# RentEase, Rental Listing Platform

*A Project Report Submitted*

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**Information Technology**

*by*

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# ABSTRACT


- Our project RentEase, recognizes the demand for efficient and user-friendly solutions in the realm of house and apartment rentals for the younger population in Manipal and for the general population as well.
- This is a tool dedicated to ease the rental process by listing all the properties available in Manipal with all the necessary information, search option, budget calculator, filter option & sort option.
- Our application will save them the hassle of searching, rent, budget, or looking for the perfect location to stay.
- The system ensures data integrity and security by implementing normalization techniques and access control measures.


# ACM Taxonomy:

**[D. Software]:** Software Engineering; Software Design; Software Maintenance.

**[H. Information Systems]:** Database Management; Information Retrieval; Data Management.

**[K. Computing Milieux]:** Computers and Society; Environmental Impacts of Computing; Human-computer Interaction.

**[L. Computing Methodologies]:** User Interface Design; Database Systems; Document Processing.

# Sustainable Development Goals:

### SDG 9: Industry, Innovation, and Infrastructure

The project leverages technology to innovate and enhance existing processes in rental listing. By digitizing viewing, registration, and coordination, the system contributes to the development of resilient infrastructure and innovation in rental listing.

# Table of Contents

# List of Tables

1. **User**
    - u_name
    - u_contactno
    - email_id
    - user_id(Primary Key)
    - password
2. **Broker**
    - b_name
    - b_id(Primary Key)
    - brokerage(%)
    - b_contactno
3. **Owner**
    - o_name
    - o_id(Primary Key)
    - o_contactno
4. **House**
    - rent
    - area
    - o_id(Foreign Key referencing Owner.o_id)
    - b_id(Foreign Key referencing Broker.b_id)
    - a_name(Primary Key, Foreign Key referencing Apartment.a_name)
    - block_no(Primary Key)
    - house_no(Primary Key)
    - floor_no
    - bhk
    - furnished
5. **Apartment**
    - address
    - a_name(Primary Key)
6. **Locality**
    - address(Primary Key)
    - pincode
7. **Feedback**
    - reviews

- ratings
- house_no(Foreign Key referencing Apartment.house_no)
- block_no(Foreign Key referencing Apartment.block_no)
- a_name(Foreign Key referencing Apartment.a_name)

8. **Amenities**
    - pool
    - gym
    - power_backup
    - clubhouse
    - parking
    - lift
    - a_name(Foreign Key referencing Apartment.a_name)

# List of Figures



# Abbreviations

- **CRUD**: Create, Read, Update, Delete - Basic operations for managing data in a system.
- **RDBMS**: Relational Database Management System - A type of database management system that stores data in a structured format, organized in tables with relationships between them.
- **API**: Application Programming Interface - A set of rules and protocols for building and

interacting with software applications.

- **HTTPS**: Hypertext Transfer Protocol Secure - A secure version of HTTP, the protocol over which data is sent between a browser and a website.

# Chapter 1

# Introduction

## 1.1 Purpose

Our project RentEase, recognizes the demand for efficient and user-friendly solutions in the realm of house and apartment rentals for the younger population in Manipal and for the general population as well. This is a tool dedicated to ease the rental process by listing all the properties available in Manipal with all the necessary information, search option, budget calculator, filter option & sort option. Our application will save them the hassle of searching, rent, budget, or looking for the perfect location to stay.

## 1.2 Document Conventions

This document follows the standard typographical conventions for headings and subheadings. Headings are formatted in size 26 font, subheadings are formatted in size 24 font, subtopic headings are in size 14 font and regular text is formatted in size 12 font.

## 1.3 Intended Audience and Reading Suggestions

The RentEase document is intended for a diverse group of readers, including developers, marketing staff, users, testers, and documentation writers. Each reader type will be interested in different aspects of the system and will require information specific to their role in the project.

This document contains an overview of the RentEase project, including the purpose, scope, and objectives. It also includes detailed functional and non-functional requirements, system, architecture, and design constraints.

For developers, this document provides information on the system's technical requirements, including programming languages, software tools, and database management systems. It also includes detailed system architecture and design specifications.

## 1.4 Product Scope

RentEase is a web-based application designed to provide an efficient and user-friendly experience to the people who are on the lookout for rentals. The main purpose of the application is to simplify the process of searching, rent, budget, or looking for the perfect location to stay.

The objective of our project is to provide users, an easier access to a greater range of options for renting and to move away from traditional house-hunting, reducing the inconvenience caused by it.

The software is directly related to corporate goals and business strategies as it aims to bridge the gap between the student community of Manipal and the Rental and Leasing system and provide them with additional tools built for managing their expenses.

# Chapter 2

# Literature and Background

The emergence of online rental platforms has revolutionized the real estate market, particularly in the context of student housing. These platforms offer a convenient, centralized location for students to find suitable accommodations while providing owners and brokers with a broader audience for their rental properties. Online rental platforms have streamlined the process of finding and leasing properties. For students, these platforms provide an interface to search for properties, compare amenities, and prices, and even apply for rentals online. Owners benefit from the ability to list their properties, screen potential tenants, and manage rental agreements through these digital services, which even brokers can make use of.

The "RentEase" initiative was conceived in response to the demand for a more creative and efficient way to rent in Manipal. This project, which is based on the concepts of efficiency and flexibility, seeks to transform the traditional rental process by adopting a more digitalized approach. The initiative aims to digitize the rental process here by utilizing contemporary techniques and technology, which will increase efficiency and eliminate the laborious house hunting procedure.

Manipal, a university town in Karnataka, India, is home to a diverse student population needing reliable and affordable housing options. The rental market in Manipal is dynamic, with a variety of housing options ranging from fully furnished flats to semi-furnished and owner flats. The rental landscape in Manipal offers a mix of 2 and 3 BHK flats, catering to different preferences and budgets. The availability of fully furnished, semi-furnished, and owner flats provides students with a range of choices to suit their specific needs. While the rental market in Manipal is thriving, there are challenges such as price fluctuations, availability during peak academic seasons, and the quality of accommodations. However, these challenges also present opportunities for a rental listing platform that can offer a streamlined, transparent, and student-focused rental experience.

# Chapter 3

# Problem Statement

In the contemporary landscape of urban living in Manipal with a vast majority of young students, the demand for efficient and user-friendly solutions in the realm of house and apartment rentals is ever-growing and one of the most in need solution of the hour. With so many people on the lookout for rentals, the present system and culture of house rentals in Manipal is not at all efficient and proves to be tiresome for the students taking their time away. This system, although not outdated, has significant

inefficiency and a lot of challenges to it which in this era of rapid digitalization will get replaced by digital platforms.

Traditional Rental Process Problems:

- **Time-Consuming Property Visits**: Prospective tenants had to physically visit multiple properties, which was time-consuming and often impractical.

- **Limited Information**: Information about properties was often scarce or unreliable, leading to uninformed decisions.

- **Lack of Transparency**: The traditional process lacked transparency in terms of pricing, property conditions, and landlord-tenant agreements.

- **Inefficient Communication**: Communication between landlords and tenants was often slow and cumbersome.

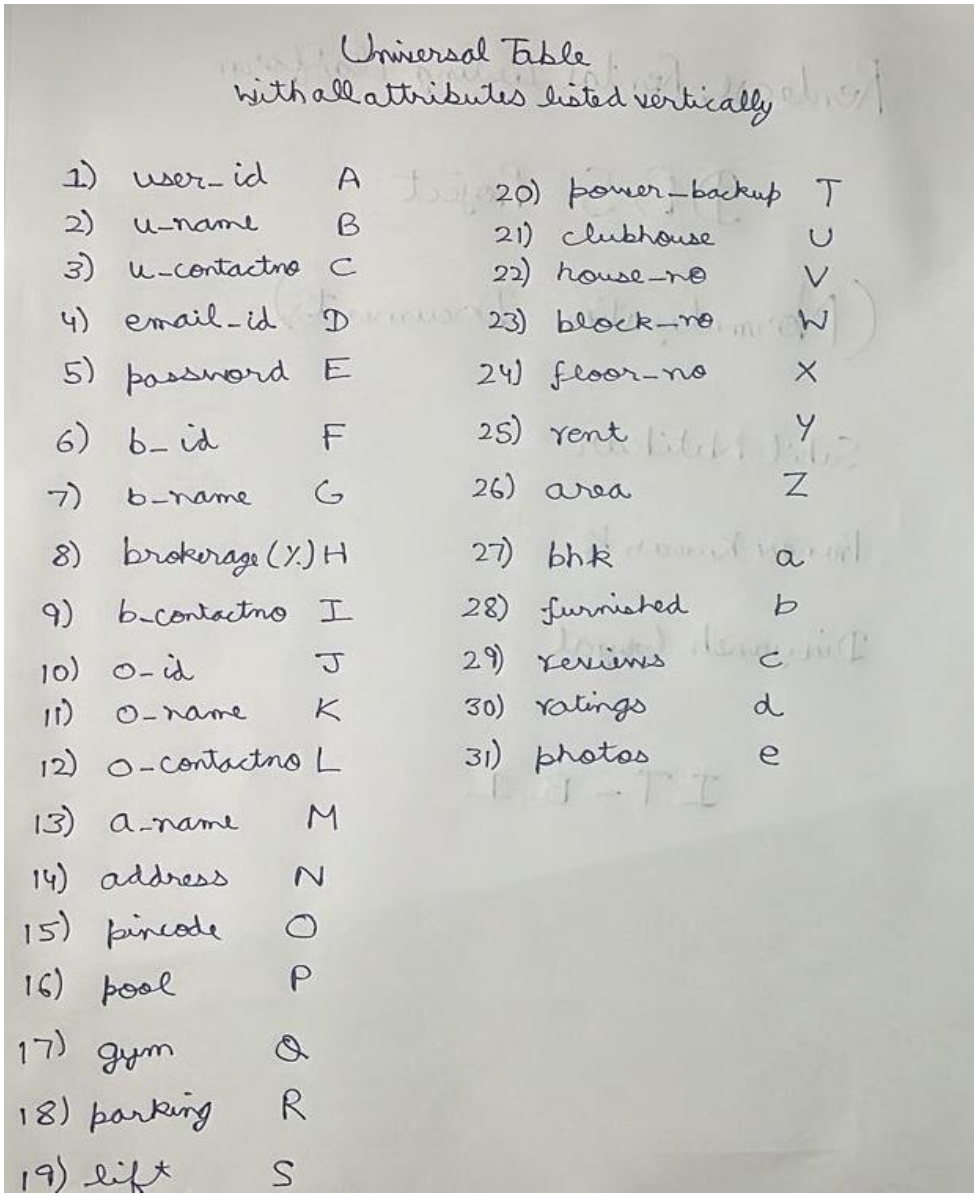
Recognizing the need for a modernized approach, the "**RentEase**" project emerges as an innovative endeavor dedicated to transforming the house and apartment rental ecosystem. Our software emerges as a tool dedicated to easing the rental process especially customized for the young college students by listing all the properties available in Manipal with all the necessary information.

This project is helpful for all students who are looking for a one stop solution to finding a place to stay in Manipal. This application will save them the hassle of searching, rent, budget, or looking for the perfect location to stay.

# Chapter 4

# Data Design

**NORMALIZATION:**



⇒ Functional dependencies - (FDs)

$A \to BCDE$, $BC \to ADE$, $BD \to ACE$,

$C \to ABDE$, $D \to ABCE$, $M \to NO$, $MN \to O$,

$MO \to N$, $N \to O$, $F \to GHI$, $I \to FGH$,

$J \to KL$, $L \to JK$, $M \to PQRSTU$,

$eVWM \to eVWM$, $MVW \to XYZabFJ$,

$MVWcd \to MVWcd$

——X——X——X——X——

(i) Now, if we observe functional dependencies (FDs)

$A \to BCDE$, $BC \to ADE$, $BD \to ACE$, $C \to ABDE$, $D \to ABCE$

are not related to others since we don't have them on L.H.S. of other FDs. So we can generalize these into one set - $R_1(A, B, C, D, E)$ (users table)

$A \to BCDE$, $BC \to ADE$, $BD \to ACE$, $C \to ABDE$,

$D \to ABCE$

Since $A^+ = ABCDE$ i.e. A already identifies ABCDE so BC identifying ADE and BD identifying ACE are redundant. So, we have,

$A \to BCDE$, $C \to ABDE$, $D \to ABCE$

Calculating closures,

$A^+ = ABCDE$ , $D^+ = DABCE$, $C^+ = CABDE$

Thus, A, B, C all uniquely identify all other attributes (CK).

Candidate keys, $CK = \{A, C, D\}$

prime attributes, $PA = \{A, C, D\}$

non-prime attributes, $NPA = \{B, E\}$

Since no multivalued attributes, $R_1$ is in 1NF

Since B and E (NPA) are fully functional dependent on PA so $R_1$ in 2NF. Since no transitive dependency so $R_1$ in 3NF. Also, since L.H.S of all F.D. is CK so $R_1$ is in BCNF.

Thus users Table is in BCNF.

(ii) FDs $M \to NO$, $MN \to O$, $MO \to N$, $N \to O$ are not related to others since we don't have them on L.H.S of other FDs. So we can generalize them in one set -

$R_2(M, N, O)$ or $R_2(A, B, C)$ with FDs- (apartment table)

$A \to BC$, $AB \to C$, $AC \to B$, $B \to C$

Since A determines BC, so AB determining C and AC determining B are redundant. So FDs -

$A \to BC$ , $B \to C$

Closures,

$A^+ = ABC$ , $B^+ = BC$

candidate key, $CK = \{A\}$

prime attribute $PA = \{A\}$

non-prime attribute $NPA = \{B, C\}$

Since no multivalued attributes, $R_2$ is in 1NF.

But since $B \to C$ is partial dependency so $R_2$ is not in 2NF. Thus decomposing -

$B^+ = BC$

say -

$R_{21} = \{B, C\}$
(locality)

$R_{22} = \{A, B\}$
(apartment) ↑

Taking B along with A

∴ B is CK of $R_{21}$.

Thus lossless decomposition

$B \to C$

$B^+ = BC$

$CK = \{B\}$

$A \to B$

$A^+ = AB$

$CK = \{A\}$

Also $R_{21} \cup R_{22} = R_2$. Thus dependency preserving.

Now in 2NF since no partial dependency.

Also since no transitive dependency so in 3NF.

Also LHS of all F.D.s is CK so $R_2$ is in BCNF. Thus,

$R_2(A,B,C)$ or $R_2(M,N,O)$ is decomposed to

$R_{21}(N,O)$ and $R_{22}(M,N)$ which are in BCNF.

(iii) $F \rightarrow GHI$ and $I \rightarrow FGH$, functional dependencies are not related to others since we don't have them on the L.H.S of other FDs so we can generalize these into one set - $R_3(F, G, H, I)$ (broken table)

or say $R_3(A, B, C, D)$ with FDs -

$A \rightarrow BCD$ $\quad$ $D \rightarrow ABC$

closures,

$A^+ = ABCD$ $\quad$ $D^+ = DABC$

candidate keys, $CK = \{A, D\}$

prime attributes, $PA = \{A, D\}$

non-prime attributes, $NPA = \{B, C\}$

Since no multivalued dependencies $R_3$ is in INF. Also no partial or transitive dependencies so $R_3$ is in 2NF and 3NF respectively. Also L.H.S of all FDs has CK. so, $R_3$ is in BCNF.

Thus,

$R_3(A, B, C, D)$ or $R_3(F, G, H, I)$ is in BCNF.

$\longrightarrow$

(iv) FDs $J \to KL$ and $L \to JK$ are not related to others since we don't have them on L.H.S of other FDs. So we can generalize them into one set –

$R_4(J, K, L)$ or say $R_4(A, B, C)$ (on renaming)

FDs-

$A \to BC$ , $C \to AB$

closures,

$A^+ = ABC$ , $C^+ = CAB$

candidate keys, $CK = \{A, C\}$

prime attributes, $PA = \{A, C\}$

non-prime attributes, $NPA = \{B\}$

Since no multivalued attributes, $R_4$ is in 1NF. Also there is no partial or transitive dependency so $R_4$ is in 2NF and 3NF respectively. Also L.H.S of all F.Ds are CK so $R_4$ is in BCNF.

Thus,

$R_4(A, B, C)$ or $R_4(J, K, L)$ is in BCNF

→

(v) FD, $M \rightarrow PQRSTU$ can be generalized into one set since the R.H.S of this FD is unique for L.H.S, M. So,

$R_5(M,P,Q,R,S,T,U)$ or say $R_5(A,B,C,D,E,F,G)$ (amities table)

FD-

$$A \rightarrow BCDEFG$$

Closure,

$$A^+ = ABCDEFG$$

Thus,

candidate key, $CK = \{A\}$

prime attributes, $PA = \{A\}$

non prime attributes, $NPA = \{B,C,D,E,F,G\}$

Since no multivalued attributes $R_5$ is in 1NF. Also no partial or transitive dependency so $R_5$ is in 2NF and 3NF respectively. Also, LHS of FD is CK thus $R_5$ is in BCNF. Thus,

$R_5(A,B,C,D,E,F,G)$ or $R_5(M,P,Q,R,S,T,V)$ is in BCNF

$\longrightarrow$

(vi) FD eVWM → eVWM is unique and since all attributes here identify themselves (all CK) so these can be generalized into one group.

$R_6(e, V, W, M)$ or say $R_6(A, B, C, D)$ (unassignable)

FD-

$$A, B, C, D \rightarrow ABCD$$

$$ABCD^+ = ABCD$$

candidate key = {ABCD} (CK)

prime attribute, PA = {A, B, C, D}

non prime attributes, NPA = {Ø}

Since no multivalued attributes $R_6$ is in INF.

There is no partial or transitive dependency so $R_6$ is in 2NF & 3NF respectively. Also LHS of FD is CK so $R_6$ is in BCNF.

Thus,

$R_6(A, B, C, D)$ or $R_6(e, V, W, M)$ is in BCNF.

→

(vii) FD, MVWcd → MVWcd is unique and since all attributes here identify themselves (all make CK) so these can be generalized into one set.

$R_7(M,V,W,c,d)$ or Say $R_7(A,B,C,D,E)$ (feedback table)

FD-

$$ABCDE \rightarrow ABCDE$$

closure,

$$ABCDE^+ = ABCDE$$

candidate key, $CK = \{A, B, C, D, E\}$

prime attribute, $PA = \{A, B, C, D, E\}$

non-prime attribute $NPA = \{\emptyset\}$

Since no multivalued attributes $R_7$ is in 1NF. Also $R_7$ does not have partial or transitive dependencies so it is in 2NF & 3NF respectively. Also, LHS of FD is CK so $R_7$ is in BCNF.

Thus,

$R_7(A,B,C,D,E)$ or $R_7(M,V,W,c,d)$ are in BCNF.

→

(viii) FD, MVW → XYZabFJ has RHS unique for unique LHS, MVW so it can be generalized into one set - $R_8(M, V, W, X, Y, Z, a, b, F, J)$

or say $R_8(A, B, C, D, E, F, G, H, I, J)$ (choose table)

FD -

$ABC \rightarrow DEFGHIJ$

closure,

$ABC^+ = ABCDEFGHIJ$

candidate key, $CK = \{ABC\}$

prime attributes, $PA = \{A, B, C\}$

non-prime attributes, $NPA = \{D, E, F, G, H, I, J\}$

Since no multivalued attributes, $R_8$ is in INF.

Also there is no partial or transitive dependency, so $R_8$ in 2NF & 3NF respectively. Also, LHS of FD is CK so $R_8$ is in BCNF.

Thus, $R_8(A, B, C, D, E, F, G, H, I, J)$ or

$R_8(M, V, W, X, Y, Z, a, b, F, J)$ is in BCNF.

→

Finally we get,

(i) $R_1(A, B, C, D, E)$ or $R_1$ (user_id, u_name, u_contactno, email_id, password).
↓ user table

(ii) $R_{21}(N, O)$ or $R_{21}$ (address, pincode).
↓ locality table

(iii) $R_{22}(M, N)$ or $R_{22}$ (a_name, address).
↓ apartment table

(iv) $R_3(F, G, H, I)$ or $R_3$ (b_id, b_name, brokerage (%), b_contactno).
↓ broker table

(v) $R_4(J, K, L)$ or $R_4$ (o_id, o_name, o_contactno).
↓ owners table

(vi) $R_5(M, P, Q, R, S, T, U)$ or $R_5$ (a_name, pool, gym, lift, parking, power_backup, clubhouse).
↓ amenities table

(vii) $R_6(e, V, W, M)$ or $R_6$ (photos, house_no, block_no, a_name).
↓ images table

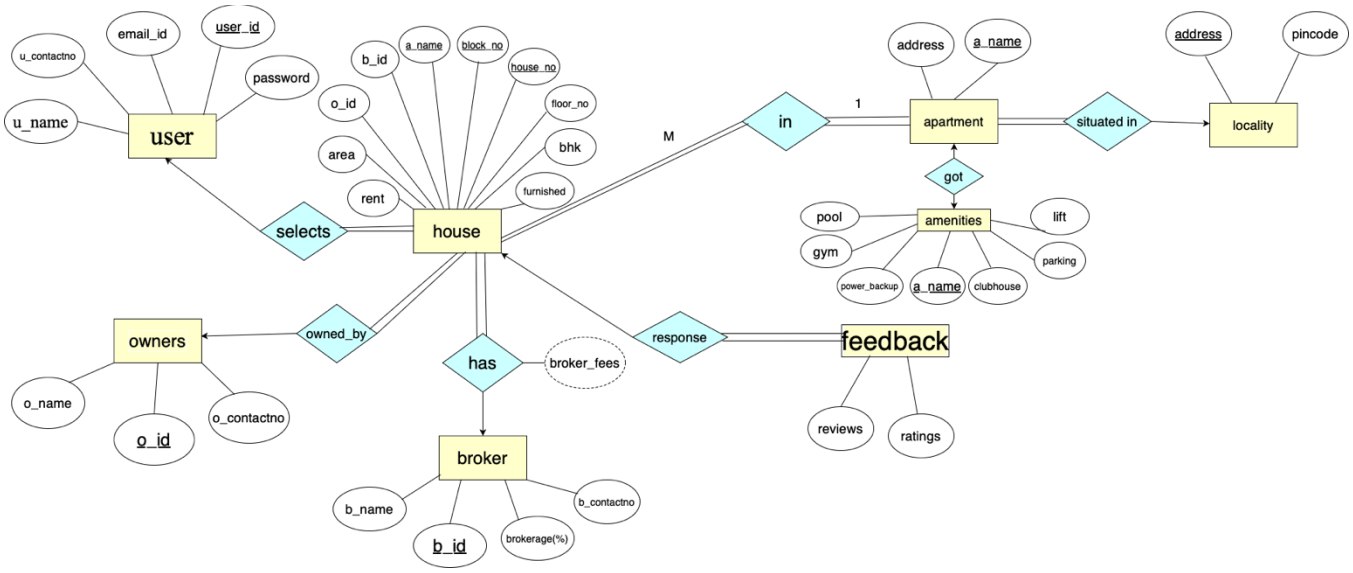
(viii) $R_7(M, V, W, c, d)$ or $R_7$ (a_name, house_no, block_no, reviews, ratings).
↓ feedback table

(ix) $R_8(M, V, W, X, Y, Z, a, b, F, J)$ or $R_8$ (a_name, house_no, block_no, floor_no, rent, area, bhk, furnished, b_id, o_id).
↓ house table

Which matches the reduction to Schema tables.

— X — X — X — X —

# ER DIAGRAM:


user
u_contactno
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user_id
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selects
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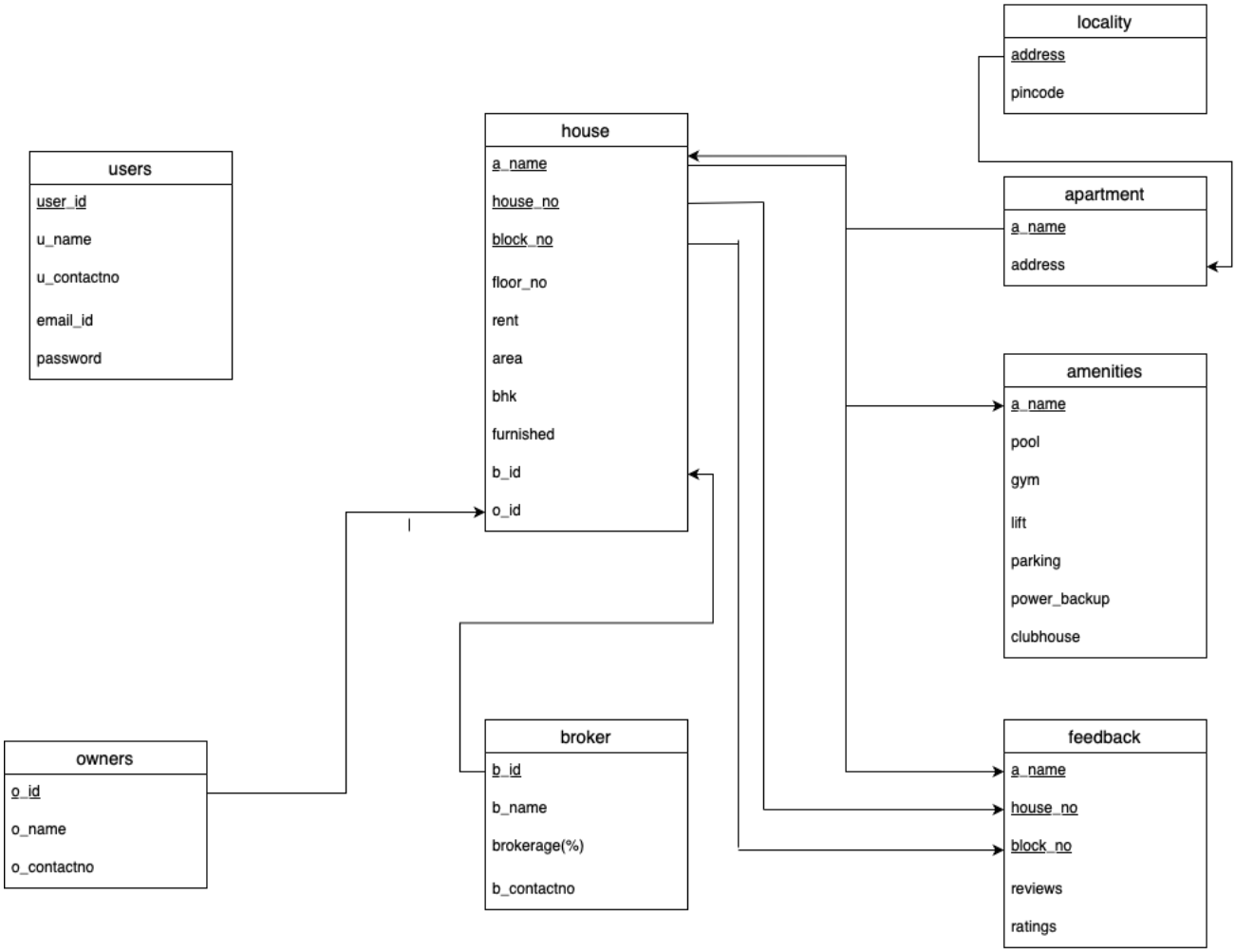
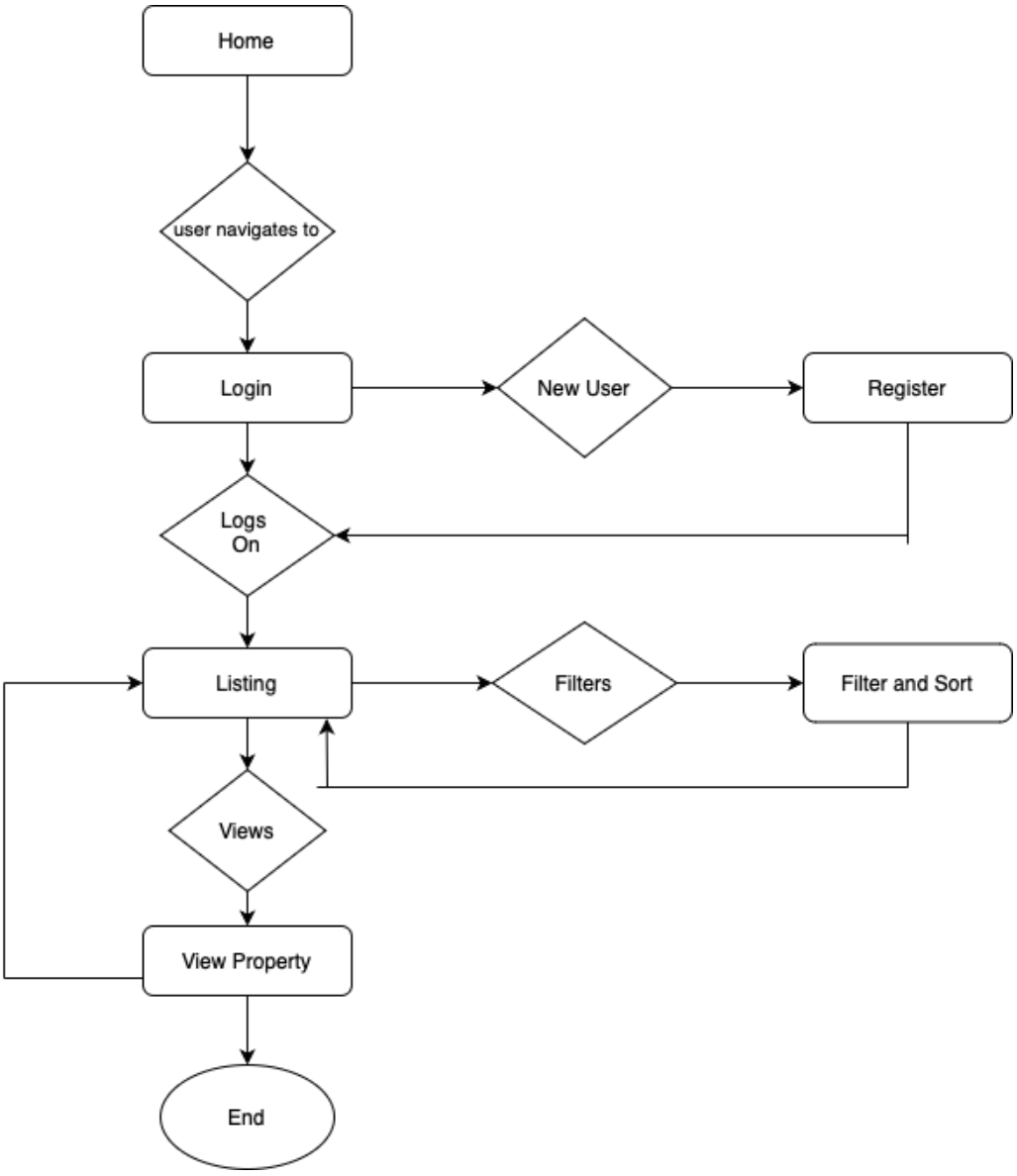
block_no
house_no
floor_no
bhk
furnished
area
rent
o_id
M
in
1
apartment
address
a_name
situated in
locality
address
pincode
got
amenities
pool
gym
power_backup
a_name
clubhouse
parking
lift
owners
owned_by
o_name
o_id
o_contactno
has
broker_fees
broker
b_name
b_id
brokerage(%)
b_contactno
response
feedback
reviews
ratings

# Schema Diagram



# Chapter 5

# Methodology:



# Chapter 6

# Results

RentEase is an online tool created to give anyone searching for a rental a quick and easy experience. The application's primary goal is to make the process of finding the ideal place to stay, whether it be for rent or budgetary reasons.

Our idea aims to reduce the inconvenience associated with traditional house hunting by giving customers quicker access to a wider selection of rental possibilities.

As the software attempts to close the gap between the Manipal student community and the Rental and Leasing system and give them extra tools designed for controlling their spending, it is closely tied to corporate goals and commercial plans.

RentEase has the ability to improve efficiency, expedite the rental process, cut down on time-consuming property visits, and increase transparency.

1. **Centralized Listings:** Online platforms provide a centralized database of rental properties, allowing tenants to browse multiple listings in one place without the need to visit each property physically.
2. **Advanced Search Filters:** Tenants can use advanced search filters to find properties that match their specific needs, such as budget, number of bedrooms, and amenities, saving time and effort.
3. **24/7 Accessibility:** Unlike traditional methods, online platforms are accessible around the clock, allowing tenants to search for properties.
4. **Transparency:** By giving customers instant access to comprehensive property details, RentEase can improve transparency. Customers obtain a comprehensive image of the property and information on variable features like conditions and price.
5. **Feedback and Reviews:** Online reviews and feedback systems help build trust and transparency, as tenants can make informed decisions based on the experiences of others.
6. **Budget Calculator:** This gives the students a ballpark figure of their annual expenditure on that property. This is just a rough estimate consisting of rent, brokerage and other maintenance charges taken as an average figure. Personal expenses are not included in this.

To summarize, Festipal has the potential to transform the rental process in Manipal. Users could gain from increased efficiency, transparency, and sustainability during the house hunt, while owners and brokers could gain from increased interaction with potential tenants, opening a larger market to them.

# Chapter 7

# Conclusion and Future Work

## 7.1 Conclusion

1. As we close out on our RentEase project, it's evident that we've taken a big step towards reinventing rental listing platforms. RentEase has optimized resources, increased sustainability, and streamlined procedures all thanks to creative digital solutions. As we draw toan end, RentEase serves as evidence of our dedication to improving rental experiences and creating thriving communities.

## 7.2 Future Work

1. **Improving User Interface:** Future developments could focus on refining RentEase's user interface to enhance usability and user satisfaction. Iterative design updates and usabilitytesting can ensure that RentEase's remains intuitive and user-friendly for all stakeholders involved in event management.
2. **Leveraging social media:** Exploring integration with popular social media platforms and marketing tools could amplify event promotion and engagement. By seamlessly integrating with social media platforms, RentEase's could facilitate targeted marketing
   campaigns, event announcements, and attendee engagement activities.
3. **Mobile Application Development:** Enhancing Accessibility: Developing a mobile application companion for RentEase's could enhance accessibility and user experience. Through a dedicated mobile app, brokers, students, and general people could conveniently manage bookings, registrations, and view properties, thereby improving efficiency and engagement.
4. **Engaging Stakeholders:** Establishing feedback mechanisms and user forums within RentEase could facilitate continuous improvement and refinement. By soliciting input from people, brokers, and owners, RentEase can iteratively enhance its features and functionality to address evolving needs and enhance user satisfaction.

5. **Partnerships and Integration with Third-party Services:** Expanding Ecosystem: Exploring partnerships and integrations with third-party apps, such as housing.com, builders, etc. we can enhance the functionality and versatility of RentEase. By offering seamless integrations, RentEase can provide a comprehensive rental listing solution tailored to the specific needs of collegestudents.

# References


**[1]** THE 17 GOALS | Sustainable Development (un.org)

**[2]**Welcome to Flask — Flask Documentation (3.0.x) (palletsprojects.com)

**[3]** https://youtu.be/6L3HNyXEais?feature=shared

**[4]** https://youtu.be/QnDWIZuWYW0?feature=shared

**[5]** https://youtu.be/lAY7nXh83fI?feature=shared

**[6]** https://youtu.be/2z_HaJ2xW9Y?feature=shared

**[7]** https://youtu.be/hQl2wyJvK5k?feature=shared

**[8]** Check if email address valid or not in Python - GeeksforGeeks

**[9]** Font Awesome

**[10]** https://youtu.be/_sgVt16Q4O4?feature=shared

**[11]** Flask HTTP methods, handle GET & POST requests - GeeksforGeeks