An-Najah National University

Faculty of Engineering

Computer Engineering Department

AQARAT PALESTINE

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Acknowledgment

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we want to thank our parents and our families, they have been a source of Strength and support for us. They continually push us to think critically and never settle for anything less than our best. They kept us focused on track. For their continual support, we are forever grateful.

Thanks are extended to Computer Engineering Department our second family, they will be always the wings beneath our wings.

Finally, we express our gratitude for our friends and colleagues for their help and support.

Abstract

In recent times, everything is going fast using the internet, and all houses have Internet. Sometimes people have a problem finding a place to rent, that's why we planning to do a real estate rental website. The real estate website/application will help people to choose a good place so easy, they can see it on the map, choosing a good price, and see the picture.

AQARAT PALESTINE app/website will provide facility to the user to search residential and commercial property and view that property, it will provide different categories of what buyers might be looking for, each of these categories will have the suitable information of that category (for example for an apartment you would like to know the number of rooms, but for a land-for-sale the number of rooms is not suitable), the buyer can choose the location based on the city that he choose to see properties on, so that any properties that match the description will be filtered from the rest. For the Seller, he can list detailed and sufficient information of their property (size, photos, location, ...etc), he can also provide high-quality images, so that it will be displayed in a custom gallery for properties, so that buyers can have a good look on the property. The Seller can make an offer on their property, the seller can manage his profile's properties, and can request an ad, so that his ad will be displayed on home page for buyers. The buyer can have the option for favorites, to easily access these properties of their interest back in future. For Languages, the application provides the ability for the users to choose different language.

We used Flutter for app frontend, React for website frontend, and node.js for backend for both.

Chapter 1

Introduction

1.1 Problem

Finding a good property where people can stay is not something easy or simple, it will take a lot of time and efforts from them so it can be overwhelming because of the increasing in the number of choices, also they can feel confusion in what choice they should make, many real estate owners in Palestine need a platform that contains their properties and can be checked easily by clients.

1.2 Objectives

- Building registration system:
  - The system gives an ability for people who want to register in it, to have an account easily by setting the category (buyer, seller) that he/she belongs to.
- Building management system:
  - Anyone who has an account in the application can edit his personal information.

- Accept or reject the requests which are sent from the buyers to real estate owner's by them.
- The real estate owner can add photos and prices for their properties.

- Building chatting system:
  - Buyers can communicate with sellers(real estate owners)
  - sellers(real estate owners) can communicate with Buyers.

- Building notification system:
  - Send a notification to sellers whenever buyers send a reservation request to them.

1.3 Scope

This application concerns with people needs of finding an appropriate place where they can live, from choosing a property with suitable area and suitable cost to choosing it in a wanted location.

First of all, in order to get benefits from this application the buyer and real estate owner should register in this application and set the category that he/she belongs to, by their accounts they can edit their profile details, uploading photos and connect with each other through the chat system.

registering as buyers this will give them the ability to view the property list which contains things they are interested in, not only viewing it, but they are also allowed to like it. Login as seller will allow them to show his/her property, prices, number of rooms. Admin is allowed to manage what properties will be uploaded to the application, what advertisements will be added, and all the users registered in the application.

1.4 Importance

It is helpful for people to have an application that makes buying and selling properties easier. **AQARAT PALESTINE** will eases the process as the application facilitates the communication process between seller and buyer through chat system.

1.5 Report Organization

The next coming chapter will show the constraints that faced while developing this app, also it will mention the courses that needed to achieve this application.

Chapter 3 will show the procedures that had been followed to finish the work completely, also the technologies and tools have been used to build this app.

Chapter 4 will describe the results from this application.

Chapter 5 which is the final will discuss the conclusion and the recommendations.

Chapter 2

Constraints, standards and earlier work

Constraints

- **Shortage of time:**

  we haven't taken any course about Flutter before so this took from our time in the beginning of the course to learn about. We also had a limited time (two months) to do the graduation project in addition to other courses, so this required us to do greater effort.

- **Technical problem:**

  Power cuts and slow internet problems affects badly by taking times from us because we needed to be connected to internet in order to make http requests from flutter.

2.2 Earlier coursework

During our study phase in computer engineering, we took many courses through which we created and dealt with websites. These courses were Web Programming, Object Oriented Programming, and the Database course which was the beginning as a gateway to learn front- end and back-end and deal with real databases. Likewise, the software Engineering course was also very useful in writing our code to meet software engineering standards. All these courses helped us in the project and speeded up the programming process, which sometimes we did not have to refer to any previous reference because we already had the previous knowledge of it. Moreover, we have taken online courses for our needs to get the work done, such as flutter and Node Js.

Chapter 3

Methodology

3.1 Technical choices

- **Flutter:**

"Flutter is Google's UI toolkit for building beautiful, natively compiled applications for mobile, web, and desktop from a single codebase. [1]"

It released in 2017, it is a cross platform language which means that one code and one programming Language used to create different application for IOS and Android "native code". Dart Language is used to develop applications in flutter, it is object programming language used on front-end applications and could create mobile or web application.

Flutter has two main parts:

1. SDK (Software Development Kit): it contains the tools that helps in developing the application which includes tools to compile the code into native code.
2. Framework (widgets on UI library): it contains the UI component "sliders, text inputs ... etc ".
3. Getx State Management : it provides the full ability to control all states of widgets and how to update them and control their behavior whether it was a constructor for a full page or a simple widget or manipulation of functions and data.

Client side:

• The design: We designed the website from scratch based on certain criteria. First, when designing, we intended that the color used should be appropriate for the

chosen topic, which is Programming. Second, we chose the basic color that is comfortable to look at and the rest of the colors are consistent, and then we tried to build an application with a simple and user-friendly interface, so that the user can understand the application and navigate between the interfaces simply and without any complexity.

• Frameworks: We decided to use React.js which is a free and open-source front-end JavaScript library for building user interfaces based on UI components. It is maintained by Meta (formerly Facebook) and a community of individual developers and companies.

Website for admin
- Client side:

• The design: at first, we defined the category of users who will use the site, and in our project only the administrator can use it, after which we chose the colors that match the theme of the site. We tried to make the site user friendly as possible.

• Programming languages: We used React.js to build the basic structure of our web-site, because it is easy to learn and use, light weighted and fast to load, supported by all browsers. CSS is used to display React documents, which is easy to use, and saves time when reusing the same sheet in multiple React pages. To enable the user to interact with the site and to call the server, JavaScript was used, which is a very fast, easy to use, lightweight and interpreted language.

Server side:

- **Node.js** which is an open source web language that is used to build the server side of the project. We chose it for its efficient performance, ease of use and learn, and high flexibility. There are also many educational resources and materials, which facilitates the development process.

- **MySQL Database**

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by Oracle Corporation.[2] It is our main database in our application. It is an open source database which developed by Oracle Corporation, it is easy, free, fast, secure, and scalable. The main reason for developing MYSQL is to manage large Database faster. It has a set of functions that is useful.

- **Firebase**

  It is a mobile- and web application development platform, backed by Google (Backend- as-a-Service), to help developers deliver richer app experiences. Firebase manages its own infrastructure with a nice set of tools to simplify the workflow of the developer by providing them with development kits and an online dashboard. These toolkits are interconnected, scalable and integrable with third party software to overcome complex challenges with standard building blocks.[3]

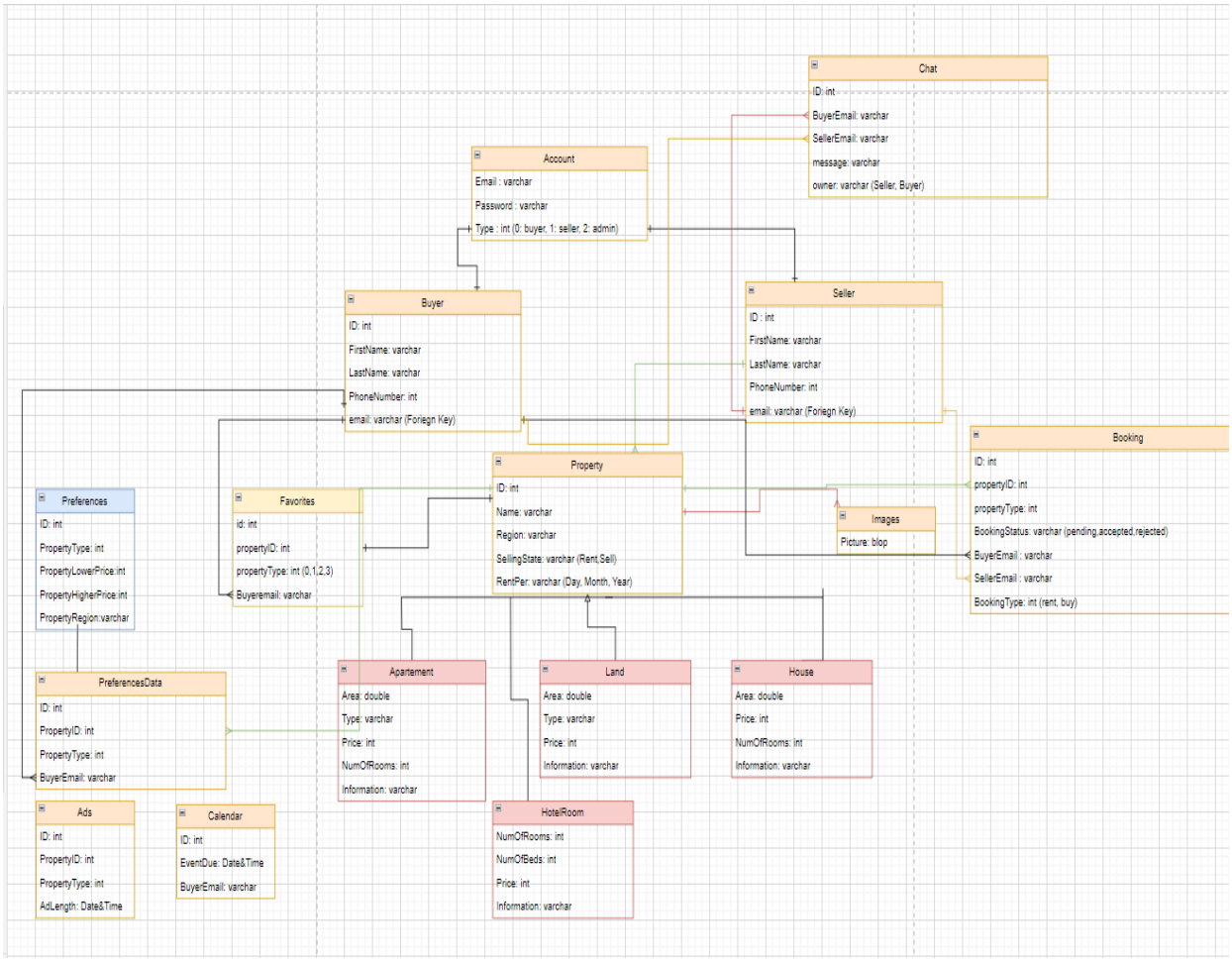
  It is a google's mobile application and a real time data base which use to develop applications without SQL datebase and server used for notifications in **AQARAT PALESTINE** application, it's fast, scalable and have a set of tools to facilitate the development process and to solve any complex issues with standard building blocks.

- **Socket/IO**

  Socket.IO works by establishing a persistent WebSocket connection between the client and the server. This allows data to be sent and received in real-time without the need for constant polling or refreshing the page. It falls back to other transport mechanisms like long polling if WebSocket is not supported by the client's environment, we used it for chatting.

3.2 Methods and techniques

UML Diagram:


Chat
ID: int
BuyerEmail: varchar
SellerEmail: varchar
message: varchar
owner: varchar (Seller, Buyer)
Account
Email : varchar
Password : varchar
Type : int (0: buyer, 1: seller, 2: admin)
Buyer
ID: int
FirstName: varchar
LastName: varchar
PhoneNumber: int
email: varchar (Foriegn Key)
Seller
ID : int
FirstName: varchar
LastName: varchar
PhoneNumber: int
email: varchar (Foriegn Key)
Booking
ID: int
propertyID: int
propertyType: int
BookingStatus: varchar (pending,accepted,rejected)
BuyerEmail : varchar
SellerEmail : varchar
BookingType: int (rent, buy)
Property
ID: int
Name: varchar
Region: varchar
SellingState: varchar (Rent,Sell)
RentPer: varchar (Day, Month, Year)
Images
Picture: blop
Preferences
ID: int
PropertyType: int
PropertyLowerPrice:int
PropertyHigherPrice:int
PropertyRegion:varchar
Favorites
id: int
propertyID: int
propertyType: int (0,1,2,3)
Buyeremail: varchar
PreferencesData
ID: int
PropertyID: int
PropertyType: int
BuyerEmail: varchar
Apartement
Area: double
Type: varchar
Price: int
NumOfRooms: int
Information: varchar
Land
Area: double
Type: varchar
Price: int
Information: varchar
House
Area: double
Price: int
NumOfRooms: int
Information: varchar
Ads
ID: int
PropertyID: int
PropertyType: int
AdLength: Date&Time
Calendar
ID: int
EventDue: Date&Time
BuyerEmail: varchar
HotelRoom
NumOfRooms: int
NumOfBeds: int
Price: int
Information: varchar

Explanation:

There are 3 types of account: buyer, seller, admin

Seller is able to add any of the 4 types of property: house, apartment, land, hotelroom

Each of these properties has different attributes but they have some in common, some attributes we have to mention are images and latitude & longtitude

Images are uploaded to the server and stored in a file called images and the path of the image stored is given to us to store it in the database for that attribute

Location is given to us from integrating map, and passed to us as the 2 values lat, long

In my application, since properties to be bought or rented, the buyer and seller have to meet up, I provide them the ability to do requests for booking, so that the seller can see all the buyers that requested booking for his property and he can chat with them to settle between them, and meet up, once the seller accepts the booking of a property all other bookings are rejected and other buyers can't request this property until seller turns it back on as available again

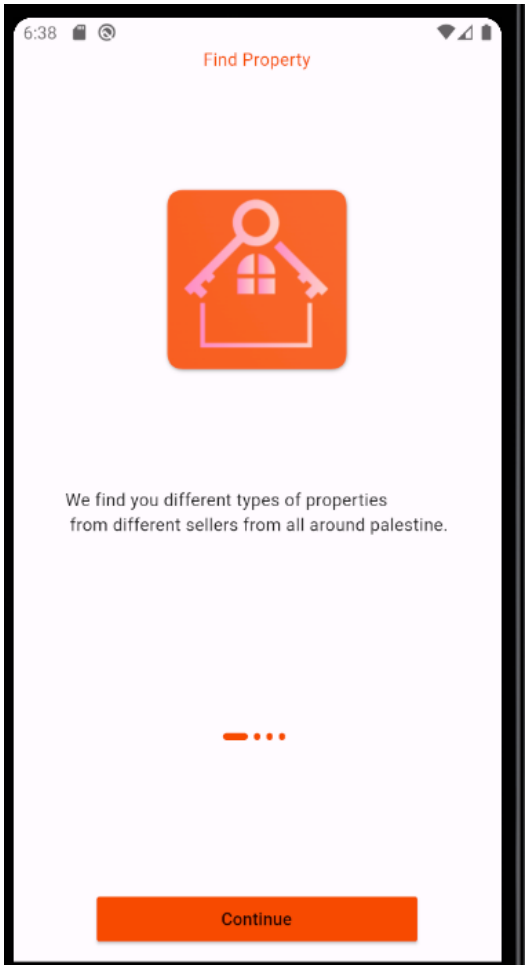
Buyer can choose any property as a favorite to be able to get back for it later, I also made it that it affects recommendations depending on properties that are favorited

Let's say a buyer want any properties in the future that are added and match his preference to be able to look at them, buyer can add multiple preferences that belong to him, and any properties that will match will be provided in preferenceData table

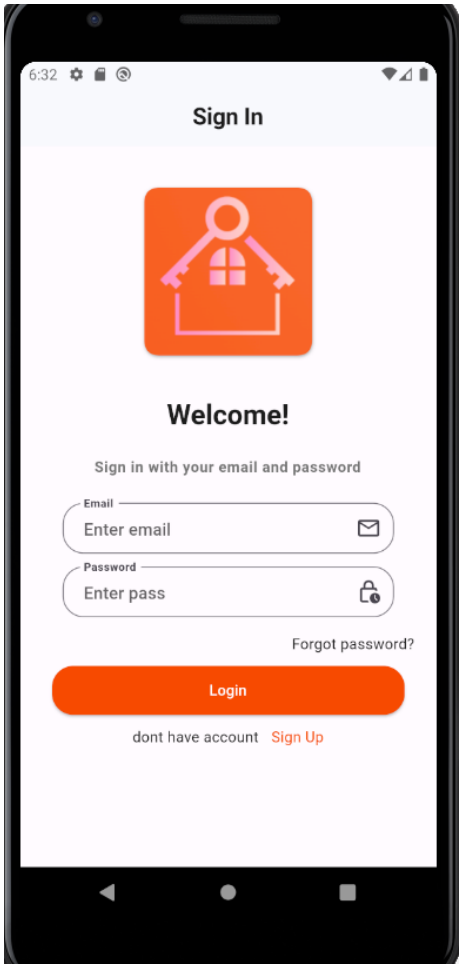
Keep in mind that the full project supports CRUD, which means we have full consistency of the data, whether they are added, updated, or deleted.

3.2.1 Main Pages

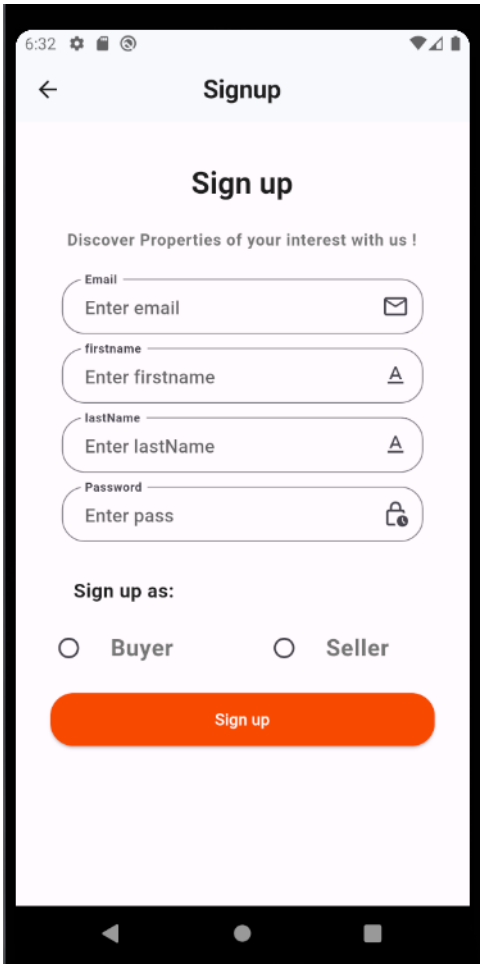
- **Choose Language: when first opening the app the user is given a choose language page.**
- **Onboarding Pages: it gives the user an idea about the application**



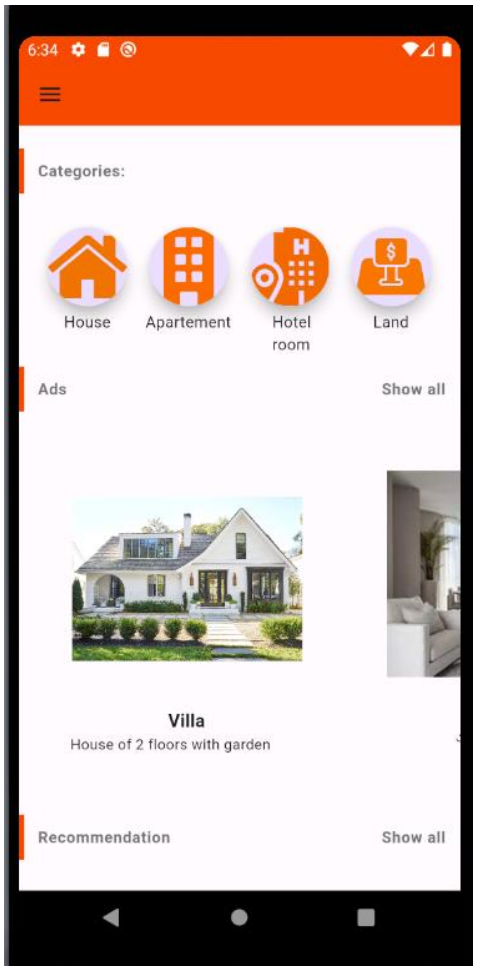
- **Login Page: the user can log in to his account either he is a seller/buyer/admin**



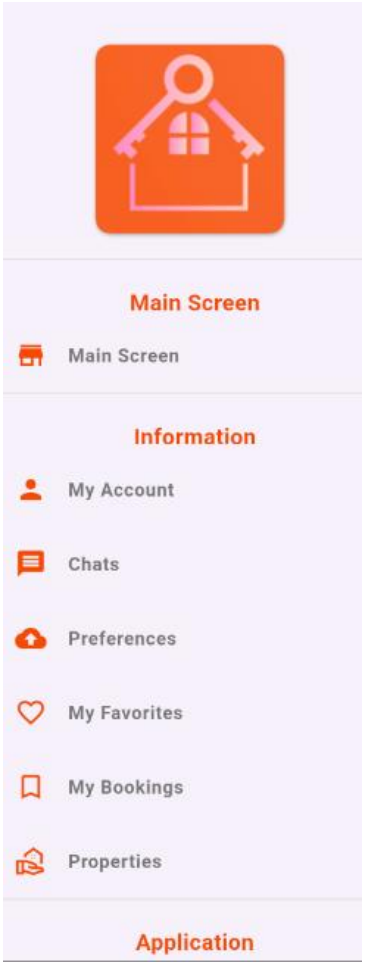
- **Sign up Page: user can sign up for application and fill his data he can either be buyer/seller**



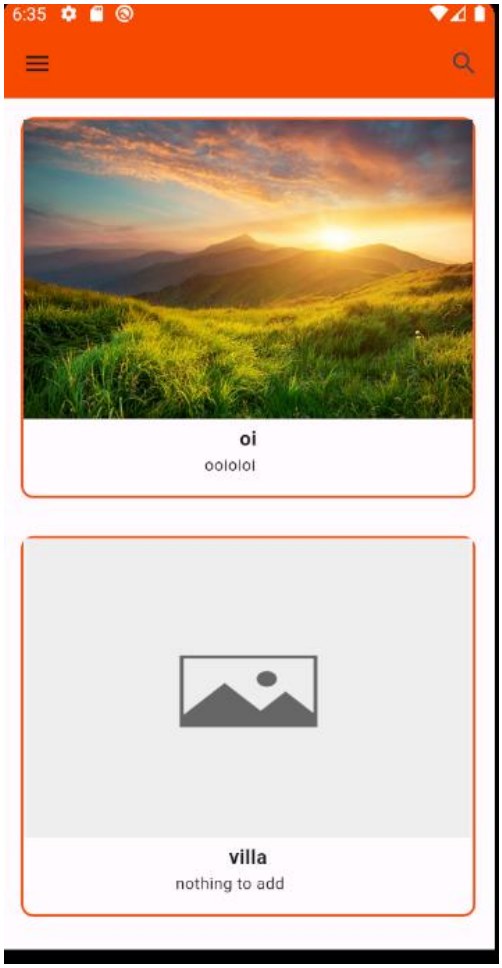
- **Buyer Home Page: for buyer home page it will display for him the four property categories (Houses, Apartments, Lands, HotelRooms), clicking on any of these categories will give you a page that lists all of their product type, Ads all ads will be displayed in home page, recommendations will also be displayed in home page**



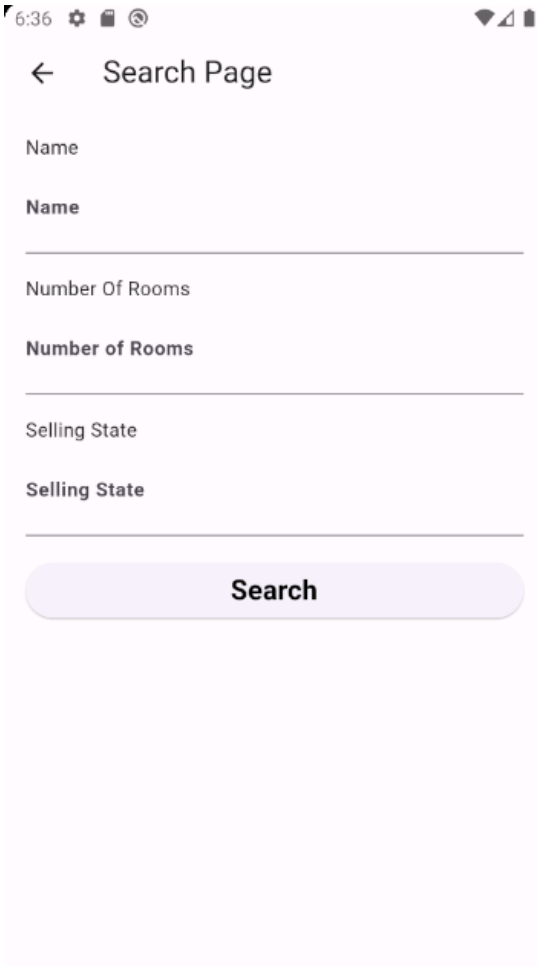
- **Buyer Drawer: the buyer will have a drawer that will bring him to the listed pages**



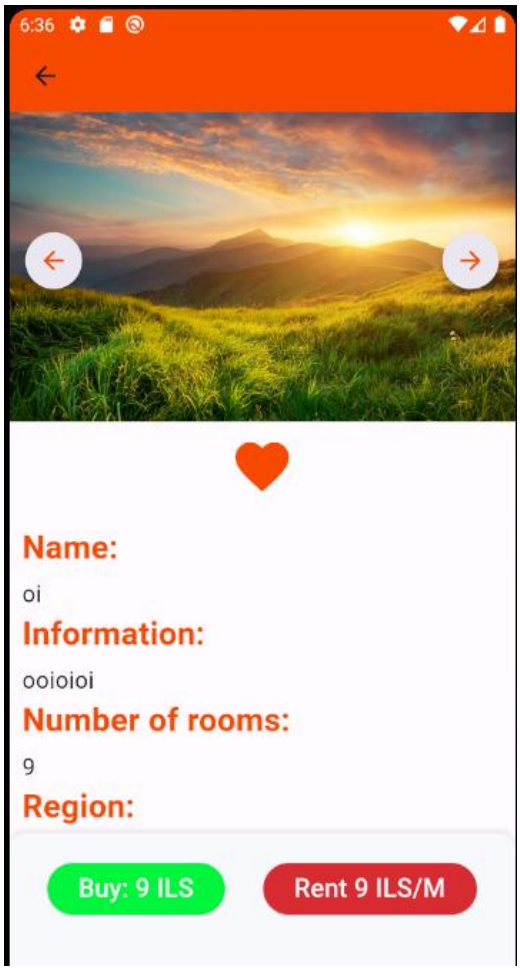
- **House Result Screen: this page will provide the house offered for selling/renting from different sellers**



- **House Search Screen: this screen will provide filtering for houses depending on user input to be displayed in result screen**

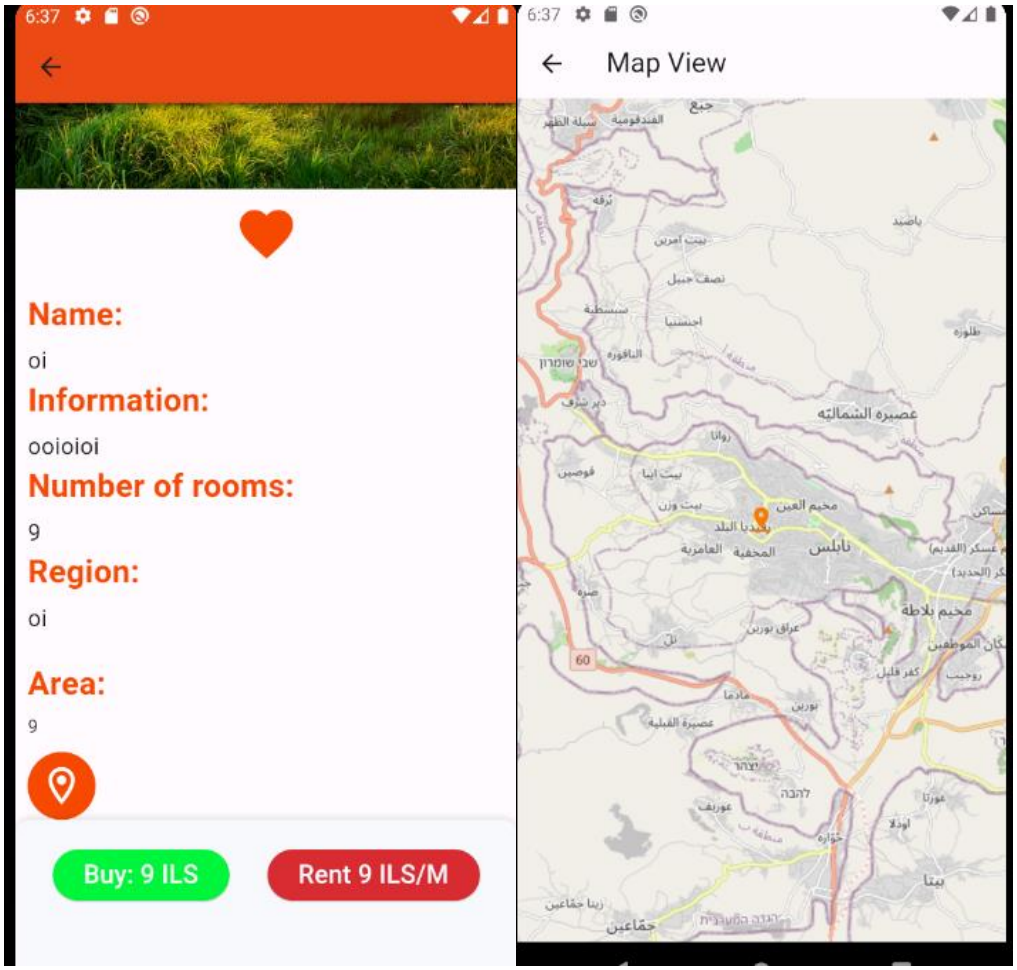


- **House View Property: this screen will display the house the user choose to view it will provide image gallery for the house and information about the house and location view to open map to see its location, options for buying or renting depending on house selling state value, pop up for booking when pressed on either of them**

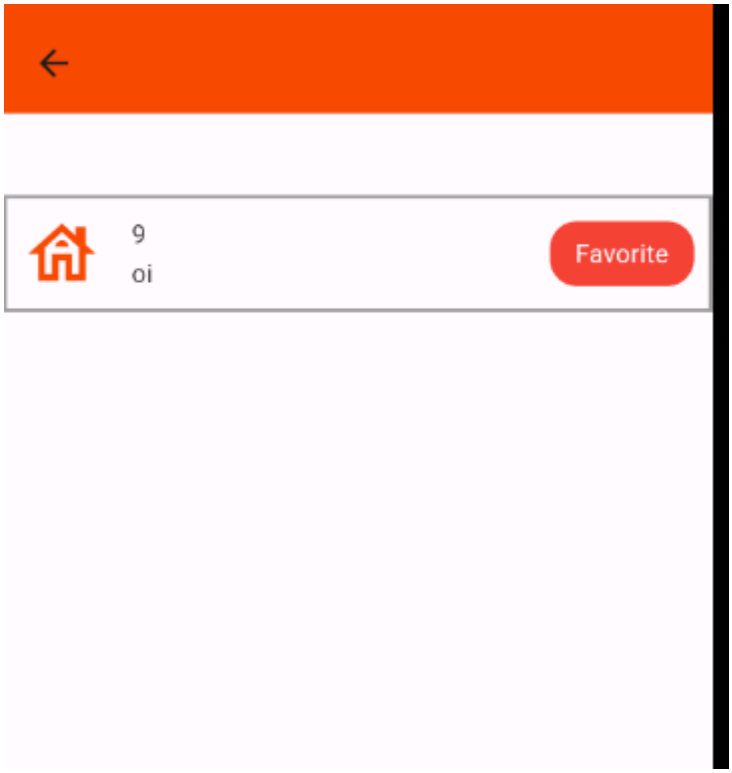


- **Apartment Result Screen: this page will provide the Apartment offered for selling/renting from different sellers**
- **Apartment Search Screen: this screen will provide filtering for apartment depending on user input to be displayed in result screen**
- **Apartment View Property: this screen will display the apartment the user choose to view it will provide same view as house but different properties depending on type of property**
- **Land Result Screen: this page will provide the land offered for selling from different sellers**
- **Land Search Screen: this screen will provide filtering for land depending on user input to be displayed in result screen**
- **Land View Property: this screen will display the land the user choose to view it will provide same view as house but different properties depending on type of property**
- **HotelRooms Result Screen: this page will provide the land offered for renting from different sellers**
- **HotelRooms Search Screen: this screen will provide filtering for HotelRooms depending on user input to be displayed in result screen**

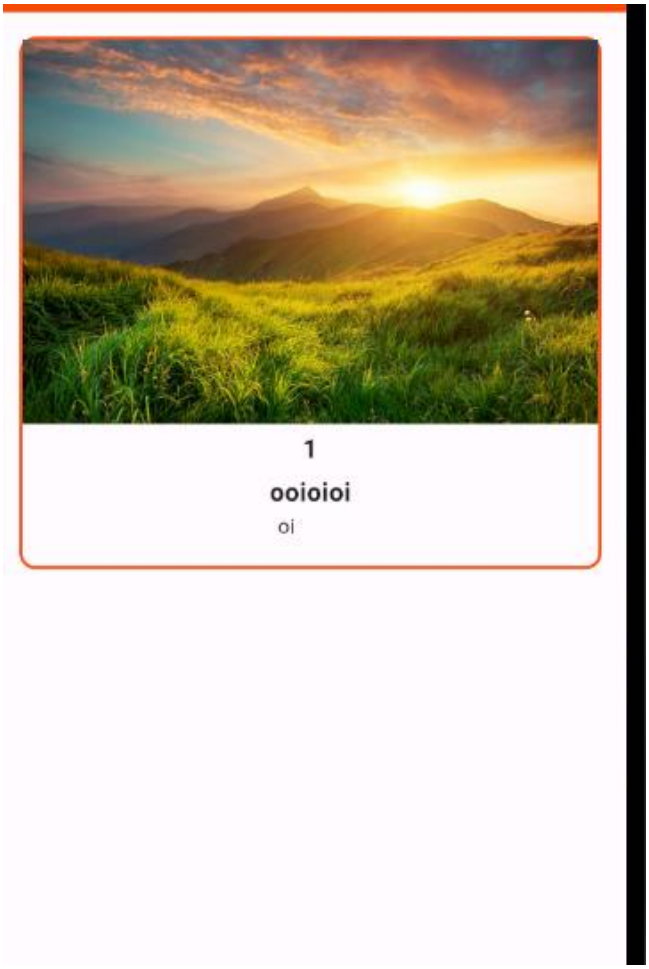
- **HotelRooms View Property: this screen will display the HotelRooms the user choose to view it will provide same view as house but different properties depending on type of property**
- **Map View Property Page: based on property latitude, longtitude user will be able to view location**



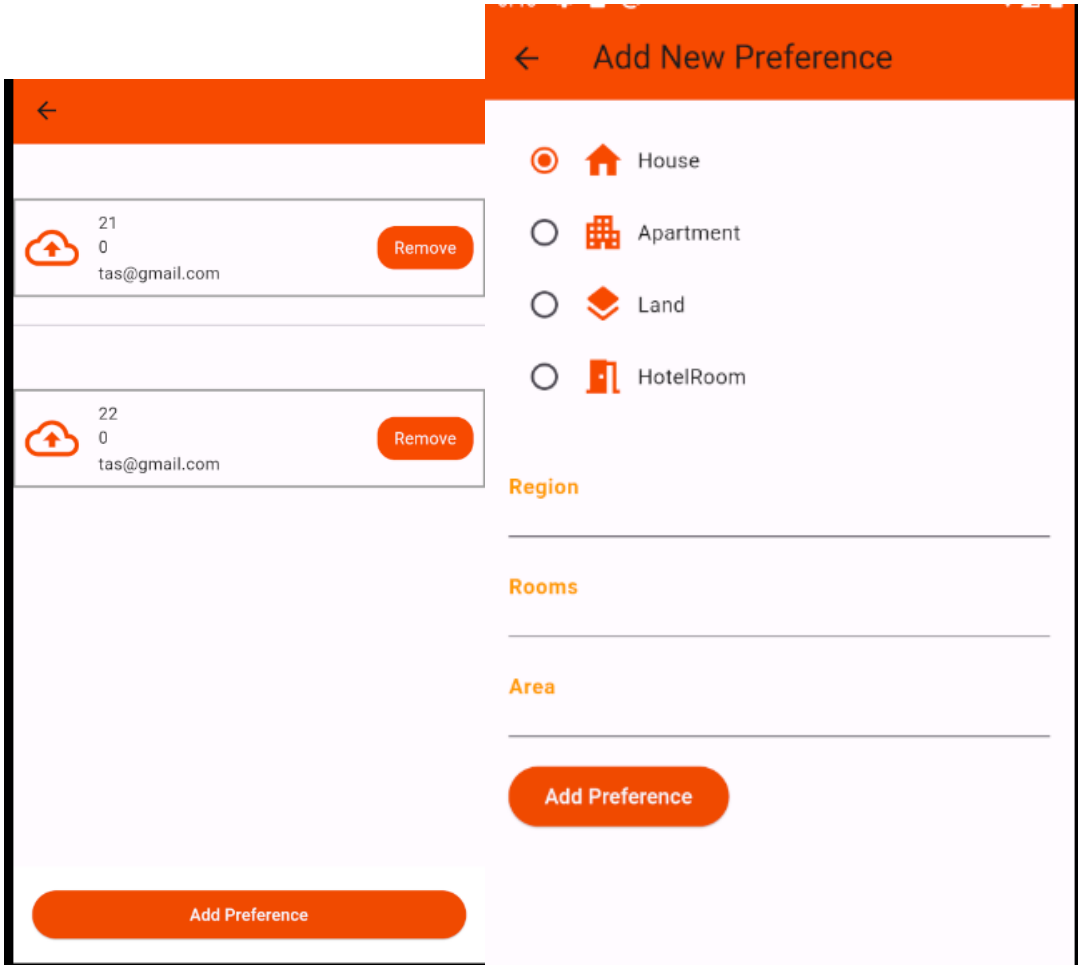
- **Favorite Page: buyers can view favorite properties if they added them from view peoperty, this favorite page will display different types of properties that were selected to be favorites upon pressing on any of them they will display view property page**



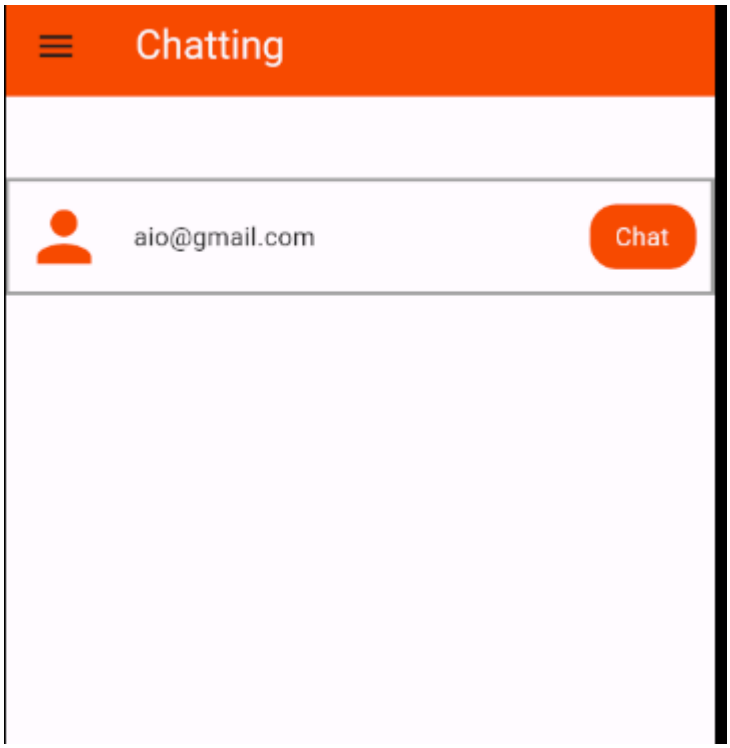
- **Preference Data Page: lets say that the user didn't find any properties that were in his interest and wanted that if any properties in the future matched his interest to be displayed in this page, this page can view different types of properties**



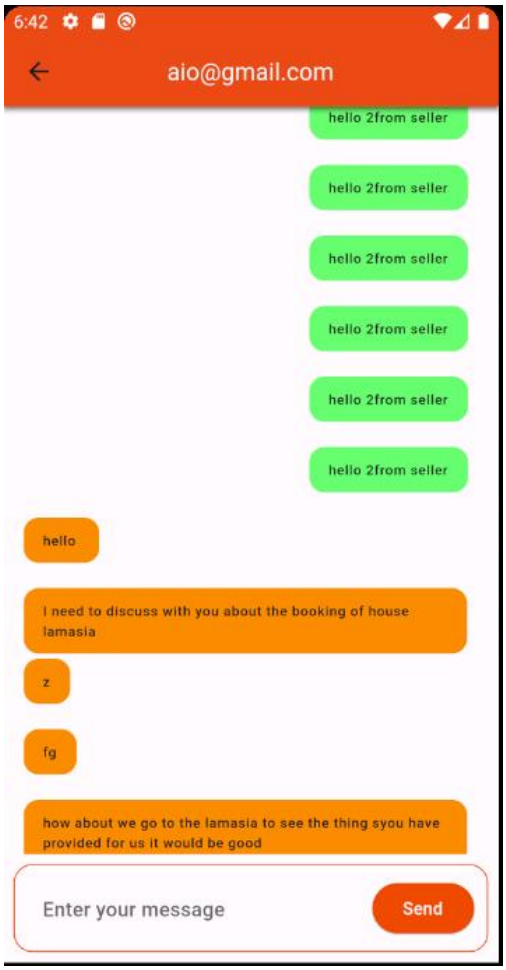
- **Preferences Page: here you can view the preferences that buyer assigned for himself he can have more than one and can remove any**



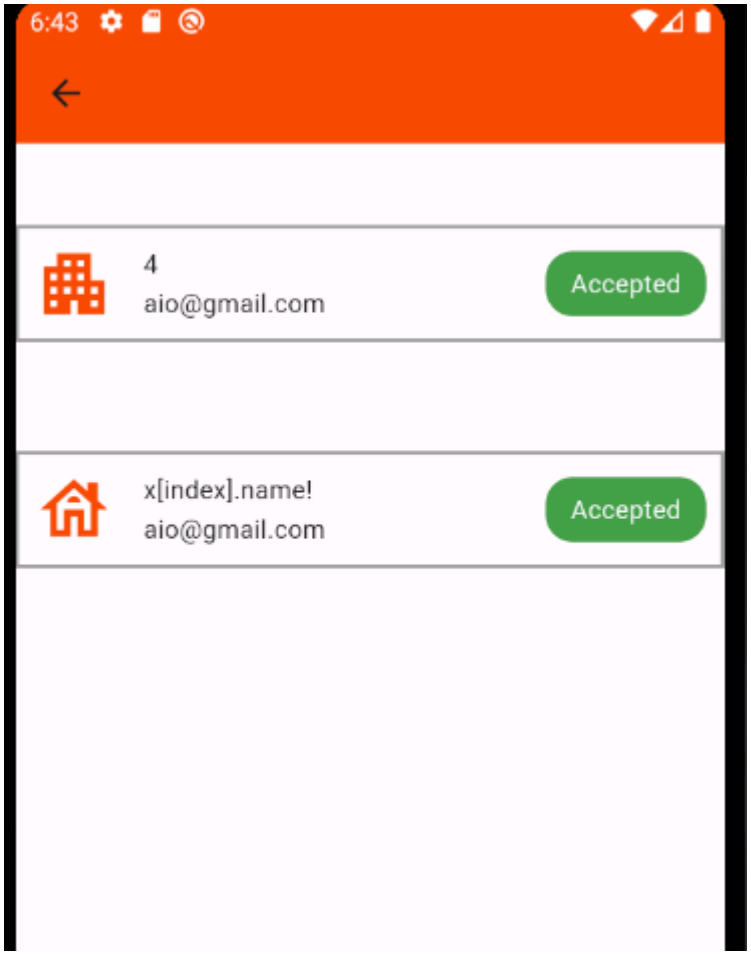
- **Add new preference page: here you can add a preference to your liking so its data can be applied in the future for properties added**
- **Chatting Select page: here you can select to chat with any seller you have previously chatted with or added you can select on his chat to view the chat between you both**



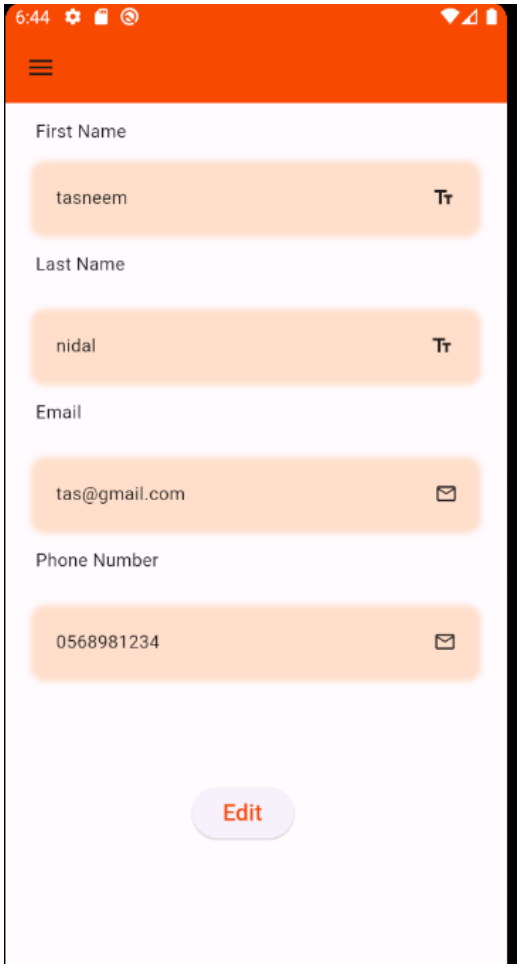
- **Chat Page: when we are inside here the socket io will do its work by connecting you to the server as listener and the widget of the messages is of type future builder which means that whatever you add msg or receive a new one the widget infront of you will be updated, this happens because of (IsSnapShotHasData) once it is true update will happen then it goes back to false**



- **Booking Page: here the buyer can see all request he made to buy or rent a property it has 3 states, pending, accepted , rejected. It will view all types of different properties he has requested to book, and can cancel booking only for the type pending**



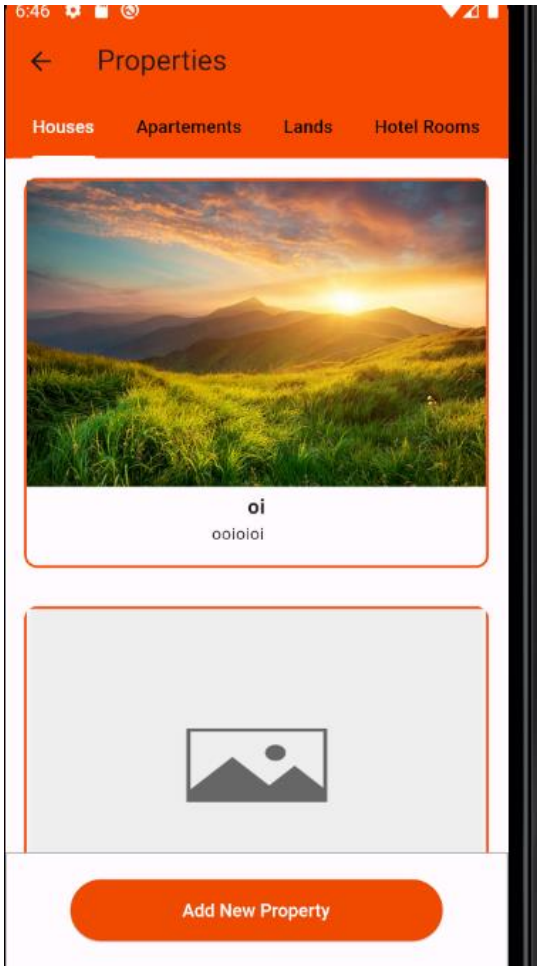
- **Account Information: here the buyer can see his own information and has the right to edit them**



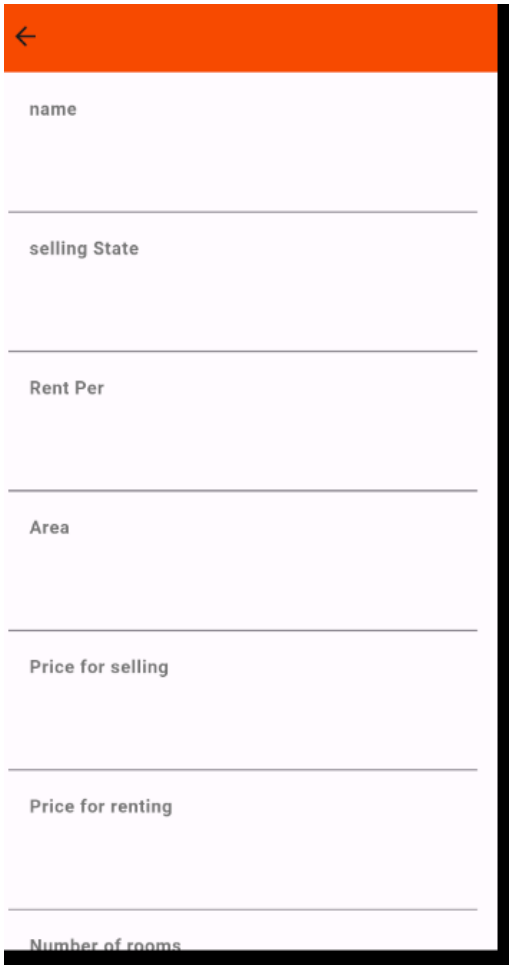
- **Calendar Page: here the buyer can assign any event on day and time and can view them, each event will have value of name & Date and time**

- **Seller Home Page: Seller will have these different pages as shown in figure**

- **Seller Drawer:**
- **Seller Property Pages: seller can add any type of property with the condition that the property id matches his ID as ownership we are supposed to have an API from financial ministry to check that seller own this property. This page will have all different types of properties that the seller own and the option to add any new property for any of them**



- **Seller Property Add: this page will be to add a new property and fill its data:**



Price for renting

Number of rooms

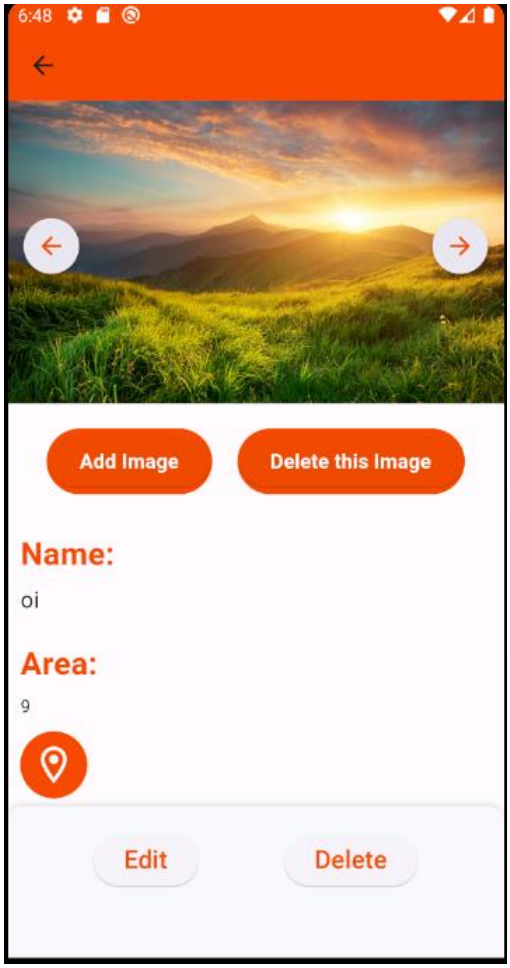
Region

additional Information

Choose location

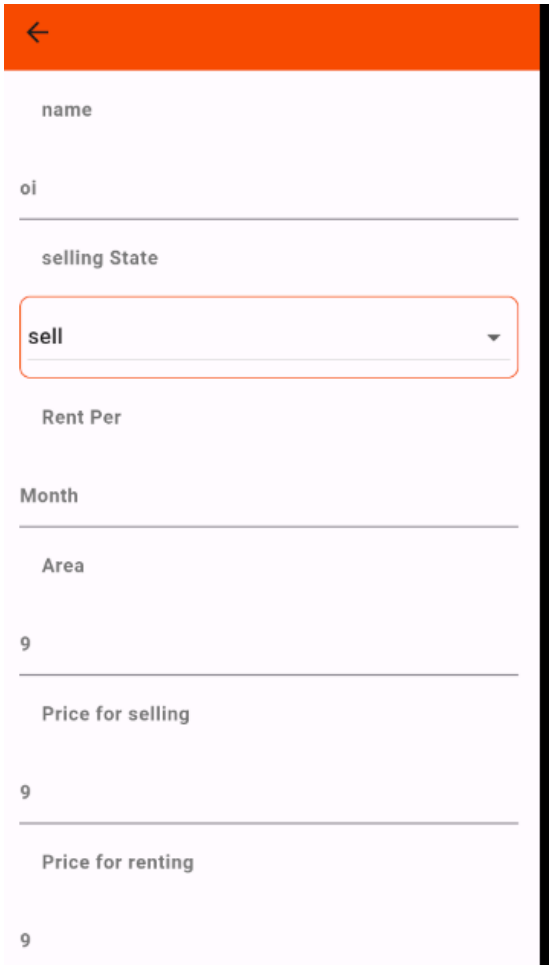
Add House

- **Add property location: here seller will be able to add location to the property he is about to add**
- **Successfully Added:**
- **No Ownership:**
- **Property View: here seller can view his own property and be able to add images to it and delete them**



- **Image Upload Screen: here the image will be selected from the phone gallery and will be viewed on screen once that is done it can be uploaded so that this property has this new image**

- **Edit property here you can edit property data, however but not location because the property is assigned location once its added, however other information can be edited**



- **Seller Information: Seller can view and edit his information that he has a right to same as buyer**
- **Chatting Select Page: Same chatting as buyer however here buyers will be displayed instead of sellers**
- **Chat Page: same as buyer chat page**
- **Booking Page: here the buyer can view all bookings requested for any of the properties he owns and can accept or reject requests, keep in mind that if a property has multiple request and he accepts one all others for the same property will be rejected, once a property is accepted it is no longer available for buyers to request, in other words if buyers search for it, it will not appear because it has been accepted, however it is not deleted from database it is simply not available**

- **Ads: here seller can view all properties that he request an ad for and has been accepted by admin, these ads will be viewed in buyer screen**
- **Admin Pages: admin pages**

Chapter 4

Results and discussion

AQARAT PALESTINE is a cross-platform mobile application and smart system with powerful features that facilitate the process of reservation, looking for the best and suitable choice to own a property.
It also allows sellers to grow their businesses as they can use the internet network to share their properties easily and fast. Moreover, the notification system helps users in managing the process.

Results of this project:
• A cross platform application with services as mentioned before.
• A notification system the keeps the user updated with any new.
• Reservation system that saves a lot of time and efforts because everything is done by a keystroke.
• Management system for sellers which allows them to add photos for their properties, also add the prices of their properties.

Chapter 5
Conclusion and recommendations

5.1 Conclusion

We gained many skills and abilities while developing this application:

- Dealing with several Flutter packages and Dart language.
- Implementing back-end by Node Js.
- Implementing notification system using firebase.

5.2 Recommendations

Using Flutter language in developing and building cross-platforms applications, because it is easy and full of packages that helps in developing.

5.3 Future work

Because of shortage of time our application misses some features, but we don't want to stop there. There are a lot of features that we want to enhance, and some that we want to add to our website. We will add a recommendation system using AI. For chat system: We want to enhance it to include voice messages, pictures, video clips, as well as the ability to create groups.

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