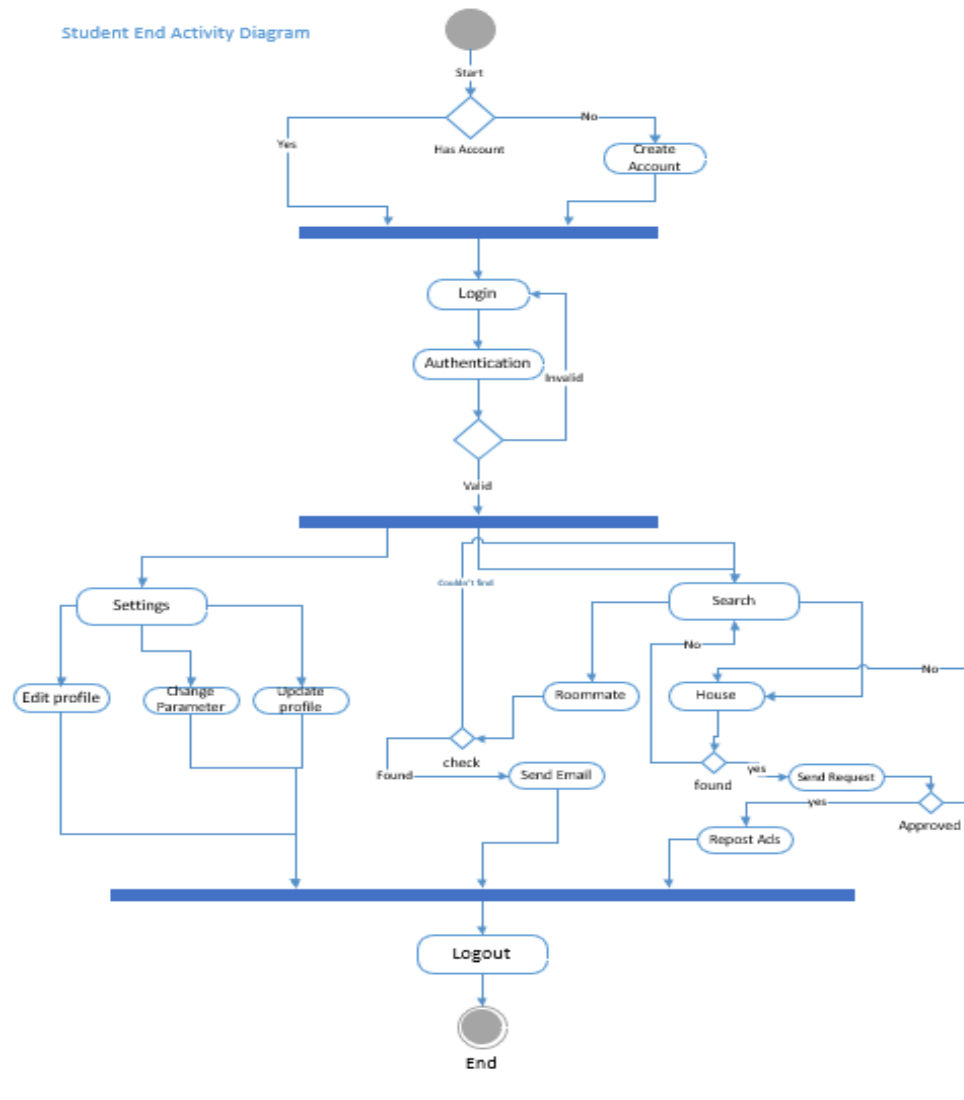


Figure 4-4: Activity Diagram (student)

Owner end activity diagram:

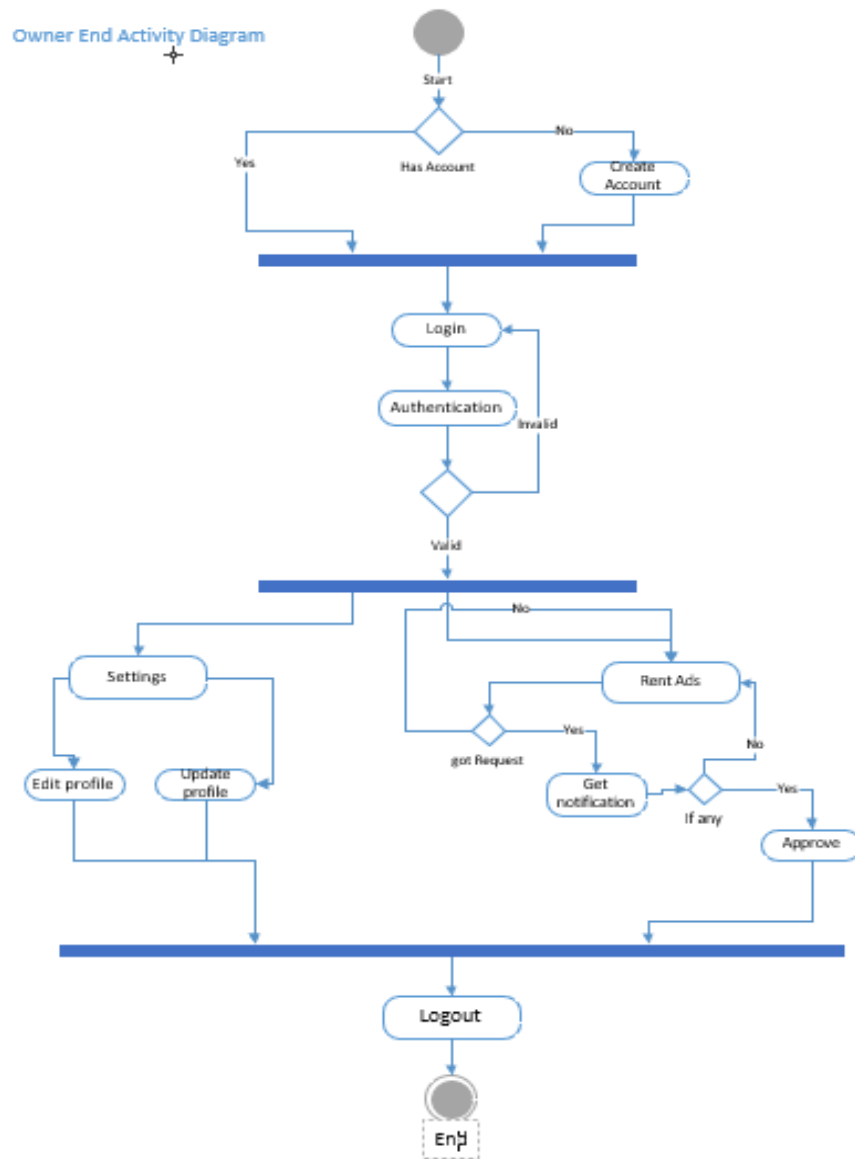


Figure 4-5: Activity diagram (owner)

Admin end activity diagram:

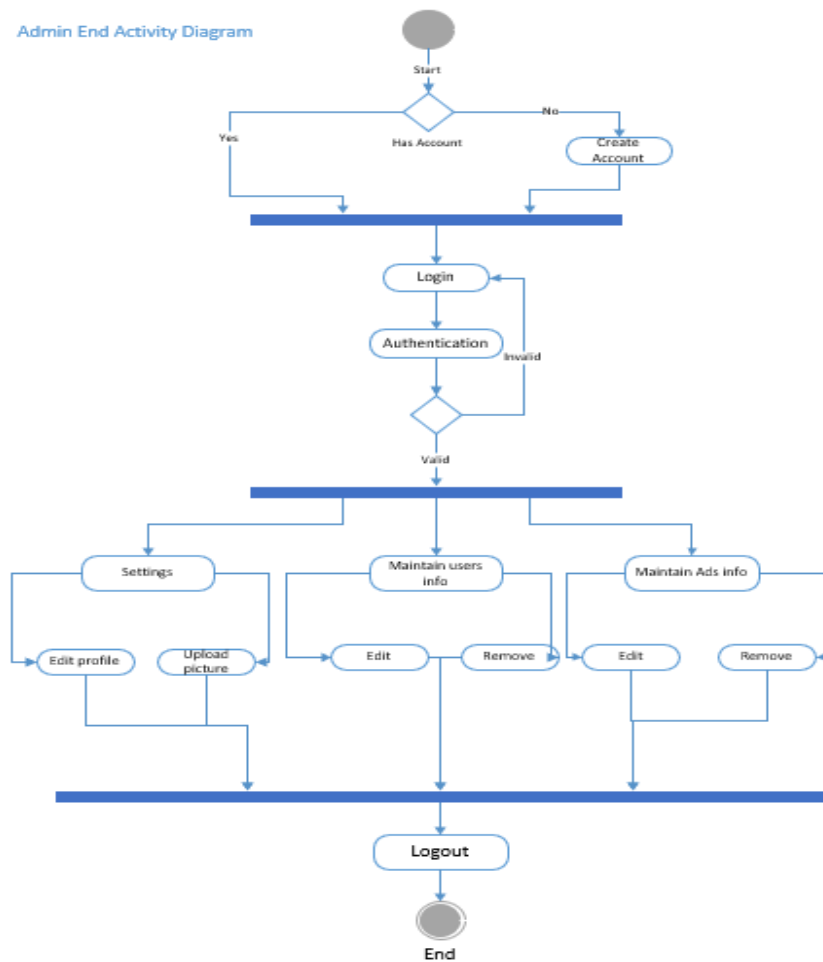


Figure 4-6: Activity diagram (admin)

4.2 Front-end Design

The struggle with front end development is that the procedures and technologies used to construct a website's front end are frequently changing, dictating constant monitoring of the industry's advancements. The objective of website design is to contemporary the content in an understandable and appropriate manner to users as soon as they access the site. This is more complicated that in the recent era customers utilize a wide range of devices with different screen sizes and resolutions, warning the site's designer to take these factors into consideration. They must make sure that their website loads properly across platforms, browsers, and devices, which entails careful planning.

The project's front-end design has been done using HTML, CSS, JS, Bootstrap. The front-end design of the project is simple and dynamic. Here we can see the navigation bar, buttons, forms, pagination, and search bar in this project. Besides that, we can also have the option of drop-downs to select the required parameters. Further, using the javascript, here a toggled menu has been designed. Moreover, all these features made it more interactive and user friendly

4.3 Back-end Design

The relationship between a server, program, and database is referred to as back-end design. For a dynamic system to be created, the back-end programming and front-end design must work together. Additionally, the end-users are completely unaware of the back-end design. We can say that the most crucial aspect of a project or system is highly reliant on the back-end design.

In the development of the back-end design, the python language and the Django framework has been used. Using the vs code editor, the project development has been implemented. Since this language is comparatively easier to implement, hence it was used. Here in the project, Django has been used to avoid complexity, build-in admin UI, and better security of the website. It uses MVC (Model View Controller) architectural pattern for dividing the application into three logic segments: The Model, the View, and the Controller. [14] Here the architecture has been used to make a scalable website. Initially, in the model segment, different variables have been declared to create a table, called a database table. To create that SQLite has been used, as initially, this system doesn't have heavily used traffic. However, for query ORM has been used for adding more efficiency and convenience. The model segment links the data-related logic which helps Django in creating different templates known as a form, and those are the registration form, listing adds form and login form. Through this, the view function has been established and it helps in the UI logic of the system. In this view module, the user will be able to see the dropdowns, boxes, and other options. Further, the controller component creates the bridge between the model and view component for processing the additional activities. To produce the desired result, the controller component interacts with the view module and the model component to manipulate the data. URL will have the control to show which design or form will be visible to users, here it is working as the controller.

4.3 Interaction Design and User Experience (UX)

The user-technology interface process is the subject of interface development. User experience (UX) or Interaction Design are terms used to describe how an end user interacts with technology. Developers make sure the end-user has the best possible interaction with the system at every visualization tool. User interface design is a term used to describe the process of creating a system's visual components. It is the responsibility of a user interface designer to make sure that every one of the functionalities that a user can observe is convenient to use across a range of devices. The main objective of this application's development is to produce a user-friendly, interactive system. As a result, this approach has been designed to be as clear-cut and straightforward as feasible.

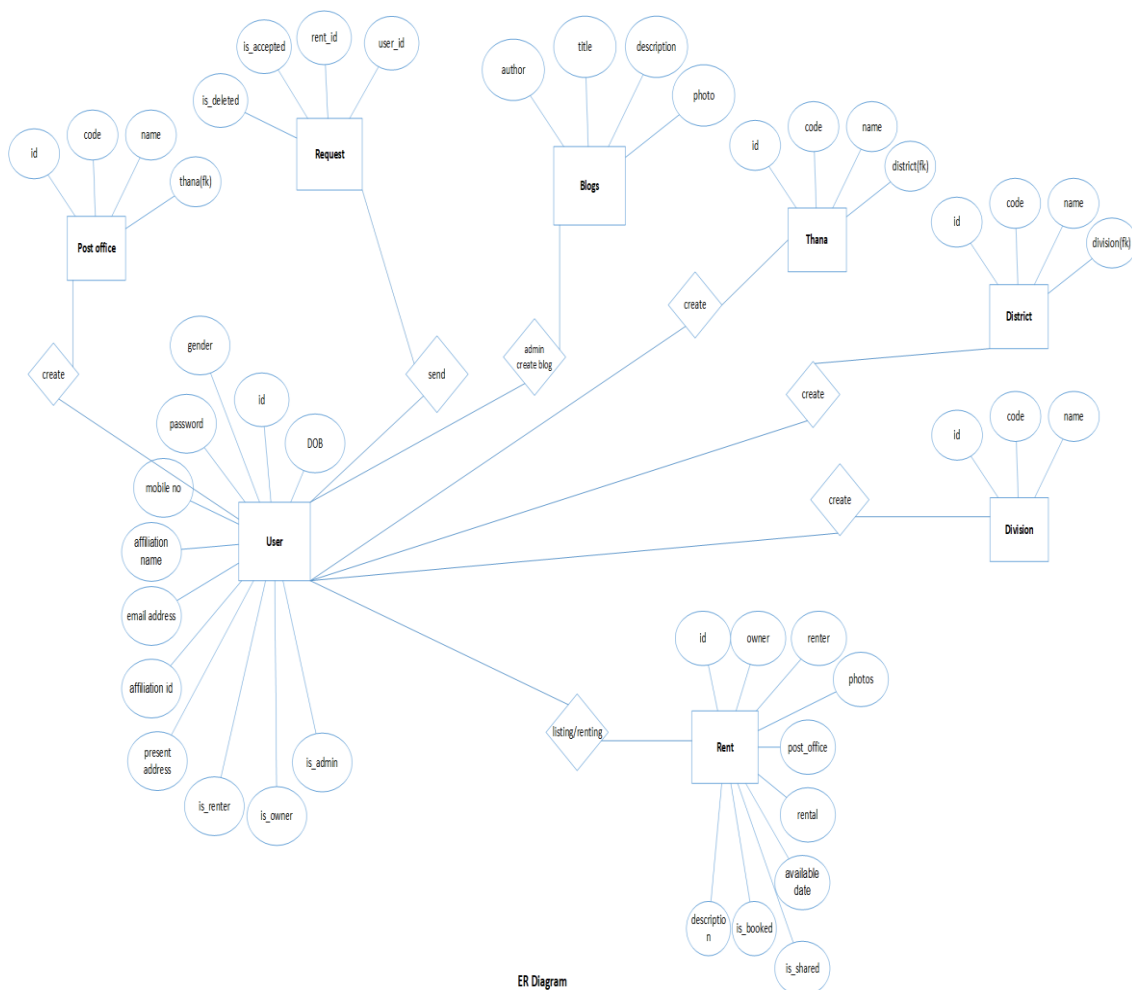
CHAPTER FIVE: SYSTEM DEVELOPMENT AND TESTING

In this section, the systems' implementation has been elaborated.

5.1 Implementation of Database

A database is a structured collection of material that has been arranged and is often kept electronically in a computer system. A database management system (DBMS) often oversees a database. The term "database system," which is frequently abbreviated to "database," refers to the combination of the data, the DBMS, and the applications that are connected to it. (What is a database?, 2022) [23]

For the implementation of my database, I have used SQLite. A relational database management system is provided by the software library known as SQLite. When it comes to setup, database management, and resource requirements, the lite in SQLite stands for lightweight. (What is SQLite? Top SQLite Features You Should Know, 2022) [24]



ER Diagram

Figure 5-1: ER Diagram

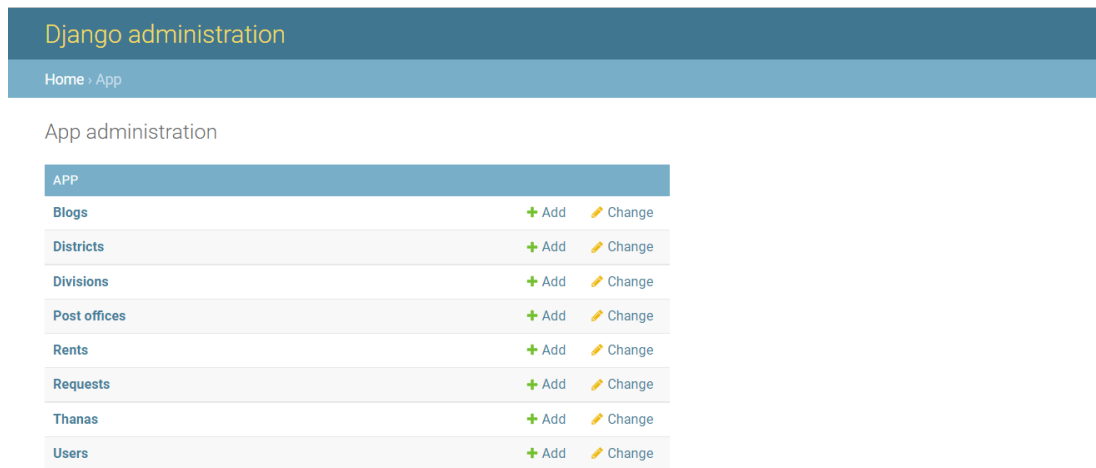


Figure 5-2: database from admin panel

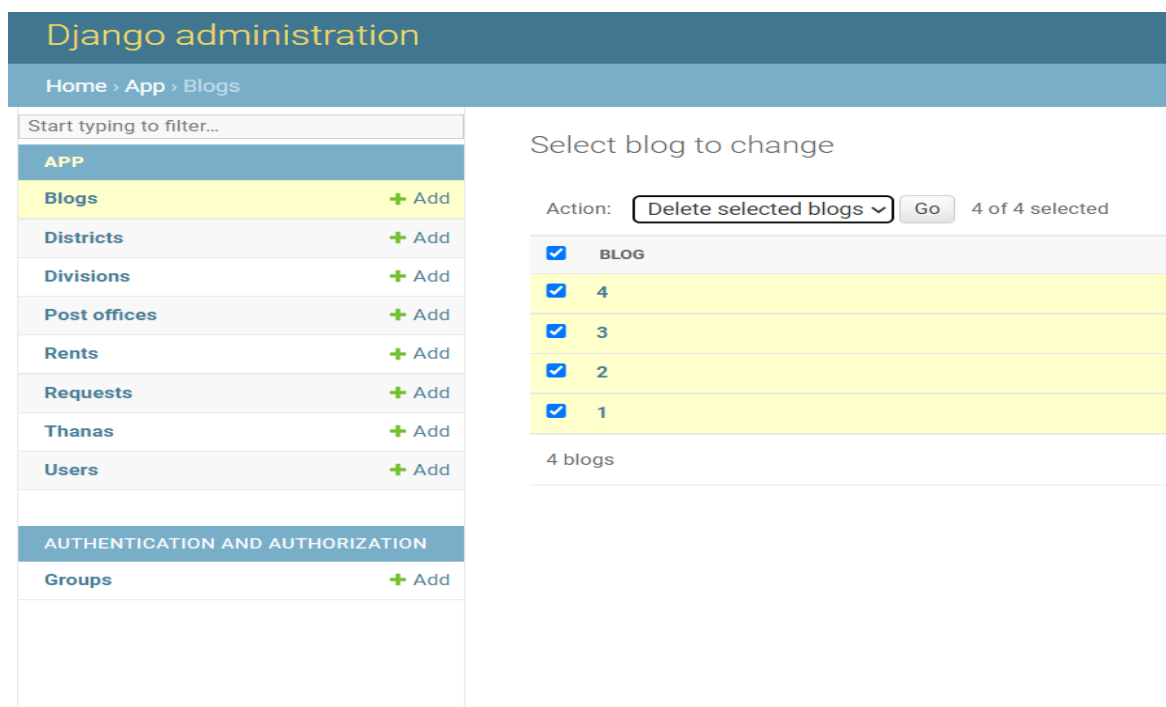


Figure 5-3: post deleting

id	code	name	is_deleted	created
1	1209	Jigatala	0	2022-10-10 12:09:00
2	1207	Mohammadpur	0	2022-10-10 12:07:00
3	1208	Tejgaon	0	2022-10-10 12:08:00
4	1216	Pallabi	0	2022-10-10 12:16:00
5	1217	Mirpur	0	2022-10-10 12:17:00

Figure 5-4: Database from VsCode

5.2 Implementation of Front-end Design

It was extremely challenging to develop a user-friendly and visually aesthetic system that can be simple at the same time. I tried to keep this system as simple as I could for the sake of manageable design. Here the concept has been turned into visual representation through some code involving with UX design, CSS framework, JS function calling, and etc.

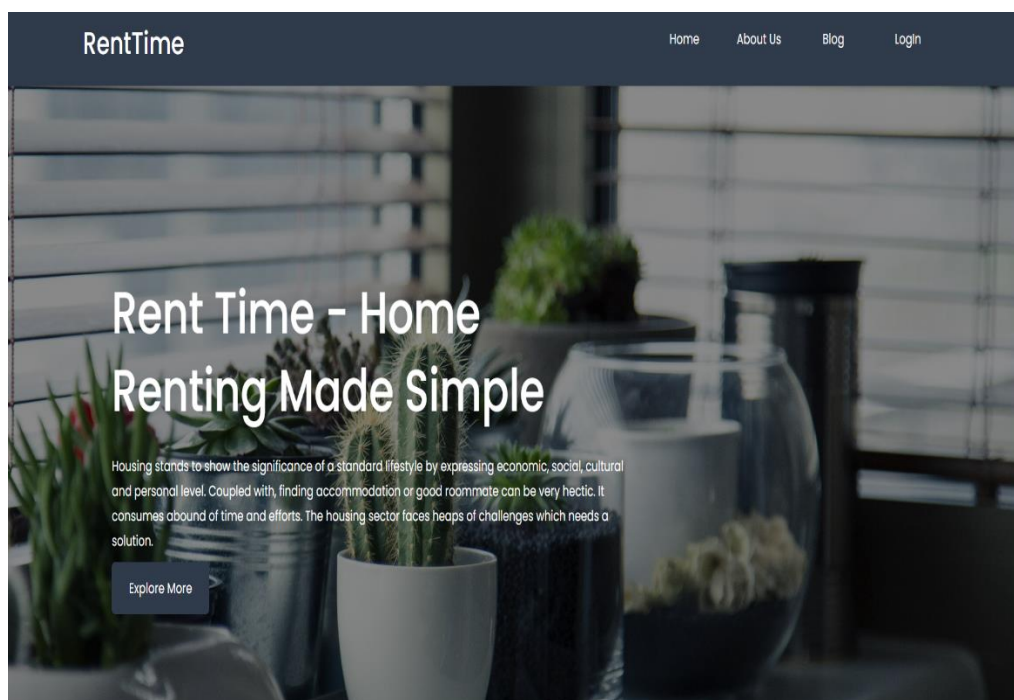


Figure 5-5: landing page

In above fig 5.5 shows a snippet of the homepage, which includes the navigation bar, along with some sample profiles of homes and students. Additionally, a testimonial of the system and footer. None of the actions is accessible without authentic login.

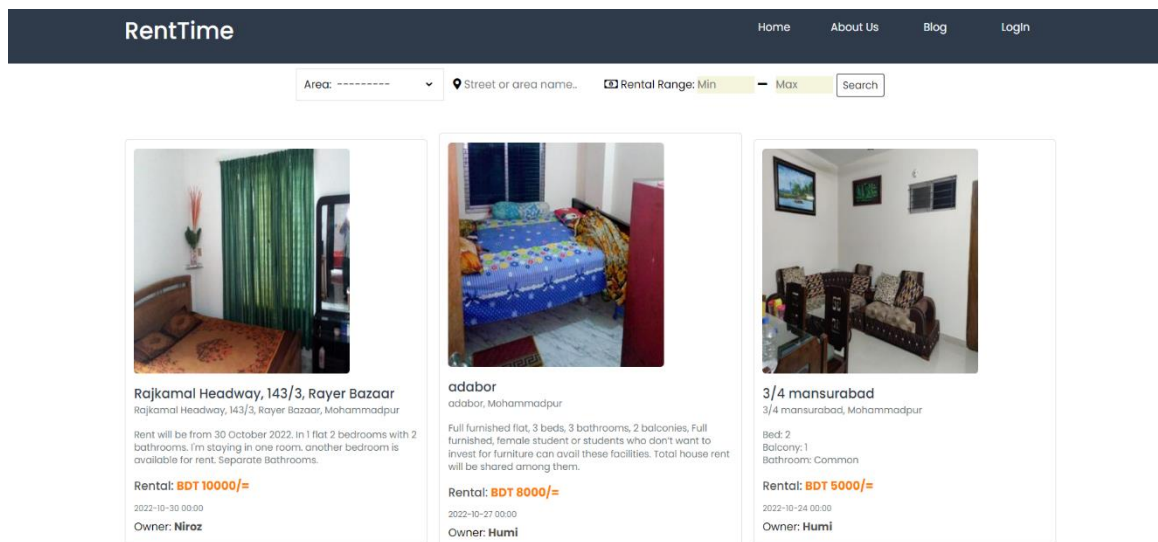


Figure 5-6: without login listing view

In Figure, 5.6 shows a snippet of the house listing for non- registered customer, however, to make any further action one must login.

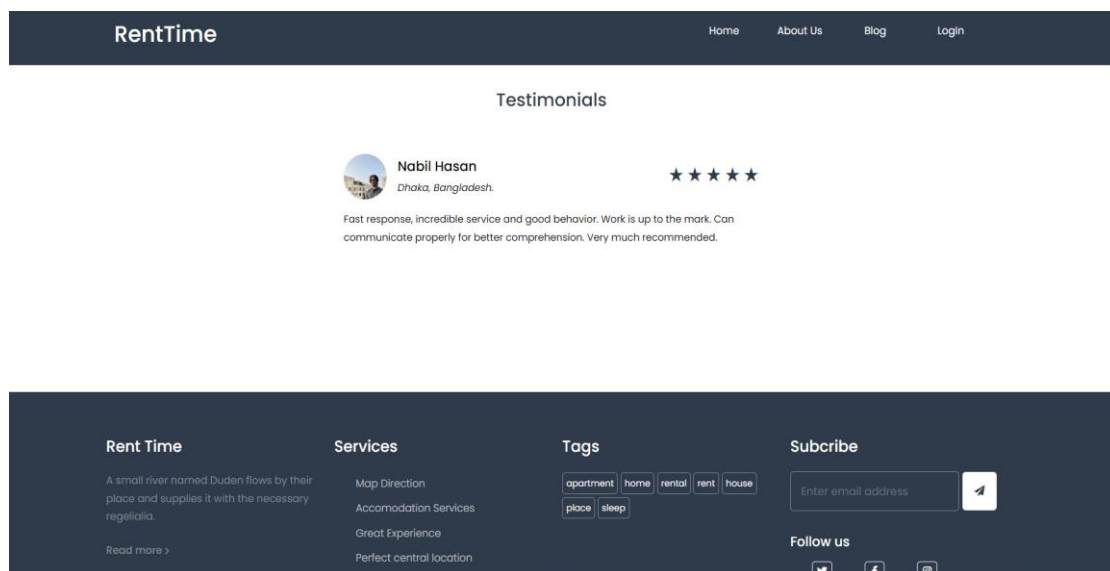


Figure 5-7: footer

In Figure, 5.7 shows a snippet of the footer section.

RentTime Home About Us Blog Login

Student Register

Student Owner

Username*
Required: 150 characters or fewer. Letters, digits and @/!/-/_ only.

First name

Last name

Nid*

Email address

Gender
MR MS MRX MSX MSXX MSXX

Mobile No*

Dob
 mm/dd/yyyy

Present address

Affiliation name

Affiliation id

Password*

Your password can't be too similar to your other personal information.
 Your password must contain at least 8 characters.
 Your password can't be a commonly used password.
 Your password can't be entirely numeric.

Password confirmation*
Enter the same password as before, for verification.

Photo

Figure 5-8: Register

In Figure, 5.8 shows a snippet of the sign-in page. There will be two options to sign in as since the authentication information will be different from user to user. I have two types of users Student and Owner. while signing up for the system, the information page will come one after another which may include basic information, password settings, etc.

RentTime Home About Us Blog Login

Member Login

Username*

Password*

LOGIN

[Don't have an Account? Sign Up](#)

Rent Time
 A small river named Duden flows by their place and supplies it with the necessary regellalia.
[Read more >](#)

Services
 Map Direction
 Accomodation Services
 Great Experience

Tags
 apartment home rental rent house place sleep

Subscribe
 Enter email address

Follow us

Figure 5-9: login form

In Figure, 5.9 shows a snippet of the login page. In this page all my users can login to the system by proving particular value. In case someone forgot the password, they can recover it too. Additionally, in case of new user there is an option to register.

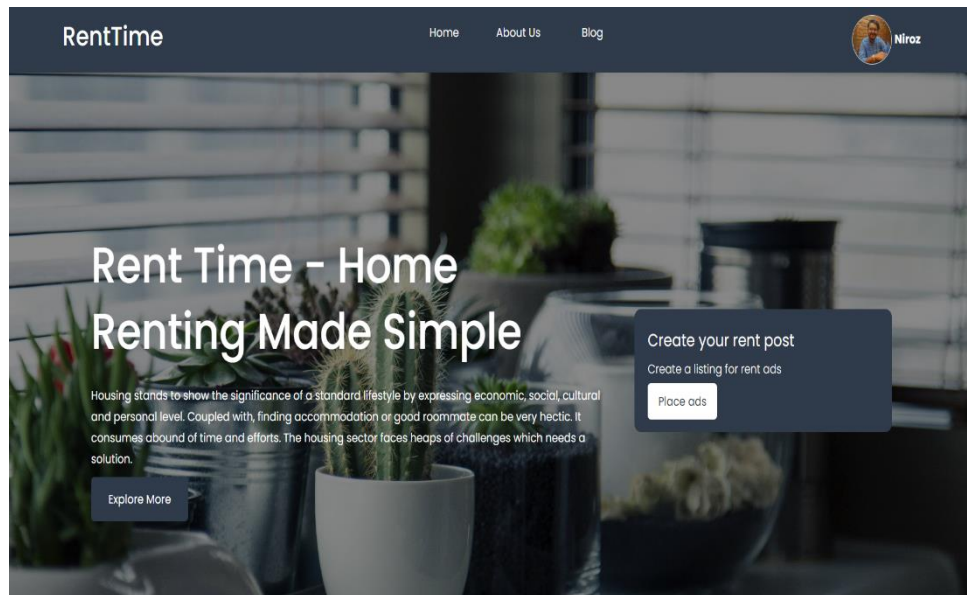


Figure 5-10: owner profile(btn,home)

In Figure, 5.10 shows a snippet of the home page from owner profile. There is a button to click action for making post for house renting. Once the user sign-in as a owner, they will redirect to this page and they will be able to see their listing (post adds for vacant place). From this page, they can browse many different options like settings, profiles, requests page, etc.

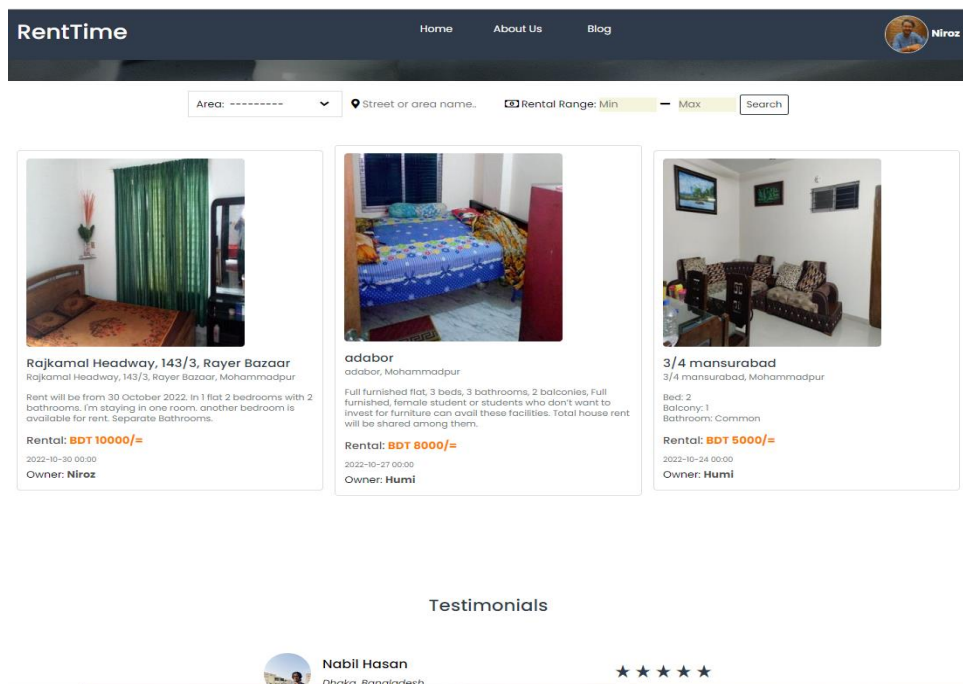


Figure 5-11: listing is visible

In Figure, 5.11 shows a snippet of the house listing in the system by every owner.

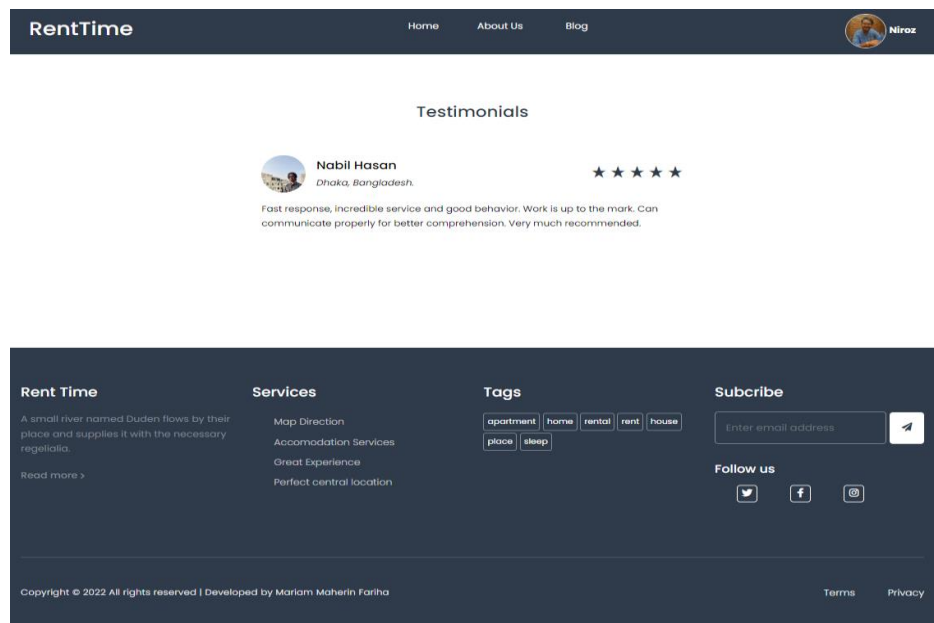


Figure 5-12: Testimonials

In Figure, 5.12 shows a snippet of testimonials for the system.

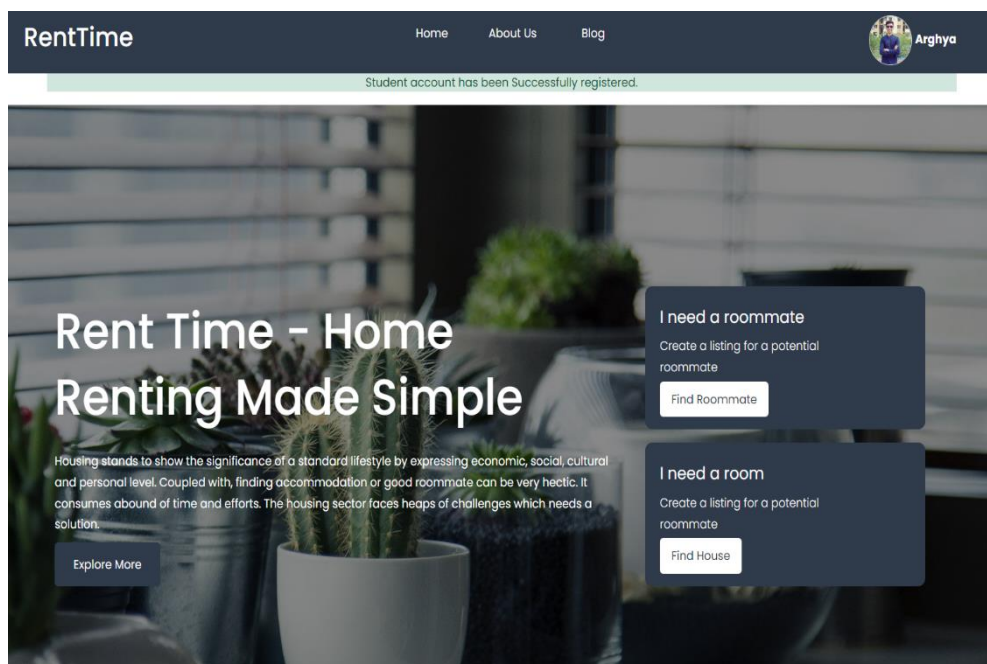


Figure 5-13: student registered

In Figure, 5.13 shows a snippet of the student landing page. Once the user sign-in as a student, they will redirect to this page and they will be able to see the homepage from where they can browse to different pages such as settings, profiles, requests page, home renting, find roommates, etc.

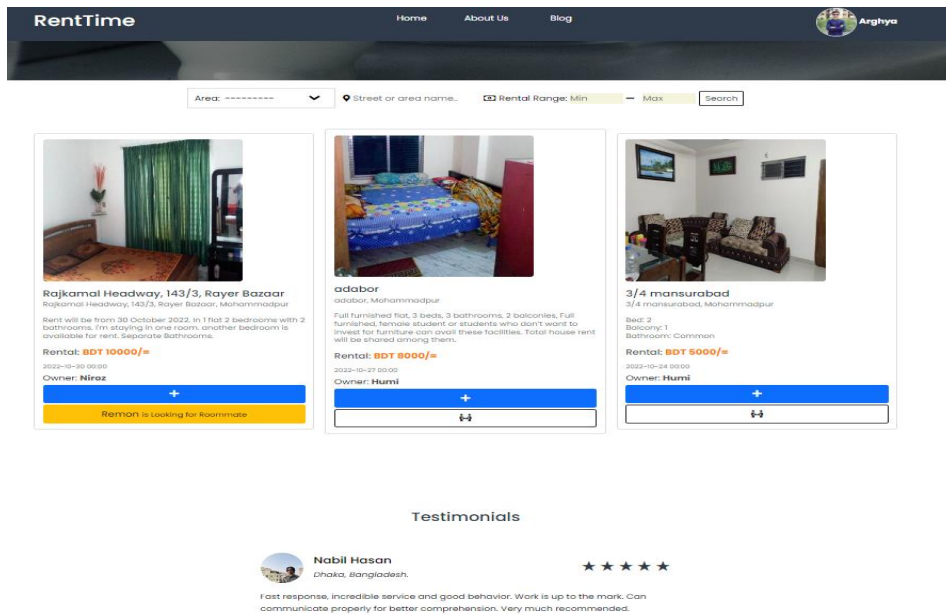


Figure 5-14: student home page

In Figure, 5.14 shows a snippet of the student home page, where they can find different house vacancies.

The screenshot shows the 'Settings' page on the RentTime website. The page has a dark header with 'RentTime' and navigation links 'Home', 'About Us', and 'Blog'. A user profile for 'Mariam' is visible in the top right. The main content area is titled 'Settings' and contains a section for 'Edit Personal Information'. The form includes the following fields:

- First name: First Name
- Last name: Last Name
- Nid: Nid
- Email address: mariam.m.fariha@gmail.com
- Gender: Female
- Mobile No*: 01842344217
- Dob: mm/dd/yyyy
- Present address: Present Address
- Affiliation name: Institute Name
- Affiliation id: Your Institutional Id
- Photo: Choose File (No file chosen)

A green 'Update' button is located at the bottom of the form.

Figure 5-15: settings

In Figure, 5.15 shows a snippet of the edit profile page. Using this page users can modify their profiles.

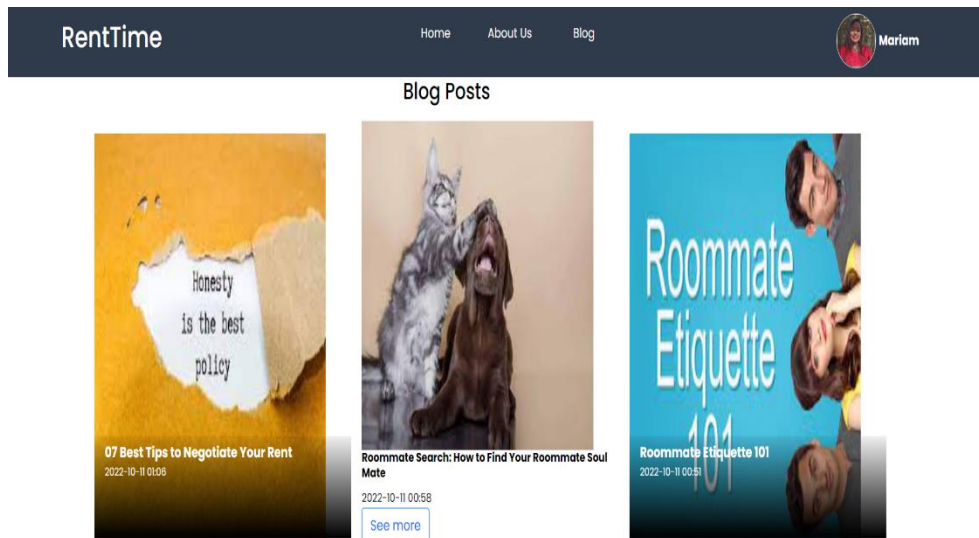


Figure 5-16: blog timeline

In Figure, 5.16 shows a snippet of the blog timeline. Using this page users can browse different blogs.

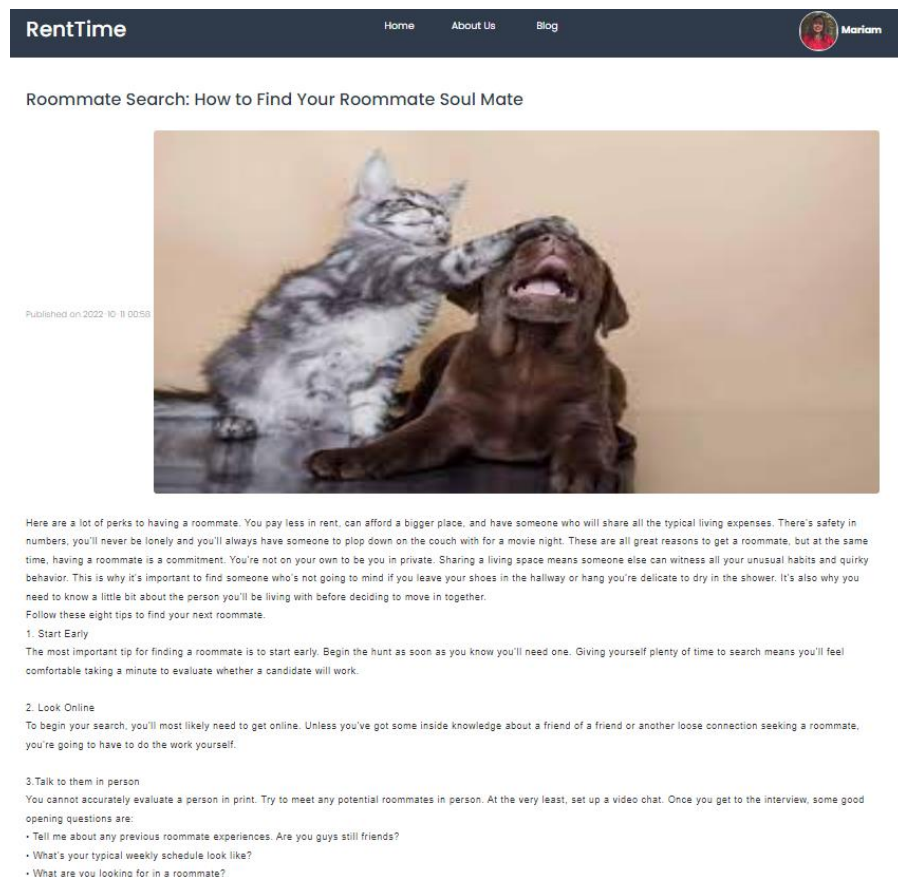


Figure 5-17: blog content

In Figure, 5.17 shows a snippet of the blog content. All users and non-users can access this page and read.

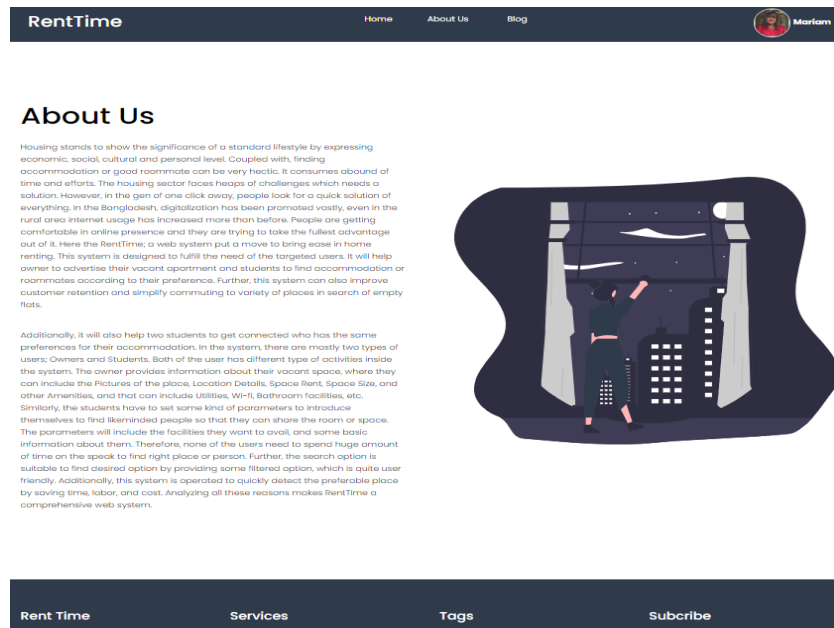


Figure 5-18: about page

In Figure, 5.18 shows a snippet of the about page. All users and non-users can access this page and read.

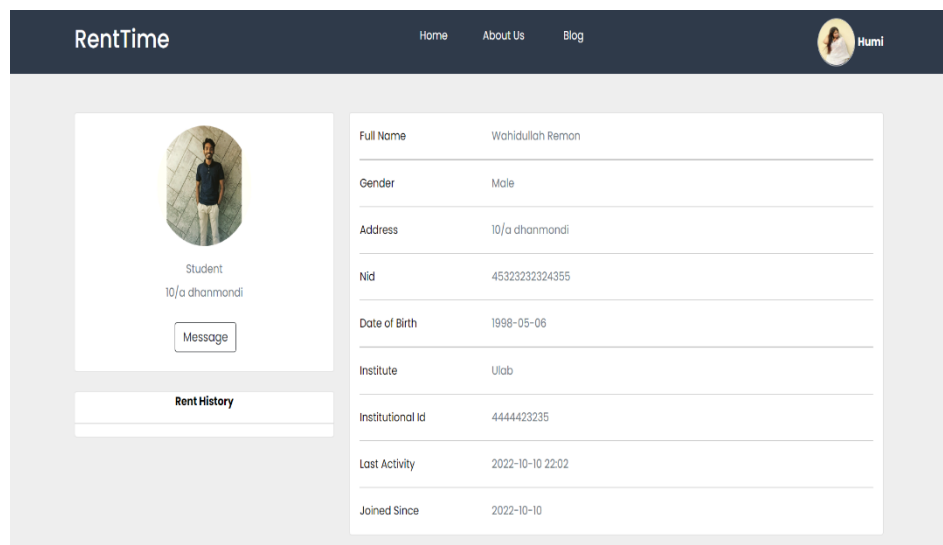


Figure 5-19: profile

In Figure, 5.19 shows a snippet of the student profile page. If someone is looking for a roommate, they can check this page to analyze another user account. If they like the profile they can send an email to them for further communication.

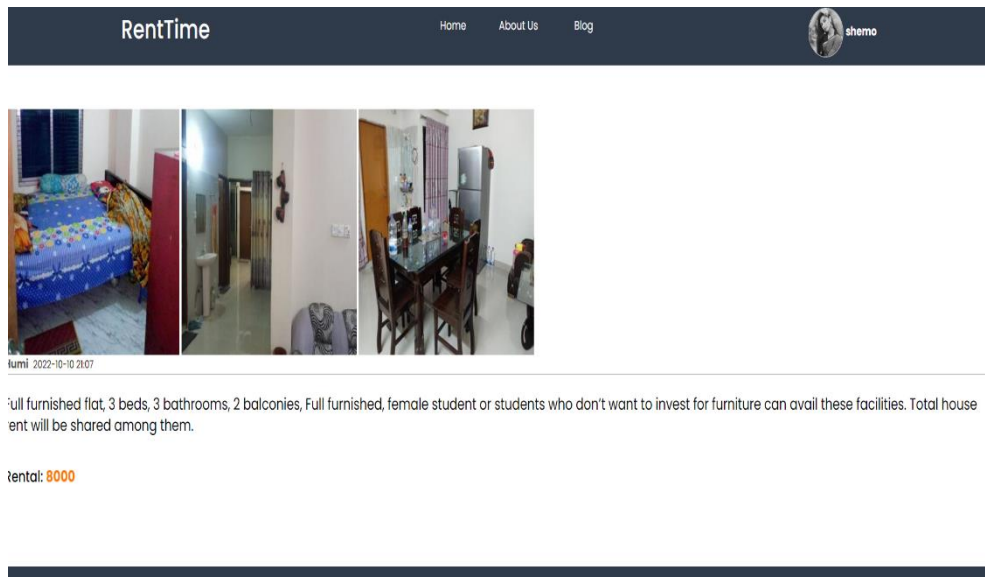


Figure 5-20: house profile

In Figure, 5.20 shows a snippet of the house profile page. If someone is looking for a house, they can check this page to analyze and can send request to the owner for further communication or send request to repost the ads to find roommate.

Figure 5-21: add post ads

In Figure, 5.21 shows a snippet of the post ads page. This is only visible to owner profile. If the owner wants to advertise their vacant house, they do it here in this page.

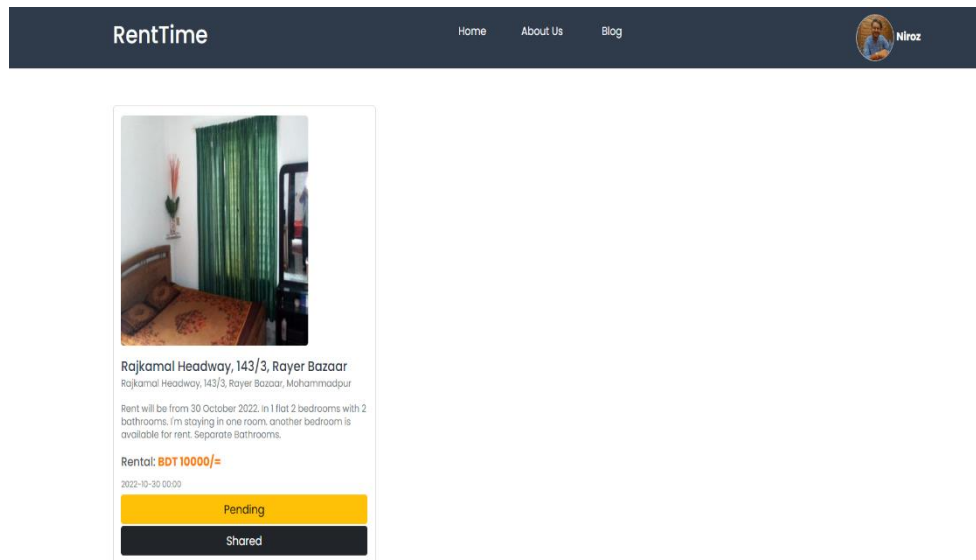


Figure 5-22: House listing

In Figure, 5.22 shows a snippet of the house list of an owner.

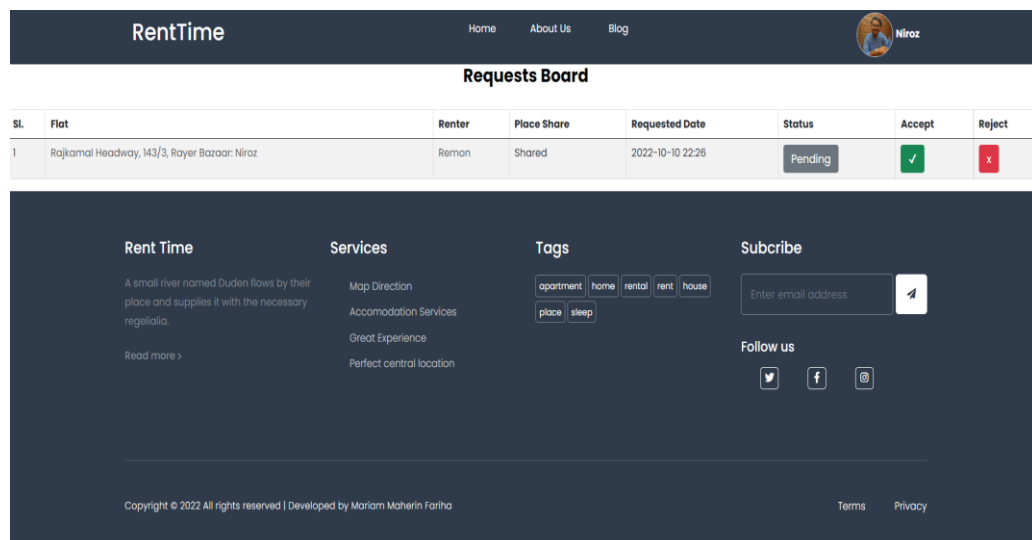


Figure 5-23: owner side (request btn)

In Figure, 5.23 shows a snippet of the request page. Both the user will have this option but it will mean different for each. Suppose for owner, it will mean the list of pending requests and for the students it will mean how many the list of houses they have requested for.

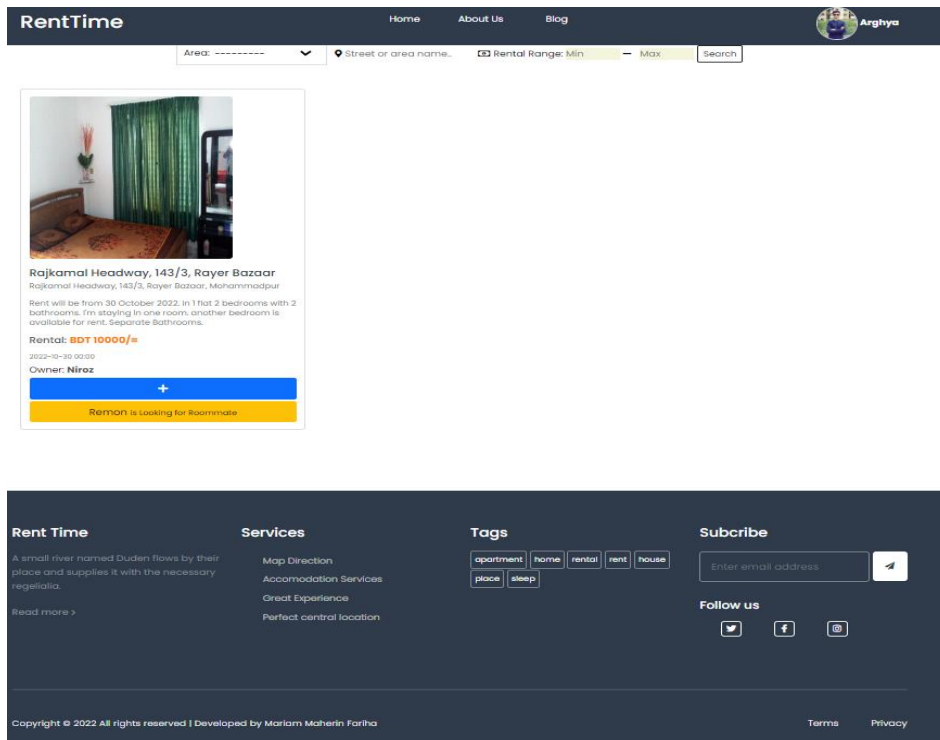


Figure 5-24: finding roommate with flats

In Figure, 5.24 shows a snippet of the find roommate option. By clicking to the button for roommate, a list of houses will come up which has been repost by another student for finding roommate, for this particular house.

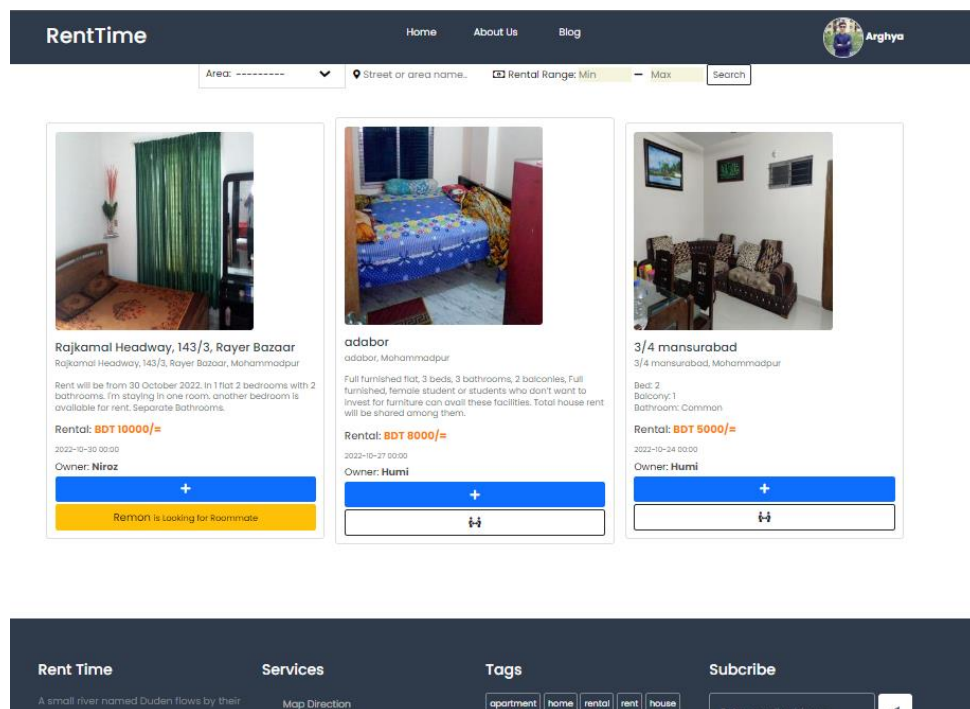


Figure 5-25: finding only houses

In Figure, 5.25 shows a snippet of searching house, to accommodate alone or to share with someone else.

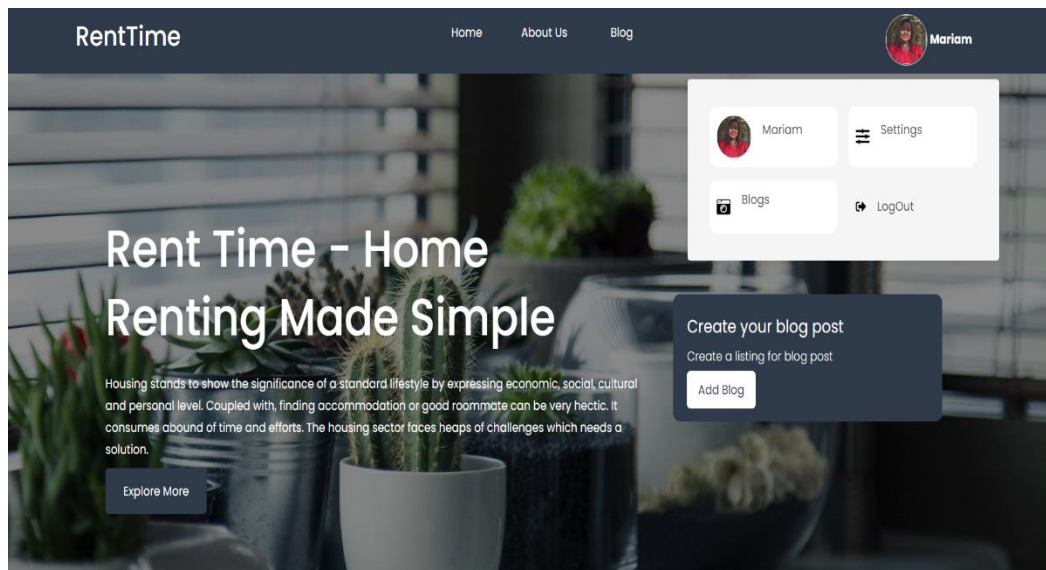


Figure 5-26: admin side

In Figure, 5.26 shows a snippet of admin login. Through this, admin can add a blog, set their own profile.

5.3 Testing Implementation

Software testing is a procedure that provides the developer a scope to verify the functionality of the software as per the requirement. It is a crucial event as it declares any fault or defect of the system in this phase. While testing the software we use demo data to find out errors or bugs. The main reason for this phase is to confirm everything went according to the requirement and it's a functional system. Different approaches can be done to test a system, however, in my project, we can see the manual testing technique.

Table 5-1: Test Category and Expected Result

Test Case Identifier	Criteria	Data Input/Requirements	Expected Outcomes
TC1	Provide authentic details for registration	Name, Username, Password,NID, DOB, Uni ID, Uni name, Preferred location, etc	Successfully registered
TC2	Try to login	Email, Password	Successfully login
TC3	Try login without internet connection	Email, password	Show error and ask to connect to internet.
TC4	View and modify user profile	Login input	Updated information saved in database
TC5	Owner can post ads	Basic details and pictures of the house	Details are stored in database and shown to house renting option
TC6	Owner can see their listing and remove if necessary	Previous posted ads	Posted ads should be visible to owner and authority for the action
TC7	Owner can see the requests and approve	Requests has to be sent by students	Send a notification to student
TC8	Owner can see the profile who sent a request	Student's basic information given	Choose according to owner choice
TC9	Student can look for roommates	Basic information of the students and their preferences	Student profile shown to another student who is looking for roommates
TC10	Student can look for house	Owner should post ads of the vacant place	Student be able to send request
TC11	Student can email to another student	Availability of students looks for roommates	Get an email

TC12	Students can see the requested list	Availability of vacant place, approval to repost	Able to repost or communicate with owner
TC13	Student can repost an ad	Approval from owner	Goes into the house finding list
TC14	Admin can add new admin	Admin login	There is a new admin
TC15	Admin can modify or delete posts and user	Admin login, users' details and posted ads	Updated list of ads and users
TC16	User and admin logout	All has to be logged in	Successfully logout of the system

5.4 Test Results and Reports

Table 5-2: Test Case 1 Result

Test Case Identifier: TC1	
Procedure	Result
Case1: User provide every information that has been asked	Passed

Table 5-3: Test Case 2 Result

Test Case Identifier: TC2	
Procedure	Result
Case1: Provide registered email and password	Case 1: Successfully logged in
Case 2: Provide Invalid email or password	Case 2: Failed to login

Table 5-4: Test Case 3 Result

Test Case Identifier: TC3	
Procedure	Result
Case1: Provide authentic information	Passed

Table 5-5: Test Case 4 Result

Test Case Identifier: TC4	
Procedure	Result
Case1: User approach to see their own profile	Case 1: Successfully view that
Case 2: User modify particular information about themselves	Case 2: Failed to post

Table 5-6: Test Case 5 Result

Test Case Identifier: TC5	
Procedure	Result
Case1: Provide all essential details and pictures of the vacant house	Case 1: Visible to student user and stored in DB
Case2: Missed out information	Case2: Failed to post

Table 5-7: Test Case 6 Result

Test Case Identifier: TC6	
Procedure	Result
Case1: View the listing page and remove	Passed

Table 5-8: Test Case 7 Result

Test Case Identifier: TC7	
Procedure	Result
Case1: Owner accepts the request	Case 1: Student get a notification for further communication
Case2: Owner approves to repost request	Case 2: Student can repost ads

Table 5-9: Test Case 8 Result

Test Case Identifier: TC8	
Procedure	Result
Case1: Click into profile to view	Passed

Table 5-10: Test Case 9 Result

Test Case Identifier: TC9	
Procedure	Result
Case1: Look into search bar or click 'find roommate' option	Passed

Table 5-11: Test Case 10 Result

Test Case Identifier: TC10	
Procedure	Result
Case1: Look into search bar or click 'find house' option	Passed

Table 5-12: Test Case 11 Result

Test Case Identifier: TC11	
Procedure	Result
Case1: write own email address and message	Passed

Table 5-13: Test Case 12 Result

Test Case Identifier: TC12	
Procedure	Result
Case1: Student has sent request for house to rent	Case 1: Home list of the requests sent to
Case2: Requested list of repost	Case 2: Repost list

Table 5-14: Test Case 13 Result

Test Case Identifier: TC13	
Procedure	Result
Case1: Request to repost	Passed

Table 5-15: Test Case 14 Result

Test Case Identifier: TC14	
Procedure	Result
Case1: Admin add a new admin	Passed

Table 5-16: Test Case 15 Result

Test Case Identifier: TC15	
Procedure	Result
Case1: Admin delete ad	Case 1: Passed
Case2: Admin delete a user	Case 2: Passed
Case 3: Admin modify blog post	Case 3: Passed
Case 4: Admin can modify user's post	Case 4: Passed

Table 5-17: Test Case 16 Result

Test Case Identifier: TC16	
Procedure	Result
Case1: Click to signoff	Passed

The aforementioned tables show that the system function successfully and there is no error or bugs. It has been implemented according to the requirements.

CHAPTER SIX: IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

Lodging conditions, quality, and residency affect us and the nature of our lives. This chapter will illustrate the impact of my project on society and environment, also talk about sustainability plan and ethical aspects.

6.1 Impact on Society

A variety of outcomes, including health, happiness, unemployment, and other social activities, can be impacted by housing characteristics. People in Bangladesh mostly go manually to find house as there is less trust among the rental house system and general customer. However, it can get very difficult to find accommodation for students who are bachelors. Since, there is a prejudice among the landlords against the bachelor is that they bring unnecessary problems to the neighborhood and they don't pay rent on time. [17] Further, this brings discrimination between single tenants and family tenants. Additionally, even if some flat owner, allows to stay it gets really expensive for the students to bear all the expenses alone. Hence, they search for roommates, but it can take longer time than expected to find a like-minded roommate. On the other hand, there are some owners who pass hard time finding a suitable tenant for their house. The housing range can be sublet, single room or shared room. To ease all of this social problem and break through the discrimination this system can help the student to find suitable house within a range and compatible people to get connected with. [20] Alongside, this system will help the owner to waste money and their valuable time on mouth-to-mouth advertisement, also let them choose whom they want to give access to their sturdy house. Further, this system will also bring out hope and faith in each other.

6.2 Impact on Environment

With blooming growth of students moving to cities and residential properties, there are many scopes to contribute to environment. Using this system can help both the owners and students a facility to reduce paper wastage for advertisement or reduce transportation usage to find accommodation. Besides, it can also encourage the flat owner to improve their buildings in an environmentally responsible way to draw in long-term tenants. Sustainable property features can lower utility and maintenance expenses, and the features can include LED lighting, Solar panels, or Rainwater consuming system. Further, students play a vital role here too, by using the facilities in a vampire power mode, preserving water, or building sustainable personal habits. [3] All these can help to reduce carbon footprint. Therefore, it can be expected to have a big impact on the environment.

6.3 Ethical Aspects

The system will be acute transparency to the customer; hence users can be aware of what they are stepping into. There is no charge that has been initialized to use the system but if in the future there any changes occur. Consumers will be aware of the matter beforehand.

Further, the admin has to provide transparent judgment regarding imposing disciplinary actions against any user who creates violence or fraud. Additionally, users have some responsibility and are ethically strong to do anything against the law of house renting policy.

6.4 Sustainability Plan

It is very important to have a sustainable plan for any kind of system which is related to a business. In the past years, we have seen many systems get outdated as no one felt comfortable using them anymore or the system's vision got crumbled. In the world of technology, no system can be totally unique forever. Now or someday there will be a competitor but only sustainable planning of the application can secure one's system. Considering that RentTime planned ahead a bit to run in the market. There is a list below by indicating some points:

- Maintain quality service as promised
- Bring adaptability and user friendliness using new technology
- Provide available 24/7
- Maintain domain and hosting according to necessity
- Be transparent to users
- Provide unbiased decision making
- Generate revenue through monetization
- Campaign to socialize and connect people

CHAPTER SEVEN: CONCLUSION AND FUTURE SCOPE

7.1 Discussion and Conclusion

Every year a large number of students come to Dhaka and to other major cities to acquire standard education. Not everyone gets access to university accommodation, and not every university offers that. Hence, there is always a huge demand for student accommodation. Besides that, not every student who seeks housing can afford a huge apartment or room. Therefore, it is quite important to have similar-minded people to share the accommodation with to cut the cost. As known, home is something where we all want to relax and would like to avoid complications. Thus, having a good roommate is as necessary as having a place to stay. On the other hand, it is also quite important that we try to bring comfort to the flat owner. Not every flat owner is at a flourishing age that they can take the hassles of traditional marketing method. Bringing the technology to their hand can aid them to get connected with the gen as well as solve their house renting problem. All of these inspired me to build this system, and the project development is going to be completed after several months of laborious work. Finally, completed the documentation. RentTime is a substantial scheme that takes more time to grasp to obtain the complete picture. I'm hoping it will be a helpful platform for owners and students and carve out a niche on its own amid competing platforms. With the click of a button, this web-based technology serves consumers' needs and gives both owners and students the ability to manage their requirements more successfully.

7.2 Scope for Further Developments

It is important to assess the feasibility of expanding and/or changing this system. These factors include a number of things that will help with the conceivable development of facility use. Problems to contemplate may include:

- Another form of the application can be established such mobile app
- A feedback form can be implemented
- A payment system can be applied
- A live chat facility for instant communication
- A login with an option such facebook or gmail
- Option to reserve an appointment or the house
- Live GPS facility
- Better monetization plans
- Provide a serverless website
- Improved verification system to provide maximum security

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